

T. LARSSON.

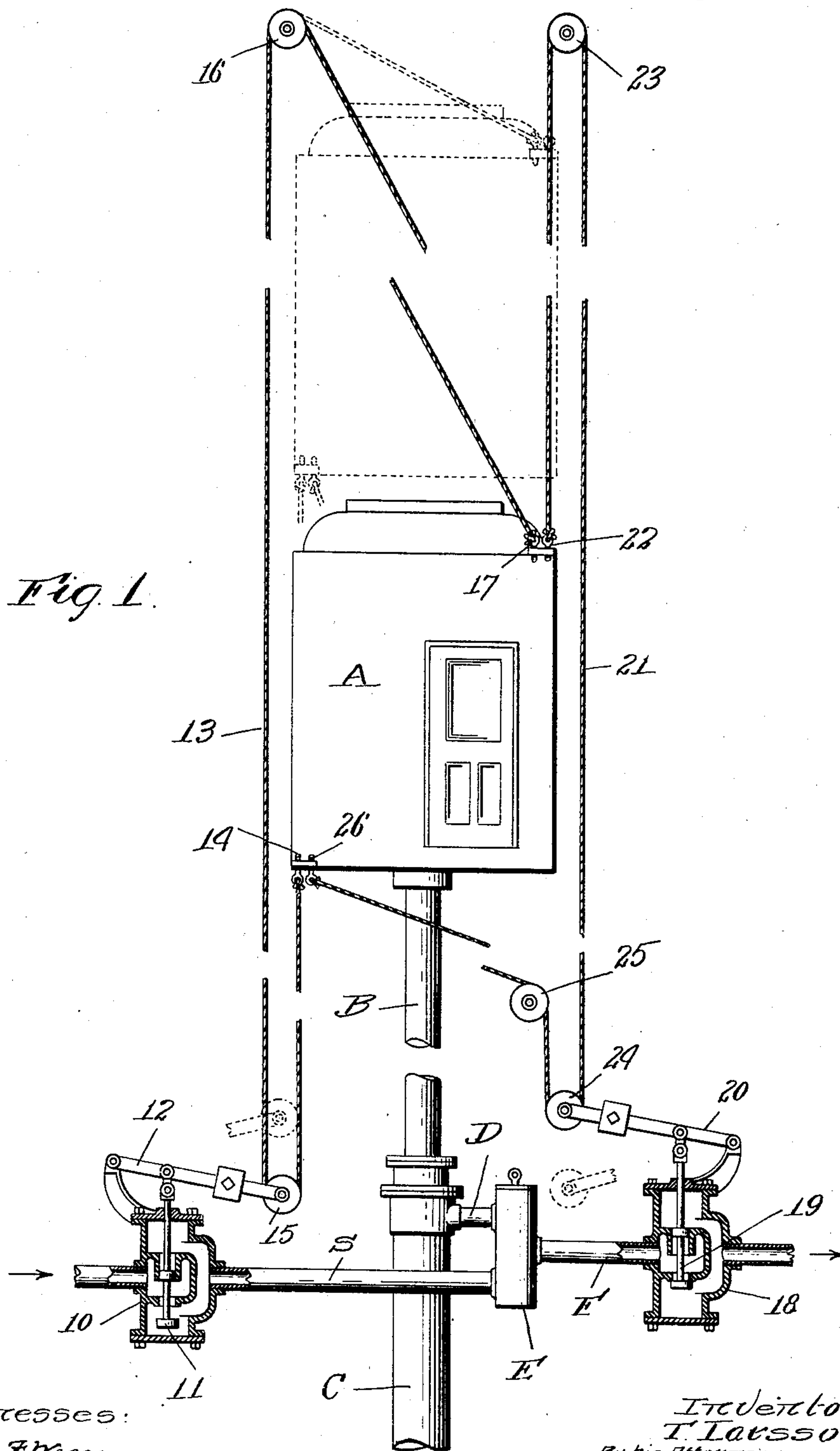
AUTOMATIC STOPPING CONNECTION FOR HYDRAULIC ELEVATORS.

APPLICATION FILED JULY 5, 1904. RENEWED NOV. 14, 1908.

924,798.

Patented June 15, 1909.

2 SHEETS—SHEET 1.



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Inventor:
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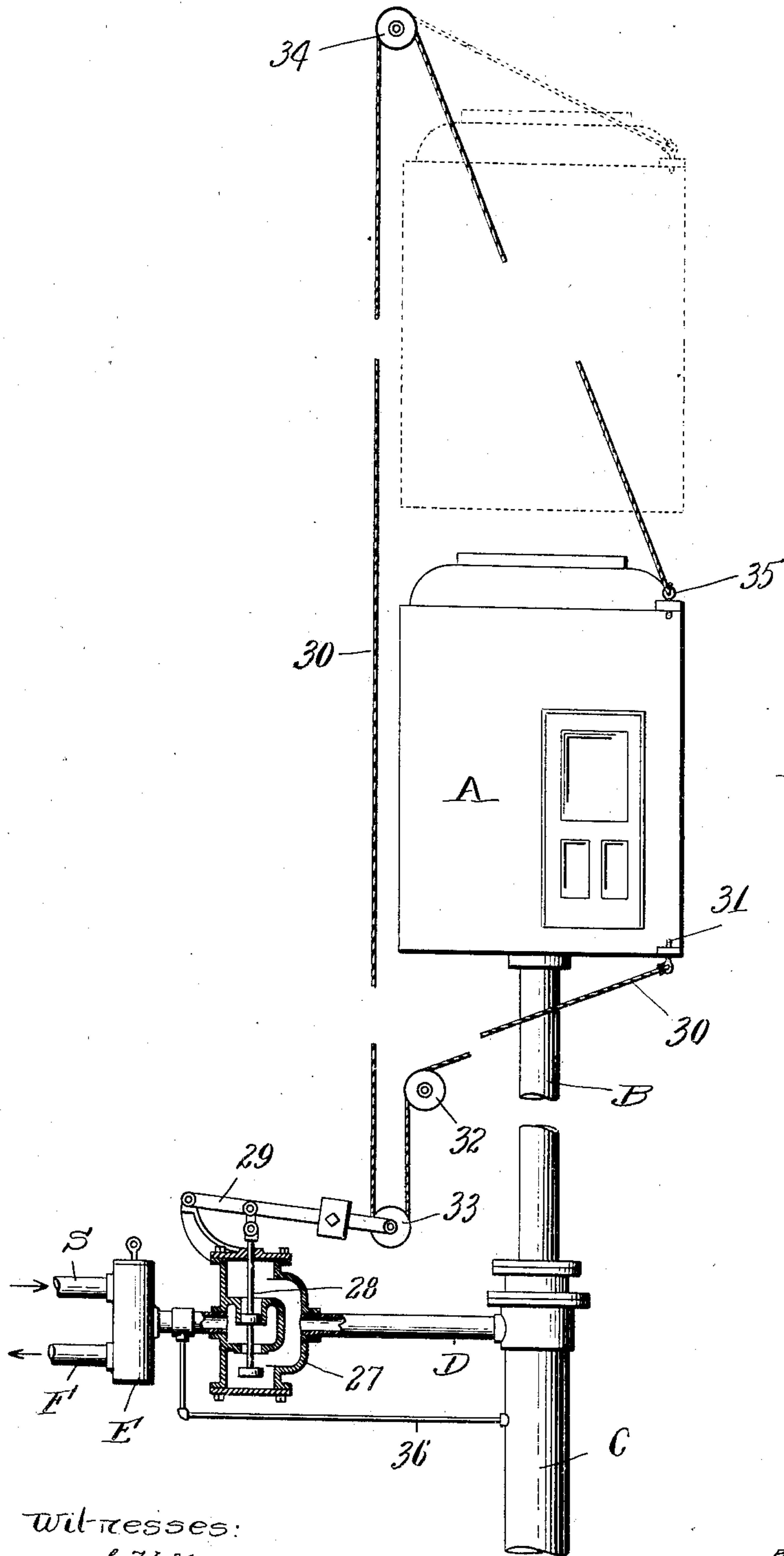


Fig. 2.

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UNITED STATES PATENT OFFICE.

THURE LARSSON, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO HIMSELF, FRED A. JONES, OF WORCESTER, MASSACHUSETTS, AND WILLIAM E. D. STOKES, OF NEW YORK, N. Y.

AUTOMATIC STOPPING CONNECTION FOR HYDRAULIC ELEVATORS.

No. 924,798.

Specification of Letters Patent.

Patented June 15, 1909.

Application filed July 5, 1904, Serial No. 215,266. Renewed November 14, 1908. Serial No. 462,619.

To all whom it may concern:

Be it known that I, THURE LARSSON, a subject of the King of Sweden, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented new and useful Automatic Stopping Connections for Hydraulic Elevators, of which the following is a specification.

This invention relates to an elevator stopping device which has been designed for slowing down and gradually bringing an elevator car to rest at the ends of its run.

The especial object of this invention is to provide a safety stopping apparatus for elevator cars, which is controlled by one or more running controlling ropes connected at their ends to the elevator car, or other moving part, and which run on pulleys or sheaves when the car is in motion.

To this end, this invention consists of a safety stopping apparatus for elevators and of the combinations of parts therewith as hereinafter described and more particularly pointed out in the claims at the end of this specification.

In the accompanying two sheets of drawings, Figure 1 is a front view partially broken away of a hydraulic elevator combined with a safety stopping apparatus constructed according to my invention, and Fig. 2 is a similar view of a modified form of construction.

One essential requisite in order to insure the safe operation of elevators is the provision of some reliable means for bringing the elevator car to rest at the ends of its run. In connection with freight elevators or other comparatively slow moving cars the requirements for automatically stopping the car at the ends of its run are fairly well fulfilled by providing stops or abutments upon the controlling ropes with which the car is brought into contact as it approaches the end of its travel. In the use of high speed long-run elevators, however, stopping connections which are directly engaged and actuated by the elevator cars cannot be used to advantage, as it is essential to provide for the gradual checking of the speed of the elevator cars, while at the same time the car must be accurately brought to rest at the same point in its travel no matter at what speed the same is moving.

To automatically control and stop a high speed elevator car at the ends of its run, the

stopping connections should come into operation very gradually, so as to commence to slow down the speed of the car sometime before the car reaches the end of the run, and the operation of said stopping devices should become more and more positive until the elevator motor is completely stopped when the car reaches the desired point. I have provided an elevator stopping apparatus which enables me to secure this operation by a simple and direct arrangement of running controlling ropes, so that I secure a reliable automatic control of an elevator car, this result being obtained without relying upon the engagement of the elevator car with any fixed stops, cams, ropes, or other devices which have heretofore been relied upon to secure the stopping action.

Referring to the accompanying drawing for a detail description of an apparatus embodying my invention, I have illustrated my construction combined with a direct plunger hydraulic elevator. A hydraulic elevator of this class, as illustrated in Fig. 1, comprises an elevator car A, its plunger B, and cylinder C. Opening into the upper end of the cylinder C is a to-and-from pipe D having a controlling valve E which connects the to-and-from pipe D either with the supply pipe S or the outlet pipe F. The controlling valve E is designed to be operated from the elevator car by any of the ordinary forms of controlling ropes, or other connections which are not herein shown or described.

The parts thus far referred to correspond with parts ordinarily employed in all direct acting plunger elevator plants. the elevator motor of such a plant comprises the cylinder and the plunger which moves up and down therein.

To stop the elevator car at the ends of its run, as illustrated in Fig. 1, I employ two shut-off valves located in the supply pipe and the outlet pipe respectively. The shut-off valve located in the supply pipe comprises a valve-casing 10, and a valve-stem 11 which is connected to an operating lever 12. Two pistons are preferably employed on the valve-stem 11 in order that the shut-off valve may be balanced so far as the water pressure is concerned. To operate the shut-off valve in the supply pipe S I employ a running controlling rope 13 which has one end secured to an eye-bolt 14 in the bottom of the elevator-car which rope passes under a pul-

ley 15 on the lever 12, up over a pulley 16 at the upper end of the elevator well, and thence to an eye-bolt or point of attachment 17 at the opposite side of the elevator car from the pulleys 15 and 16, around which the rope passes. That is to say, the operative end of the running controlling rope is connected to the elevator car or other moving part with a point of attachment which is out of line with the pulleys 15 and 16. The shut-off valve in the outlet pipe F may be of the same construction as the valve of the supply pipe. As illustrated, it comprises the valve-casing 18 and the valve-stem 19 connected at its upper end to the operating lever 20. The shut-off valve in the outlet pipe F is operated by a running controlling rope 21, which is connected to an eye-bolt 22 in the upper part of the car, passes up over a pulley 23, under a pulley 24 on the controlling lever 20, over a pulley 25, and thence to an eye-bolt or point of attachment 26 at the opposite side of the elevator car from the pulleys 23 and 24. In the operation of a hydraulic elevator as thus equipped, when the elevator car is near the lower end of its run, as illustrated in Fig. 1, the shut-off valve in the inlet pipe S will be opened and the shut-off valve in the outlet pipe F will be closed. When the elevator car goes up, the running controlling ropes will move with the car, and as the operative end of the running controlling rope 21 moves away from the pulley 25 the rope will be slackened, permitting the shut-off valve in the outlet pipe F to be opened, so that when the elevator car is near the middle of its run, both the shut-off valves will be opened. As the elevator car approaches the upper end of its run, and as the operative end of the running controlling rope 13 approaches the pulley 16, the running controlling rope 13 will begin to be taken up, so that when the car reaches position shown by dotted lines, the shut-off valve in the inlet pipe will be closed.

In the operation of this automatic stopping device for a hydraulic elevator, it will be seen that the stopping action commences very gradually, and as the operating end of either one of the controlling ropes is brought nearer to the pulley to which the rope runs, the rope will be taken up more and more rapidly, until the controlling levers of the stop valves will be moved to shut down the flow of water through the corresponding stop valve with such accuracy and positiveness of movement as to insure the car being brought to rest without jar, and at the same point in its travel, no matter with what speed the car may have been running.

In some cases, instead of employing two running controlling ropes, and a separate stop valve for the inlet and outlet pipes, I may employ a shut-off valve in the to-and-

from pipe, and control the same by a single running controlling rope. A construction of this character is illustrated in the second sheet of drawings, in which the elevator car A, the piston B, cylinder C, and controlling valve E correspond with parts designated by the same letters in Sheet 1. Located in the to-and-from pipe D is a shut-off valve comprising, as in the construction before described, a valve-casing 27 and valve-stem 28 connected to a weighted operating lever 29. The running controlling rope 30 for operating the shut-off valve is connected at one end to an eye-bolt 31 at the farther side of the elevator car, passes down around a pulley 32, around a pulley 33 on the operating lever 29, up over a pulley 34 at the upper end of the elevator well, and thence to an eye-bolt or point of attachment 35 also at the opposite side of the elevator car. In this construction the running controlling rope is taken up by both of its ends. That is to say, when the end 35 is carried up near to the pulley 34 at the upper end of the run, the shut-off valve will be closed, as well as when the elevator car approaches the bottom of its run. In a construction, however, where the shut-off valve is located in the to-and-from pipe, the action of the shut-off valve would prevent the operation of the controlling valve E from starting the elevator in the opposite direction after it had been brought to rest provided some means are not devised for permitting the elevator to be started slowly in the desired direction. I accomplish this by providing a small by-pass or pipe 36 connecting the controlling valve E with the cylinder. This by-pass will permit sufficient water to be admitted or exhausted from the cylinder to start the elevator car in the desired direction by the manipulation of the controlling valve. In this construction, however, the car could only be started away from the end of its run comparatively slowly, and the operation of the shut-off device will only slow down the car, and would not bring the same to absolute rest without a further manipulation of the controlling valve E to stop the flow of water through the by-pass 36. For these reasons, I prefer to employ shut-off valves in both the supply pipe and the exhaust pipe, and to control the same by two separate running controlling ropes.

I am aware that other changes may be made in practicing my invention by those who are skilled in the art without departing from the scope thereof as expressed in the claims. I do not wish, therefore, to be limited to the constructions I have herein shown and described, but

What I do claim and desire to secure by Letters Patent of the United States is:—

1. In combination with an elevator-car and a stop mechanism therefor, of a rope

connected to run with the elevator-car and stationary means for causing a deflection of said rope to actuate said stop mechanism.

2. In combination with an elevator-car and a stop mechanism therefor, of a rope connected to run with the elevator-car and stationary means unattached to the rope for causing a gradual deflection of said rope to gradually actuate said stop mechanism.

3. In combination with an elevator-car and a stop mechanism therefor, of means for actuating said stop mechanism, a pair of running ropes for actuating said means, and means for causing a deflection of one or the other of said ropes as the car approaches the end of its run.

4. In combination with an elevator-car and a stop mechanism therefor, of means for actuating said stop mechanism, a pair of ropes connected to run with the elevator-car for actuating said means, and means for causing a deflection of one or the other of said ropes as the car approaches the end of its run.

5. In combination with an elevator-car and a stop mechanism therefor, of a pair of ropes connected to travel with the car and means for causing a deflection of each of said ropes to actuate said stop mechanism.

6. In a construction of the class described, the combination of an elevator motor, a part moved thereby, means for stopping the motor, and a running controlling rope passing over pulleys at the top and bottom of the elevator well, and having its end connected to the moving part with a point of attachment therewith out of line with said top and bottom pulleys.

7. In a construction of the class described, the combination of an elevator car, a cylinder, a plunger movable therein to operate the car, a controlling valve, a shut-off valve, and a running controlling rope operating the shut-off valve and passing over pulleys at the top and bottom of the elevator well, and having its end connected to the car with its point of attachment therewith out of line with said top and bottom pulleys.

8. In an apparatus of the class described, the combination of an elevator car, a cylinder, a piston movable in the cylinder and operating the car, supply and exhaust pipes for the cylinder, shut-off valves located in said supply and exhaust pipes respectively, and a running controlling rope operating each of said shut-off valves.

9. In an apparatus of the class described, the combination of an elevator car, a cylinder, a plunger movable therein to operate the car, supply and exhaust pipes for the cylinder, shut-off valves located in the supply and exhaust pipes respectively, a running controlling rope for each of said valves passing over pulleys at the top and bottom of the elevator well, one end of each of said controlling ropes being connected with the elevator car with a point of attachment out of line with said pulleys.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

THURE LARSSON.

Witnesses:

LOUIS W. SOUTHGATE,
ANGIE M. GODDARD.