(No Model.)

F. E. HERDMAN.

ELEVATOR.

No. 560,209. Patented May 19, 1896.

Fig. 2.

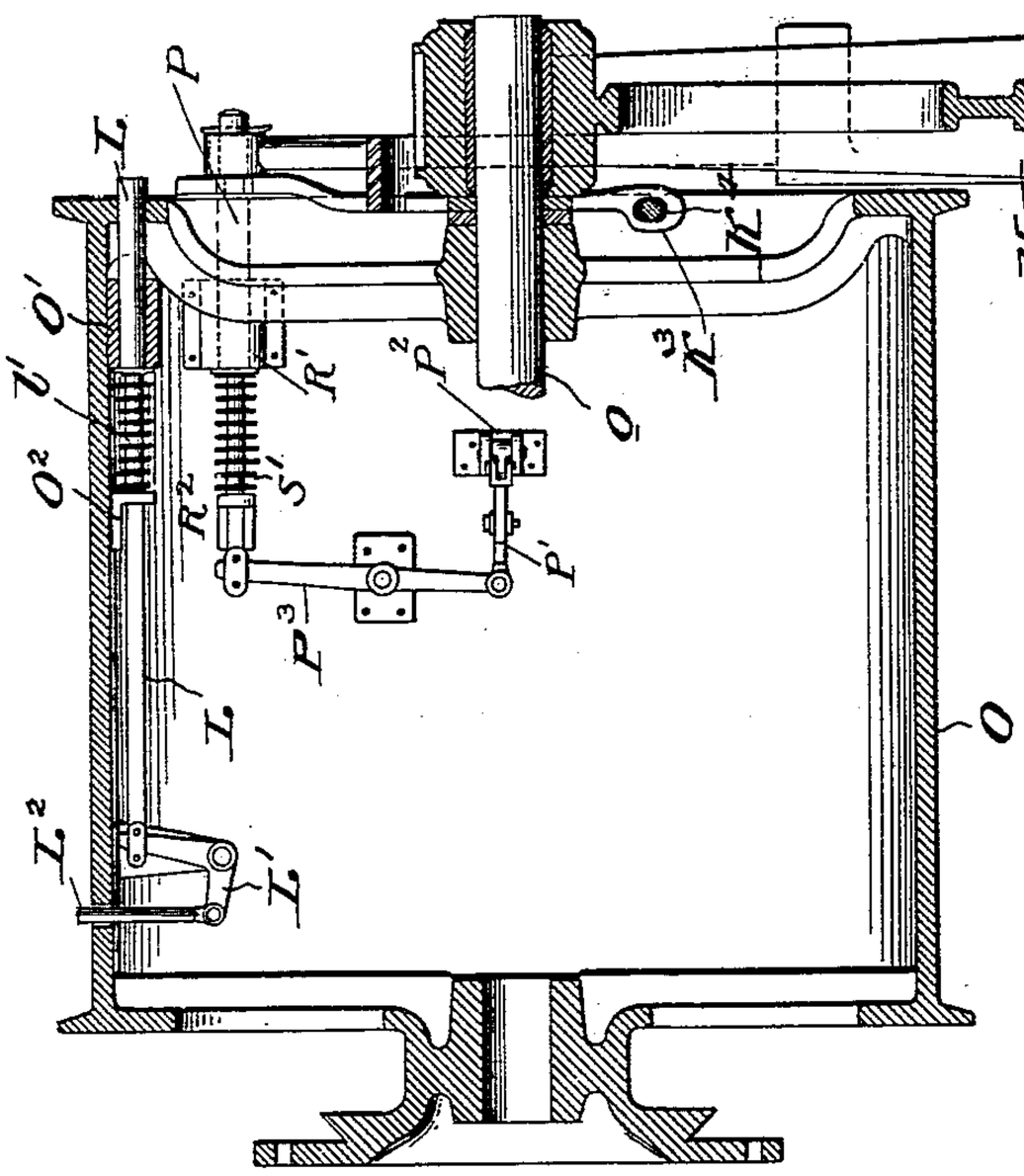
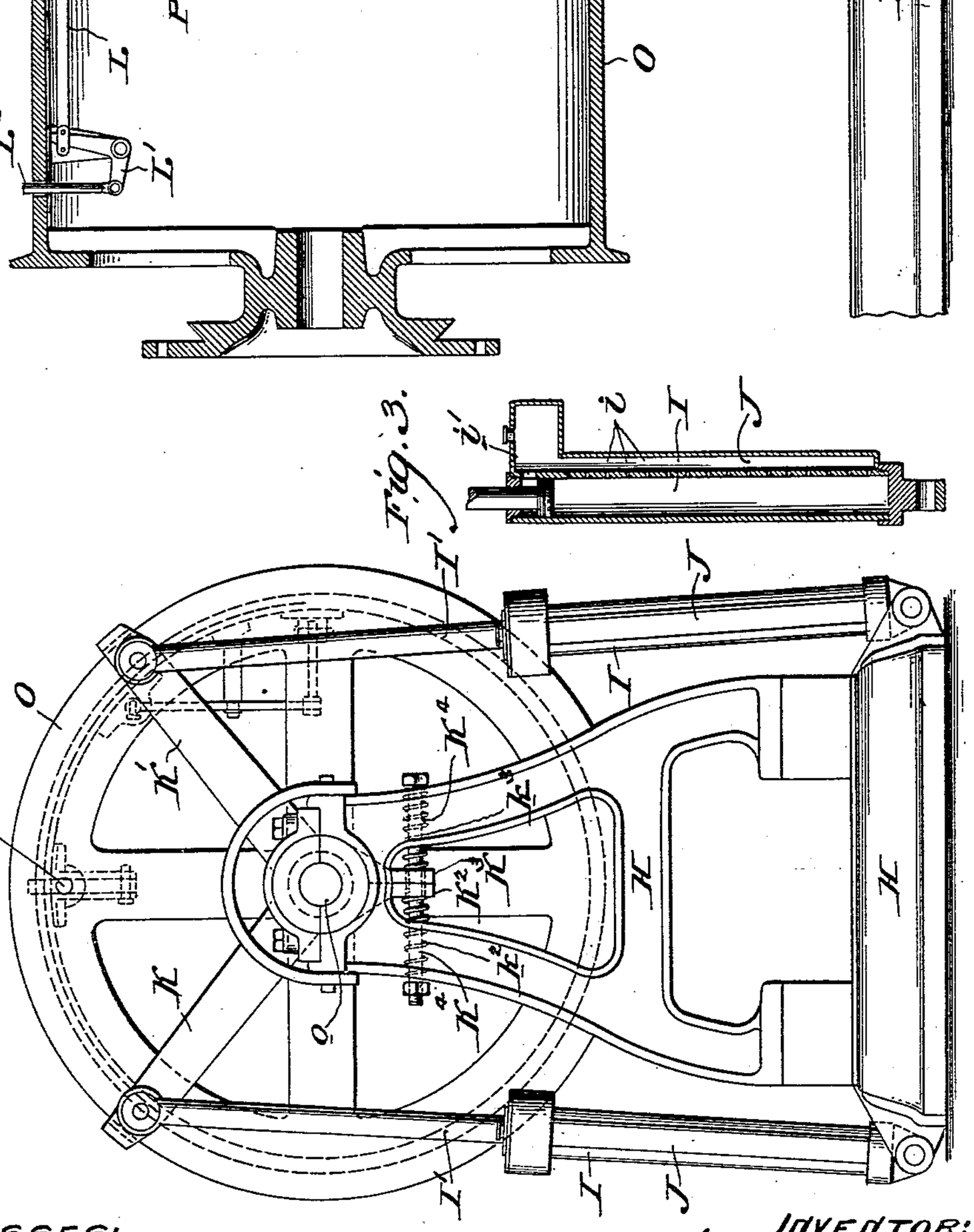


Fig. 3.

Fig. 1.



WITNESSES:

David S. Williamson

Frank S. Busser

INVENTOR:

Frank E. Herdman

by his atty

G. F. Harding

UNITED STATES PATENT OFFICE.

FRANK E. HERDMAN, OF INDIANAPOLIS, INDIANA.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 560,209, dated May 19, 1896.

Application filed June 21, 1893. Serial No. 478,353. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. HERDMAN, a citizen of the United States, residing at Indianapolis, county of Marion, and State of Indiana, have invented a new and useful Improvement in Elevators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention has for its object the automatic stopping of an elevator at the end of its travel, either up or down, and is particularly applicable to elevators operated by a winding-drum and ordinarily stopped by means of a friction-brake. The objection to the ordinary friction-brake is that by reason of its giving a certain definite amount of resistance to the further travel of the elevator the power cannot be proportioned to the speed of the elevator nor to the load in the car. The consequence is that if the load is heavy or the speed great the car will travel a much greater distance than it would were the load light or the car traveling slowly. Hence to prevent the possibility of the car striking considerable leeway must be given to it—that is, the friction-brake must be applied too long before the elevator reaches the end of its travel. My invention is designed to obviate this objection to the friction-brake by using mechanism in connection with the winding-drum whereby the car will be automatically stopped with certainty just before it reaches its extreme limit of movement independently of the friction-brake and without regard to the load in the car or the speed of its movement.

I will now describe the mechanism which I prefer to use to carry out my invention. I do not illustrate the elevator-car, the power for revolving the drum-shaft, the stopping, starting, and reversing mechanism under the control of the operator in the car, nor the connections between them and the drum-shaft, as these embody many different constructions well known to those familiar with elevator construction and form no part of my invention.

In the drawings, Figure 1 is a front elevation of the winding-drum and mechanism connected therewith embodying my invention. Fig. 2 is a side elevation of a portion of the same, partially in section. Fig. 3 is a sectional view of one of the cylinders.

H is the bed-plate and frame of the machine.

O is the drum; *o*, the drum-shaft.

To opposite sides of the bed-plate are pivoted the cylinders I, which are adapted to swing from side to side on their pivotal bearings. The chambers J are attached to the sides of the cylinder I. At the upper end of each cylinder is the large port i', and between the chamber and cylinder are the small communicating holes i. On the drum-shaft are the arms K and K′, having the lower projections, respectively, K^2 and K^3. To each arm is attached a plunger I′, moving in one of the cylinders I. Through the projections K^2 and K^3 passes the rod K^4, fastened to the framework, and around this rod are the coiled springs k^2 and k^3, bearing, respectively, against the projections K^2 and K^3 and normally of sufficient strength to hold the arms K and K′ in their extreme upward position. Through the flange of the drum passes the rod or projection L. Between the brackets O′ and bearing O^2 and attached to the rod at the flanged portion and upon the rod is the spring l', which, when left free to act, forces out the rod, so that its outer extremity will be in the line of movement of the arms K and K′. To a bracket on the inner periphery of the drum is pivoted the bell-crank L′, one end of which passes through a slot on the end of rod L, while the other end is secured to a bolt L^2, which, when the rod L is moved to the right, (see Fig. 2,) extends through and beyond and forms a projection on the face of the drum. Through the flange of the drum passes the rod or projection P. Between the brackets R′ and bearing R^2 and attached to the rod at the flanged portion and upon the rod is the spring S′, which, when left free to act, forces out the rod, so that its outer extremity will be in the line of movement of the arms K and K′. To a bracket on the inner periphery of the drum is pivoted the bell-crank P′, one end of which connects by a lever P^3 with the end of rod P, while the other end is secured to a bolt P^2, which, when the rod P is moved to the right, (see Fig. 2,) extends through and beyond and forms a projection on the face of the drum.

In an elevator operated by a winding-drum,

as is well known, the lifting-cables are attached to one end of the drum, while the counterbalance-cables are attached to the other end of the drum, and as one set of cables unwind the other set are being wound. When the cables fastened to the left end of the drum are wound about the drum, the bolt L^2 is depressed, which in turn draws the rod L from right to left, so that the end to the right will be substantially flush with the flange of the drum. If the drum is revolved to unwind this cable, the portion of the cable which passes over and holds down the bolt L^2 will not be unwound until the elevator nearly reaches its limit of travel. When this does occur, the spring *l'* will force the rod L to the right, and this rod, as the drum revolves, will be brought in contact with the arm K' (see Fig. 1) and force said arm to the right and through it the plunger to which it is attached down into its cylinder I. When the cables fastened to the right end of the drum are wound about the drum, the bolt P^2 is depressed, which in turn draws the rod P from right to left, so that the end to the right will be substantially flush with the flange of the drum. If the elevator is revolved to unwind this cable, the portion of the cable which passes over and holds down the bolt P^2 will not be unwound until the lever nearly reaches its limit of travel. When this does occur, the spring S' will force the rod P to the right, and this rod, as the drum revolves, will be brought in contact with the arm K (see Fig. 1) and force said arm to the left and through it the plunger to which it is attached down into its cylinder I. It will be observed that the same mechanism is used at both ends of the drum for effecting the automatic operation of the plunger, one device being operated by the winding and unwinding of the lifting-cables, the other device being operated by the winding and unwinding of the counterbalance-cables. When the car is near the bottom, the lifting-cables being unwound, the device controlled by this set of cables would act as a stop, while when the car is at the top the device controlled by the counterbalance-cables would act as a stop.

When the plunger is depressed, as before described, the fluid in the cylinder I is forced through the holes *i* into the chamber J and returns into the cylinder through the port *i'*. As the plunger moves downward, one hole after another is cut off, and as the outlets for the contained fluid are gradually diminished its resistance to the descent of the plunger is correspondingly increased, the rate of travel of the plunger is gradually diminished, and when or before the plunger has reached its limit of movement it is stopped, thus stopping the elevator.

The return movement of the plunger is accomplished by means of the spring k^2, the port *i'* at the top of the cylinder affording a large outlet for the passage of the fluid. Other means might be employed for locking the arms K and K'. Said arms might also be connected with controlling mechanism in the car, in order to enable the car to be brought to rest when in any position, whether intermediate or at an extreme end of the travel of the car.

The buffer-cylinder may be constructed without an outside cylinder or communicating holes, and other means adapted for gradually increasing the resistance of the fluid to the movement of the piston, and I do not restrict myself to the particular mechanism herein described and shown for accomplishing this.

For the fluid-containing-cylinder buffer may be substituted any of the well-known types of spring-buffers, and I do not restrict myself, except where I particularly claim it, to a fluid-containing-cylinder buffer. This latter form of buffer is, however, preferable, its results in practice being decidedly more satisfactory.

In an application, serially numbered 478,352, whose filing date is the date of this application, I have described and illustrated a winding-drum, a buffer-cylinder, a piston working therein, connection between the piston and drum for operating the piston at predetermined points in the revolution of the drum, and means for returning the piston to its normal position, in its main features substantially similar to and designed to effect the same purpose as the corresponding mechanism herein shown and described. I do not therefore claim the above combination of mechanism, broadly; but

What I do claim, and desire to protect by Letters Patent, is—

1. In an elevator operated by a winding-drum, the combination with the drum of a cylinder adapted to contain a fluid, a piston in said cylinder, a passage from one side to the other of the piston-head, an arm one end connected with said piston, a bolt extending through the winding face and in contact with the cable when the latter is wound, a rod extending through the end of the drum, a bell-crank one end pivoted to said bolt, and the other end resting in a slot in said rod and a spring upon said rod.

2. In a buffer, in combination, a cylinder adapted to contain a fluid, piston in said cylinder, a chamber secured thereto, along the side of said cylinder connected with said cylinder along the division-wall between the cylinder and chamber by a number of small holes and at one end by a large hole.

3. In an elevator operated by a winding-drum, the combination with the drum of a buffer, a bolt projecting from the face of the drum, a rod, an arm connected to said buffer and in the path of travel of said rod and connection between the rod and bolt whereby the winding of the cable over the bolt will move the rod out of line with said arm substantially as described.

4. In an elevator operated by a winding-

drum, the combination with the drum of a buffer, stop mechanism having one end adapted to be engaged by the cable, and a device connected to said buffer and in the path of travel of the other end of said stop mechanism when said stop mechanism is not engaged by the cable, whereby the unwinding and winding of the cable will move said stop mechanism so that said device will be in and out of the path of travel of the end of the stop mechanism.

5. In an elevator operated by a winding-drum, the combination with the drum of buffers, stop mechanism having one end adapted to be engaged by the lifting-cable, a device connected to one of said buffers and in the path of travel of the other end of said stop mechanism when said stop mechanism is not engaged by the lifting-cable, other stop mechanism having one end adapted to be engaged by the counterbalance-cable, a device connected to the other of said buffers and in the path of travel of the last-named stop mechanism when the same is not engaged by the counterbalance-cable, whereby the unwinding and winding of each cable will move its corresponding stop mechanism so that its corresponding device will be in and out of the path of travel of the end of its corresponding stop mechanism.

In testimony of which invention I have hereunto set my hand.

FRANK E. HERDMAN.

Witnesses:

WM. N. DUNNINGTON,

CHAS. A. SUFFRINS.