(No Model.) 3 Sheets—Sheet 1.

H. J. REEDY.

AUTOMATIC STOP VALVE FOR ELEVATORS.

No. 480,278. Patented Aug. 9, 1892.

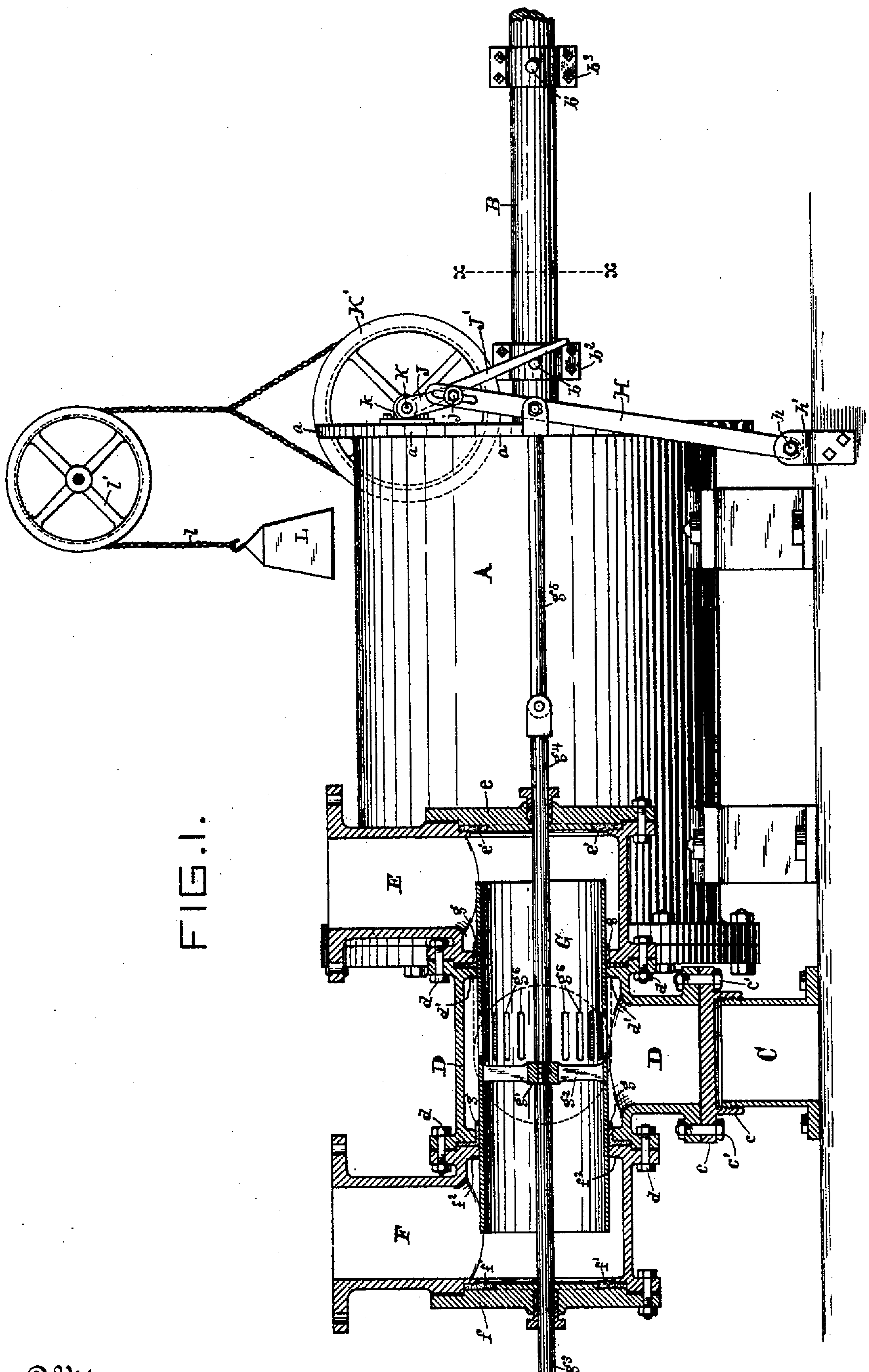

FIG. 1.

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(No Model.) 3 Sheets—Sheet 2.

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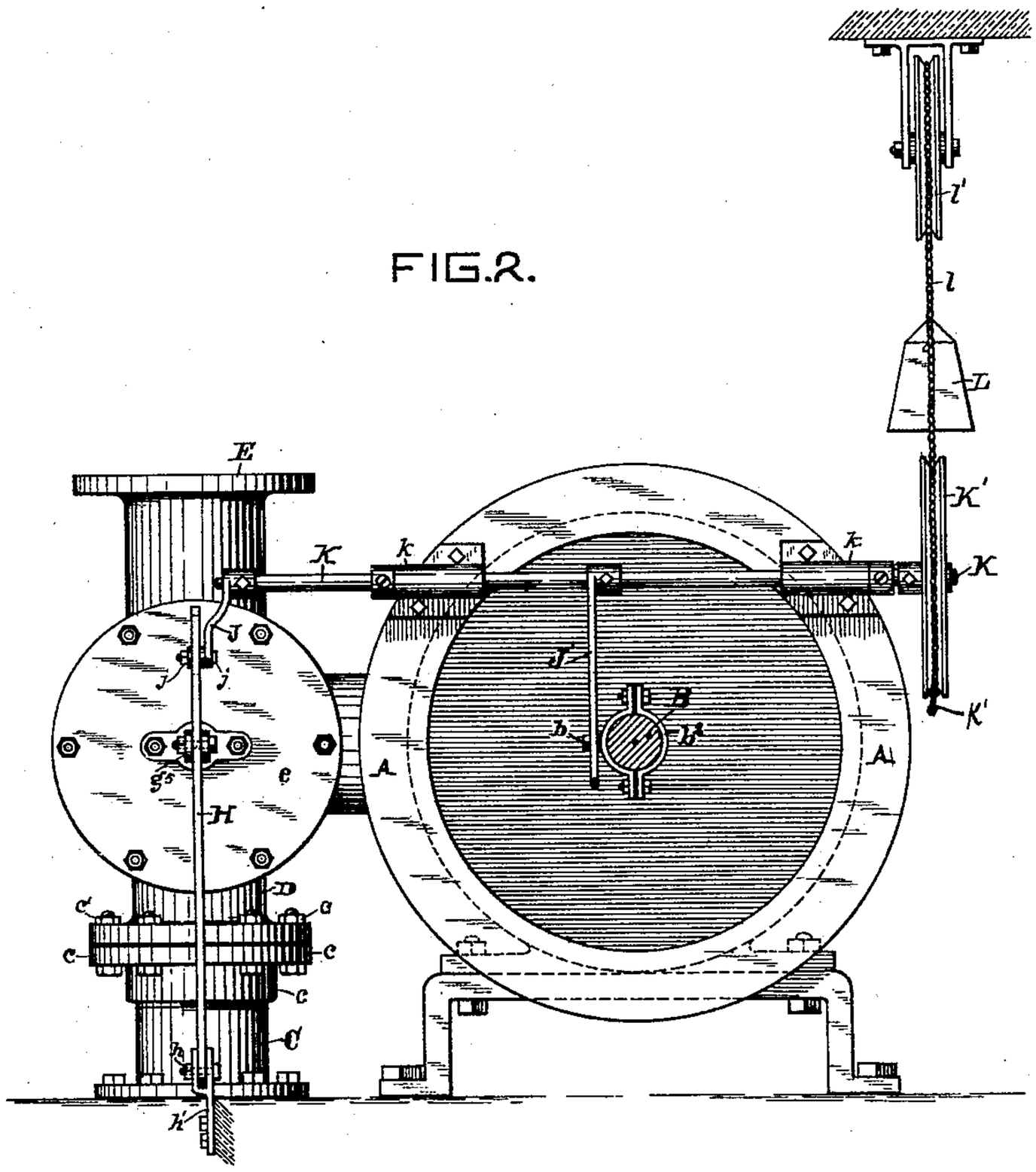
FIG. 2.



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(No Model.) 3 Sheets—Sheet 3.

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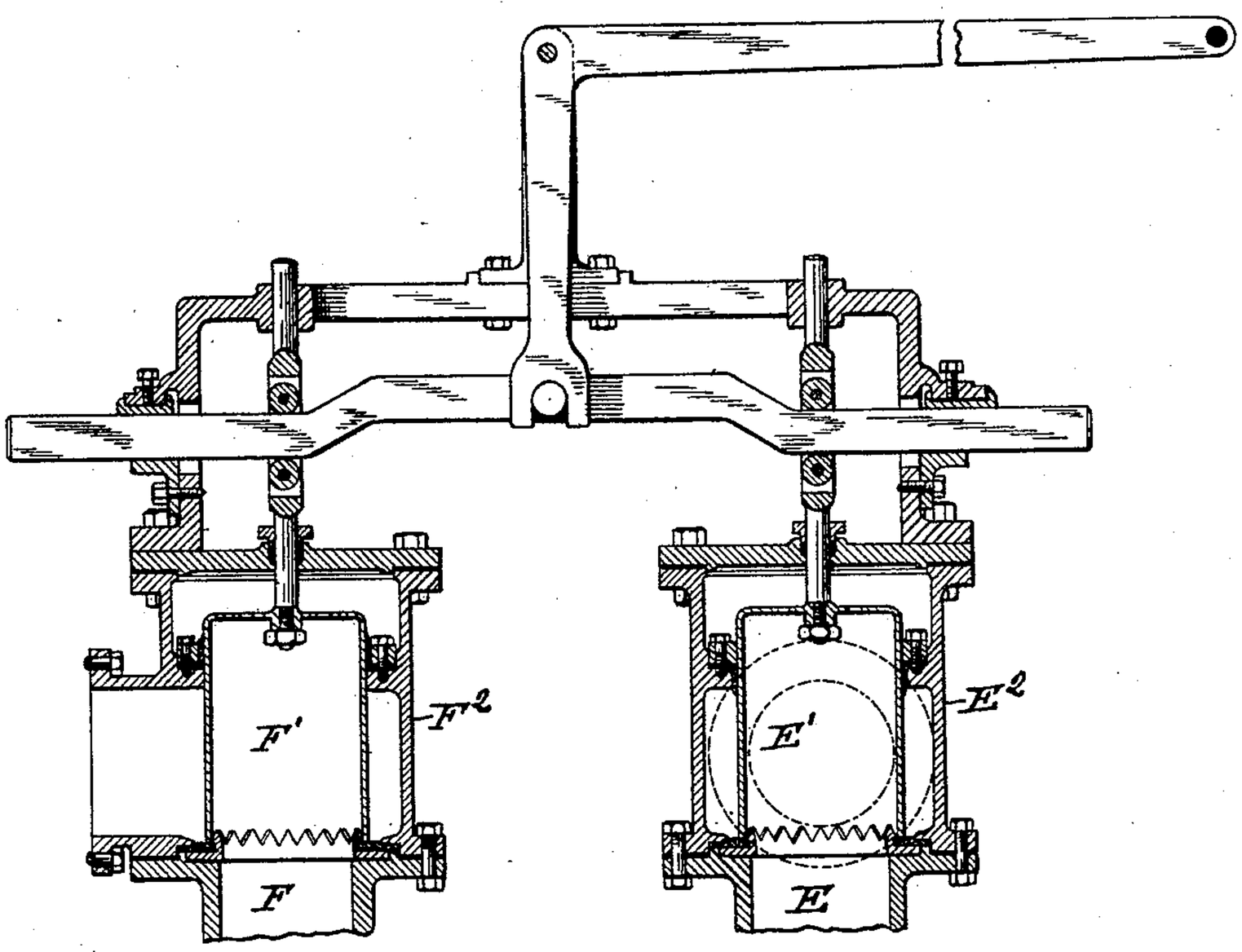
FIG. 3.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC STOP-VALVE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 480,278, dated August 9, 1892.

Application filed February 8, 1889. Serial No. 299,159. (No model.)

To all whom it may concern:

Be it known that I, HENRY J. REEDY, a citizen of the United States, and a resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Automatic Stop-Valves for Elevators, of which the following is a specification.

My invention relates to hydraulic elevators. Its object is an automatic valve arranged to be actuated by a moving part of the elevator mechanism to automatically stop the elevator cab or platform to prevent it from going too far in either direction.

The invention will be first fully described in connection with the accompanying drawings, and will then be particularly referred to, and pointed out in the claims.

Referring to the accompanying drawings, in which like parts are represented by similar reference-letters wherever they occur throughout the views, Figure 1 is a view, partly in side elevation and partly in central vertical section, of so much of the elevator-actuating mechanism as is necessary to illustrate my invention. Fig. 2 is a transverse section of the same, taken through line *x x*, Fig. 1, showing the plunger-cylinder and automatic stop mechanism in elevation. Fig. 3 is a view, partly in side elevation and partly in central vertical section, of the elevator-control valves and part of the chambers E and F, Fig. 1.

The water-cylinder A, the plunger fitted to move within it, and the plunger-rod B are of the usual construction employed in hydraulic elevators, as are also the parts not shown—to wit., the rope-wheels and their attachments, the pressure-tank, &c.

The case of my improved valve is supported upon a stand-pipe C at one side of the water-cylinder A, and consists, as shown, of the central chambered casting D and the inlet-chamber E and outlet-chamber F, which are secured at each end of the central chamber D by bolts *d* through their adjacent annular flanges. The stand-pipe C has a flanged cap *c*, upon which the lower branch of the chamber D rests. The parts are secured together by bolts *c'*. The cylindrical ends of the part D are recessed to receive the cup-leather packings *g*, which are held in place by the inwardly-projecting flanges of the castings E and F. The tubular automatic valve G, which is preferably made of brass, is turned off true upon the exterior to snugly fit the inner flanges f^2 and *d'* of the chambers F D, water-tight joints being formed by the cup-leather packing *g*. The heads *e* and *f* of the chambers E and F are recessed to receive packing-rings *e' f'*, against which the ends of the cylinder G adjacent to each is seated as it is alternately moved by its rod to cut off the supply to the cylinder A or the exhaust from it. The valve G has a central hub *g'*, which is connected to the shell by radial arms g^2. The hub is axially bored and screw-tapped to receive the screw-threaded ends of the rods g^3 g^4, which pass through the heads *e* and *f* and are suitably packed, as shown, to prevent leakage. The rod g^3 simply acts in the present instance as a guide or steady rod, while the rod g^4 is hinged to rod g^5, the opposite end of which is jointed to a vibrating upright bar H, which is at its lower end hinged upon a pin *h*, which projects laterally from a lug-plate *h'*, secured upon or to the foundation. The upper end of the rod H is longitudinally slotted to receive a pin *j*, which projects from an arm J, which arm is secured upon a rock-shaft K, which rock-shaft has its bearings in boxes *k*, which boxes are secured upon the outwardly-projecting flange *a* of the plunger-cylinder A. An arm J', also secured upon shaft K, extends down past and in proximity to the plunger-rod B and in the path of two pins *b b'*, which project from strap-clamps b^2 b^3, adjustably secured around the said plunger-rod B, so that when the plunger-rod B reaches the outward limit of its stroke, which should occur when the elevator platform or cage has reached the upward limit it should travel, the arm J' has been carried away from the end of the cylinder A, pulling with it the arm H and rods g^4 g^5 until the end of the valve G has been brought against its seat *e'*, cutting off the supply to the cylinder and arresting the further ascent of the cage or platform. It is understood, of course, that during the ascent of the elevator the exhaust-valve F' from chamber F is closed and the supply-valve E', leading to the chamber E, is open, and that during the descent of the elevator platform or cage the exhaust from chamber F is open and the supply to chamber

E is closed. It is evident that so soon as the exhaust from chamber F is open the elevator will begin to descend by gravity and will continue to descend until the pin b' strikes the opposite side of the arm J′ and carries it inward until the end of the valve G is seated against the packing-ring f', the exhaust cut off, and the descent of the platform or cage arrested. Thus by shifting the clamp-straps b^2 b^3, or either of them, along the plunger-rod B the platform will be automatically stopped between any two points desired. Thus all injury to the mechanism incident to the carelessness of the operator or from accident—such as breaking or disorder of the shifting devices—is avoided.

The inlet to and exhaust from the plunger-cylinder A is through the slots g^6 in the tubular automatic valve G, there being but one port to the cylinder A, which serves alternately for the supply and exhaust ports. This port is represented by dotted lines to be in the rear of the grated opening g^6, Fig. 1. As shown in this view, the automatic valve is in its normal position, allowing a free flow either to or from the plunger-cylinder A, depending upon whether the supply-valve is open and exhaust-valve closed, or vice versa. To this position the valve G is always brought when the arm J′ is released from either of the pins b b' by the weight L, which is suspended from the end of chain l. The chain passes over the pulley l' and is thence looped around the wheel K′, which is secured upon shaft K. The chain is secured to the rim of pulley K′ at its lowest point by a bolt k', which passes through one of the links of the chain and into the rim of the pulley. When the shaft K and pulley K′ are rotated in either direction by the arm J′, the weight will be drawn up, slackening one side of the chain loop, while the other side is wound upon the pulley. When the arm is again released from either engaging pin, the weight returns to its lower position, bringing the valve G to its normal position. The same result would be accomplished by coiled springs around the rods g^3 g^4, compressed between the hub g' and the ends e' and f'; but the form shown is preferable, because more positive in action, and, being exposed, any defect is more readily detected and remedied.

The supply and exhaust valves are in the present case located in pipes E^2 F^2, secured upon the chambers E and F. Any well-known form of valve and valve-shifting devices may be employed, as my automatic valve may be placed between any of the well-known valves and the port of the plunger-cylinder. I however prefer the form of valves shown in my patent, No. 155,675, of October 6, 1874, which consists of the cylinders E^2 F^2, the hollow cylindrical valves E′ F′, and the valve-actuating devices shown clearly in Fig. 3.

As the leading feature of my invention is the open-ended cylindrical automatic valve located between the supply and exhaust valves and the port of the plunger-cylinder and means for actuating said cylindrical automatic valve by a moving part of the elevator mechanism, I do not limit myself to the exact form of valve-actuating mechanism shown and particularly described, as it will readily occur to the skilled mechanic after an examination of my device that mere mechanical changes may be easily made to effect the same result without departing from the spirit of my invention.

The operation of the device is as follows: The valve G is practically inoperative when in its central position, as shown in Fig. 1, (and it is always in this position when the elevator-platform is between the upper and lower stories of the building.) Now, assuming that the platform or cage has reached nearly the upper limit of its travel, the parts will be in the position shown in Fig. 1, the pin b having just touched the arm J′. The still further outward movement of the plunger-rod B carries the arm J′ outward, bringing the end of the valve G against its seat e', cutting off the supply of water from chamber E and of course arresting the further ascent of the elevator. The outer movement of the arm J′ has also rocked the shaft K and wound the chain around the wheel and elevated the weight. The valve controlling the supply of water to the chamber E is still open, while the valve controlling the exhaust from chamber F is still closed, as when the elevator is ascending. Now when the operator closes the supply-valve to chamber E and opens the exhaust from chamber F, as is usual when the elevator cage or platform is to be brought down, the weight of the platform or cage will carry the plunger in the direction of the closed end of the water-cylinder A, forcing the water through the grated openings of the valve G, out through its unseated end, and through the chamber F. When upon the return movement the plunger-rod B has again reached the position shown in Fig. 1, the valve G has been returned by weight to the position shown, which position it retains until the outer pin b' strikes the arm J′ and carries it in the direction of the plunger-head until the exhaust is cut off by the opposite end of the valve coming against its seat f', which occurs when the platform has reached its lower limit of travel. The exact points at which the platform is stopped either above or below are regulated by shifting the strap-collars b^2 b^3 along the plunger-rod B. My automatic safety-valve arrangement, comprising the connected chambers D E F, their inclosed valve G, and its stem g^4, may be attached to any of the hydraulic elevators now in common use. The necessary connecting devices in each case will be readily suggested to the skilled mechanic or constructer.

I claim—

1. The combination, as hereinbefore set forth, of the water-cylinder A and plunger B, the connected chambers D E F, located at the

side of said cylinder, the pipe connecting the central chamber D and the cylinder, the tubular valve G, open at the ends and having the openings g^6, the seats e' f' for said valve, the valve-rod extending through the head e and connected to tripping mechanism, such as shown, and the straps b^2 b^3, having pins b b' carried by the plunger B to seat said valve and automatically cut off the supply or exhaust when the platform or cage has reached either the upper or lower limit of its travel.

2. A safety cut-off valve for hydraulic elevators, consisting of the three chambers D E F, the open-ended tubular valve G, having opposite ends in communication with the opposite supply and exhaust chambers E and F and the central portion of its shell perforated to communicate with the chamber D, which chamber has a port to connect with the water-cylinder of the elevator, packings for said valve between the chamber D and the supply and exhaust chambers E F, the seats e' f' for the tubular valve, and the valve-rod extending outside of the valve-chambers for connection to a movable part of the elevator mechanism, whereby the valve may be brought against either seat e' or f' to cut off the supply or exhaust, substantially as hereinbefore set forth.

3. In a valve mechanism for hydraulic elevators, the combination, substantially as specified, of the central chamber D, having a port for connection to the cylinder of a hydraulic elevator, and interior flanges d' and exterior perforated flanges at each end, the supply and exhaust ports E F, having flanges corresponding to the flanges upon the chamber D, the packings g, held between the said interior flanges, the valve G, open at both ends, centrally perforated and fitted to slide longitudinally in said flanges and packings, the valve-rod g^4, and seats e' f' at outer ends of chambers E F, substantially as and for the purpose set forth.

4. The combination, substantially as specified, with cylinder A, plunger B, and supply and exhaust valves for said cylinder, of an intermediate valve between the supply and exhaust valves, and the cylinder arranged to automatically control the supply to and exhaust from said cylinder independent of the customary valves, with the rock-shaft K, wheel K', chain secured to said wheel, pulley and weight, rod g^5, and arms H and J for returning said automatic valve to its normal position.

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