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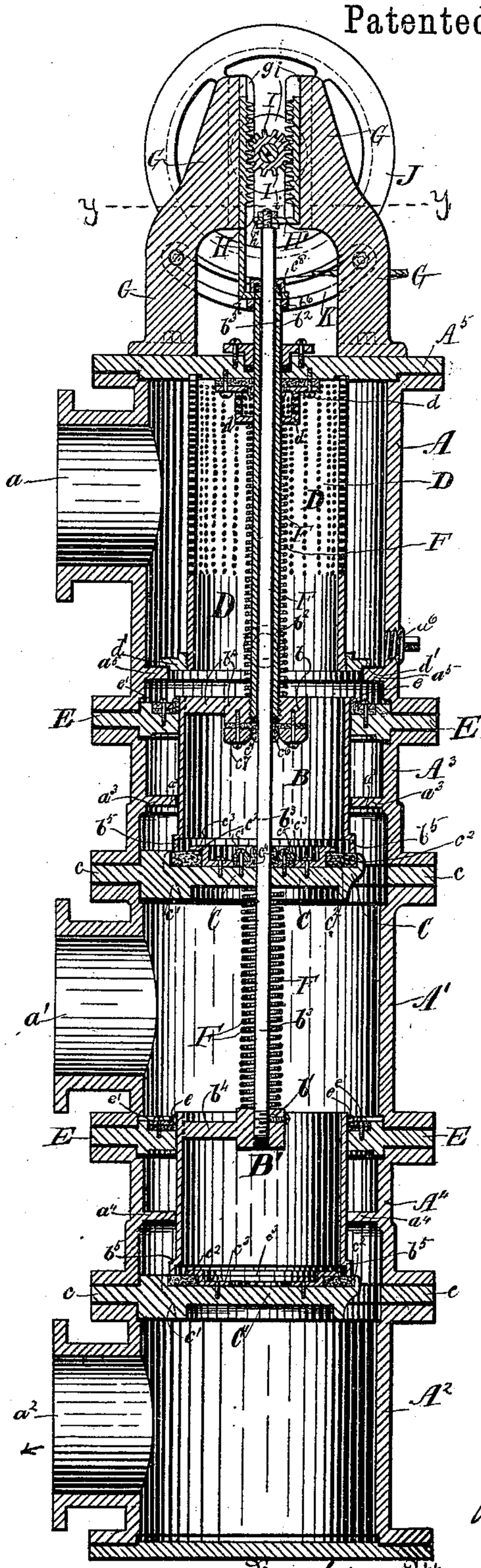
W. WARNER, Dec'd.

C. H. M. ATKINS, Executor.

VALVE FOR HYDRAULIC ELEVATORS.

No. 512,773. Patented Jan. 16, 1894.

FIG. 1.



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(No Model.) 2 Sheets—Sheet 2.

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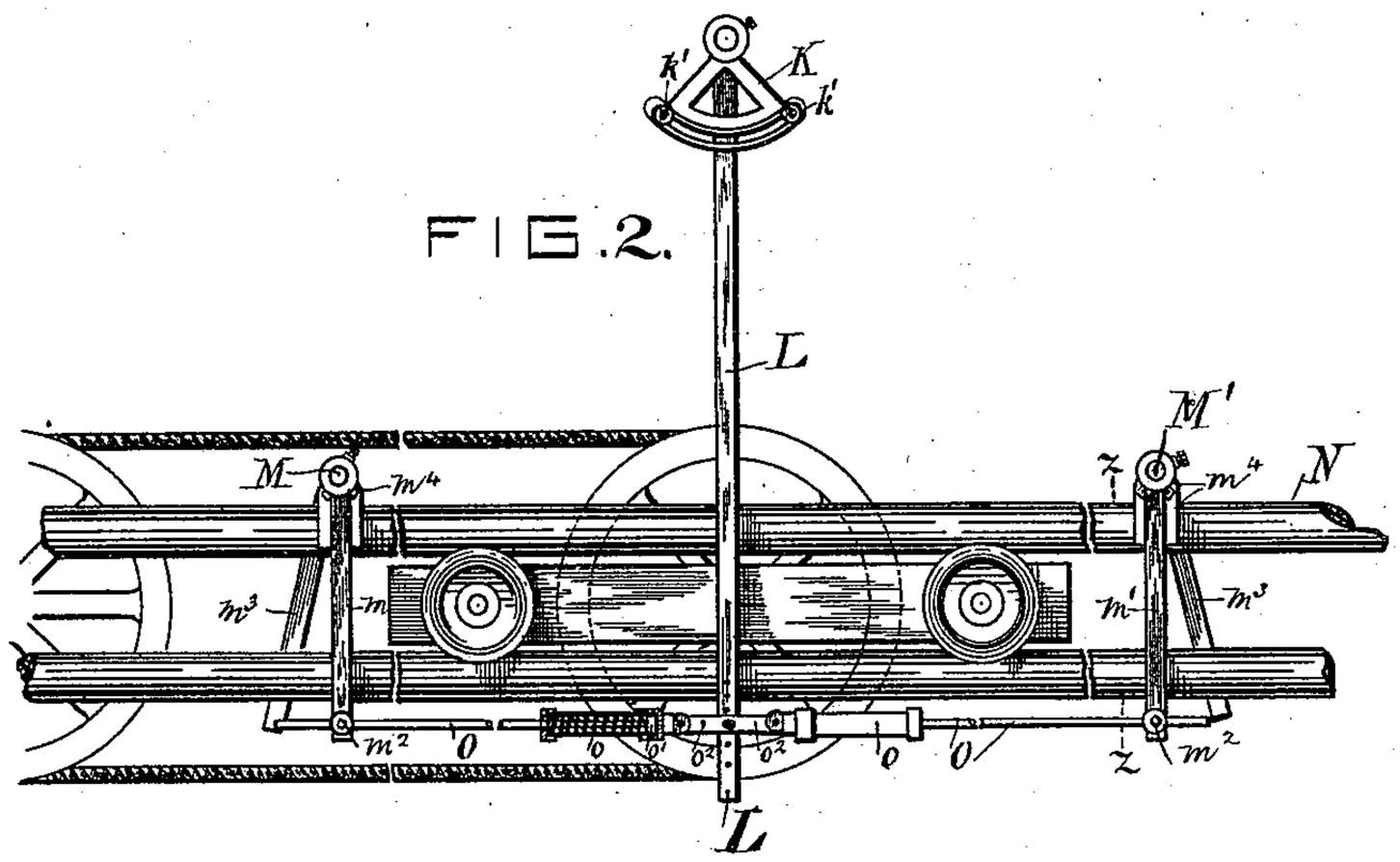


FIG. 2.

FIG. 3.

FIG. 4.

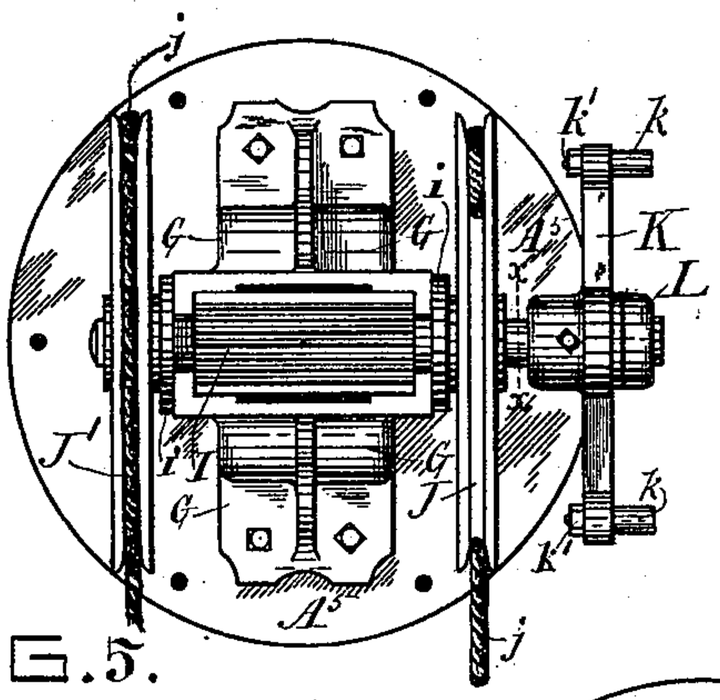
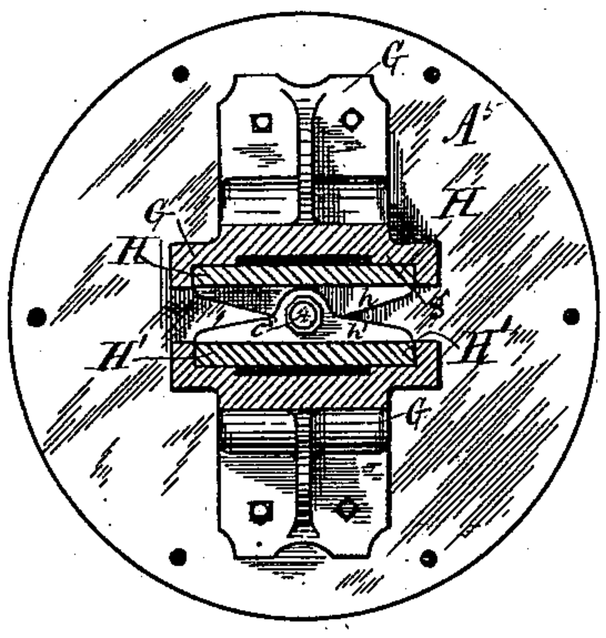
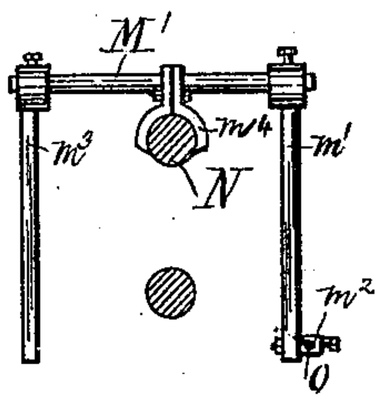


FIG. 5.





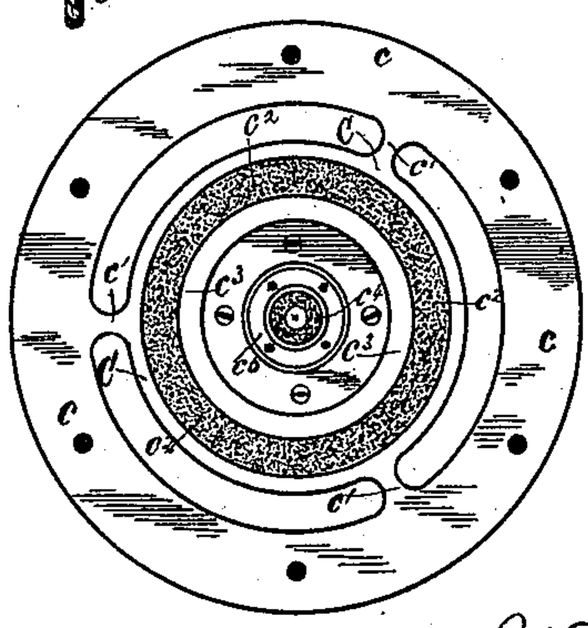


FIG. 6.

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VALVE FOR HYDRAULIC ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 512,773, dated January 16, 1894.

Application filed February 9, 1891. Serial No. 380,801. (No model.)

To all whom it may concern:

Be it known that I, WARREN WARNER, 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 Valves for Hydraulic Elevators, of which the following is a specification.

The object of my invention is to provide an easily operated and reliable valve for hydraulic elevators, by means of which the cab or platform may be quickly started, and stopped at any position by the operator; and in connection therewith means to automatically control the valves and stop the platform or cab at its upper and lower limit of travel.

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

Referring to the drawings in which like parts are indicated by similar reference letters wherever they occur throughout the various views, Figure 1 is a diametrical section of a valve embodying my invention. Fig. 2 is a detail view in side elevation, and upon a diminished scale of the rope carriage and ways, with my automatic valve tripping devices in position, the view being taken through line x, x, of Fig. 3. Fig. 3 is a top or plan view of the valve case cap, with the valve actuating mechanism in position upon it as seen in Fig. 1. Fig. 4 is a transverse sectional view taken through line y, y, of Fig. 1. Fig. 5. is a detail view in transverse section taken through line z, z, of Fig. 2. Fig. 6. is a plan view of one of the valve seat pieces detached.

The valve case is composed of five cylindrical sections, each section having outwardly projecting flanges at each end the upper and lower sections being closed by caps. The upper section A, has a flanged branch a, to connect with a supply pipe from the water main. The section A′, has a similar branch a', to connect with the pipe that leads to the elevator cylinder, and the section A^2, which is similar to section A′, has a branch a^2, to connect with the exhaust or waste pipe. Between the sections A, and A′, and A′ and A^2, are shorter sections A^3 and A^4, each of the same size and shape. These are provided with inwardly projecting rings or flanges a^3, a^4. The inner edges of these rings are turned true to guide and steady the supply valve B, and exhaust valve B′. These valves are alike except that the central hub b, in the upper one is larger than the hub b', of the lower one to accommodate the tubular valve rod b^2, through which the rod b^3, of the lower valve B′, extends, and the packing which excludes water from the tubular rod b^2. The tubular valves B, B′, are preferably made of brass having the central hubs b, b', connected to the top edges of the tubular portions by arms b^4. The hub arms and tubular part of each are preferably cast in a single piece. The peripheries and lower edges of the tubes B, B′, are turned off true to make water joints with the seats, and peripheral packing. The lower ends of the valves are slightly enlarged forming angular offsets at b^5. The object of these inner offsets are to counterpoise the pressure of water upon the top edges of the valves, in effect balancing the valves, and insuring their rapid and easy movement from their seats. The valve seat supports are also alike except that the upper one is centrally perforated to pass the valve rod b^3, and they consist of central recessed disks, C, C′, connected to an outer ring c, by short arms or webs c, (See Fig. 6.) The rings c, are clamped between the flanges of the case sections A′, A^3, and A^2, A^4. The valve seats are rings c^2, of elastic or yielding material which fit into the recesses of the upper faces of the supports C, C′, and are held in place by flanged metal rings c^2, around the rod b^3, and upon the upper side of the seat support C, is fitted a cup leather packing c^4, which is compressed against the rod, b^3, and held in place upon the seat piece C, by a ring c^5. A similar packing c^6, is arranged around the rod b^3, underneath the hub, b, of the supply valve B, and held in place by a ring c^7. The rod, b^3, is also packed at the top of the tubular rod b^2, by a packing nut c^8. The tubular rod b^2, passes through a stuffing box in the cap A^5, and underneath the cap it is surrounded by a strainer d, which prevents sand or sediment from entering the rod bearings.

E, are packing rings which are clamped be-

tween the case sections A, and A^3, and A′, and A^4. The upper faces of these rings are rabbeted to receive the cup leather packings *e*, which are held in place and against the peripheries of the valves by rings *e′*, to form the water tight joints.

The strainer D, is a light tube of brass perforated around its upper portion. It has screwed over its lower end a ring or collar *d′*, which rests upon a flange a^5, which projects inwardly from the section A. The upper end of the strainer enters an annular recess in the cap A^5. This strainer as well as the strainer *d*, is not necessary to the operation of the device, and is only used when the water for supplying the power contains substances or foreign matter. The section A, is also provided with plugs a^6, which may be removed for the purpose of freeing the cylinder from any sediment, which may settle in the bottom of the cylinder, and between it and the unperforated portion of the tube D.

The springs F, which are coiled around the valve rods b^2, b^3, exert a light downward pressure upon the valves. They are useful should the packing become too tight, but are not essential to their operation, and may be dispensed with.

I will now describe the valve actuating mechanism which is for compactness and strength mounted upon the cap A^5, of the valve case: G, G, are standards bolted securely upon the cap A^5. The parallel adjacent faces *g*, are channeled; within these channels the rack plates H, H′, are fitted to slide vertically.

I, is a pinion, the teeth of which mesh with the teeth in both racks, and hold the rack plates in their guides. The pinion shaft (which is preferably in one piece with the pinion) extends out upon each side of the standards to receive the pulleys J, J′, to which the ends of the cab rope *j*, by which the pinion is reciprocated, is attached, and also the devices for rocking the pinion shaft automatically. Collars *i*, *i*, are secured upon the pinion shaft upon each side of the rack guides or standards G, to prevent longitudinal movement of the pinion.

The rack bar H, has a downward extension *h*, which terminates in an inwardly extending angle lug. The tubular valve rod b^2, passes through this lug, and is firmly secured to it between the collar b^6, and the packing nut c^8. The rack bar H′, has a similar angular extension *h′*, to which the upper end of the valve rod b^3, is secured.

As the cab cable *j*, has its ends secured in the rims of the pulleys J, J′, and the opposite ends of the cable passing around under the pulley J, and over the pulley J′ and it being understood that when the parts are in the position shown in Fig. 1 both valves are closed, as they are when the platform or cab is at rest, and that one valve must remain closed while the other is moving in either direction. The action of the valves when under the control of the operator is easily understood. If it is desired to send the cab or platform up, the pinion I is revolved to the right. By this operation it travels up the teeth of the rack bar H′, and carries up the rack H, opening the supply valve B. When it is desired to stop the cab the lever or wheel in the cab, by which the cable *j*, is operated is released or brought to its central or normal position. (At whatever point the cable rope is released the valve held open by the operator will quickly close and stop the cab.) To lower the cab the pinion is revolved to the left. It then travels up the rack H, carrying with it the rack H′, and opening the valve B′.

The means by which the elevator cab is stopped automatically at either the upper or lower limit of its travel, will now be described.

The device above described is placed for use alongside of the frame of the rope carrier; and upon the end of the pinion shaft nearest said frame, and outside of the pulley J, is dependently secured the sector K, the rim of which is slotted to receive the shanks of the studs *k*, which are adjustable in said slot by means of the nuts *k′*, by which they are secured in place. Loosely journaled upon the same shaft, alongside of the sector K, is a pendent arm L. Two rock shafts, M, M′, are journaled in bearings each of which is made in two parts, with curved lower jaws, which embrace the upper rail N, of the carrier frame. These bearings are clamped upon the rods N. Upon the outer ends of the rock shafts are secured dependent arms *m*, *m′*. In the lower ends of these arms are secured perforated studs m^2, which support the ends of the horizontally arranged rods O. To the adjacent ends of the rods are secured tubular boxes *o*, which are provided with spring pressed followers *o′*. These are connected by a link o^2. The link o^2, is connected to the pendent arm L, by a pivot pin. (See Fig. 2.) Upon the inner ends of the rock shafts M, M′, are secured dependent arms m^3. These extend down in the path of travel of the rope carrier, or some moving part of the carriage. Now it will be seen that when the shafts M, or M′ are rocked by the moving carrier through either of the arms m^3, the arms *m*, or *m′*, will move correspondingly carrying the flexible rod to the right or left as the case may be, and communicating motion to the dependent arm L. As this arm is swung in either direction it will strike one or the other of the sector pins *k*, carrying the sector with it, and reciprocate the pinion shaft, closing one or other of the valves B, or B′, and stopping the platform or cab.

There are three means for adjusting the automatic tripping device, to insure the stopping of the cab or platform floor upon a level with the upper and lower floors of the building, and adjusting devices to accommodate the elevator to buildings of different heights: first, by loosening the set screws which secure the rods O in the studs in the lower ends

of the arms m, and m', loosening the screws in bearings m^4, and moving said bearings nearer to, or farther from, each other along the rod n; second, by giving the inner pendent arms m^3, a different inclination, and third, by adjusting the studs k, in the slot in sector K.

The means above described and shown particularly in Figs. 2 and 5 to vibrate the pendent arm L, and through it rock the sector K, to close either valve are simple, admit of ready adjustment, and are very reliable but may be dispensed with, and the arm L, be vibrated by projections fixed upon the moving carriage at suitable distances upon either side of it. For instance, the axles of the carrier wheels n, may be made to project out far enough to strike it. It is also evident that the sector K, may be dispensed with by arranging the rim of the rope pulley to carry the pins k. As the pinion I, is held between the opposite valve-moving racks without other bearings, its action upon one rack when turned, is due to the resistance of the other. If therefore the moving rack is arrested from any cause, any movement of the pinion in the reverse direction, will elevate the other rack, stop the cab, and start it in the opposite direction. Now it is therefore evident that the automatic stop mechanism will operate positively, even against the resistance of the operator in the cab. Should the operator through carelessness forget to stop the elevator at its upper or lower limit of travel, he will feel the action of the automatic stop in time for him to release the lever or wheel. Should he fail to heed the warning, and hold the lever or wheel rigidly, the action of the automatic stop will open the opposite valve, and start the cab in the opposite direction. Thus all damage to the machinery and occupants of the cab is positively avoided.

By arranging my supply and exhaust valves one above the other as shown, the whole device is very strong, and occupies but little space. The valve case being put up in short sections, and a great many of the parts being duplicates, should any of the parts become deranged from any cause, they are easily accessible and readily replaced.

It is evident that many mechanical changes in the construction and relative arrangement of the parts may be made by those skilled in the art without departing from the spirit of my invention. I desire it therefore to be understood that I do not confine myself to the exact construction, shown and described, but consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of my invention.

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

1. In an elevator valve the combination of the valve case composed of the port sections A, A′, A^2, and valve sections A^3, A^4, arranged one above the other, the covering caps for the upper and lower sections, the seat supports, and packing rings clamped between said sections, the tubular valves, their seats and actuating rods b^2, b^3, passing through the upper cap, said rod b^2, being tubular, and said rod b^3, passing through it, and suitable valve operating mechanism to open and close said valves substantially as shown and described.

2. The combination substantially as hereinbefore set forth, of the port sections, and the valve sections, arranged one above the other, the valve packing rings and seat supports clamped between said sections, the supply and exhaust valves arranged one above the other, the valve rods b^2, b^3, extending through the cap of the case, the standards G, secured upon the case cap, the racks H, H′, arranged to slide in said standards and connected respectively to the valve rods, the pinion I, meshing with said racks, and means such as shown for imparting motion to said pinion to alternately elevate the racks and open the valves.

3. The combination of the port sections and the valve sections, arranged alternately one above the other, the said valve sections having integral guide rings a^4, the seat supports C, and packing rings E, clamped between the sections, said seat supports being recessed, to receive the yielding seat packing rings c^2, the rings c^3, to hold the seat packing, the cup leather packing rings e, the rings e', to hold them in place, the tubular valves B, B′, the tubular valve rod b^2, for the upper valve and the rod b^3, passing through it and connected to the lower valve both of said rods extending through the cap of the upper section to connect with the valve actuating mechanism, substantially as shown and described.

4. The hydraulic elevator valve case having the supply and exhaust valve arranged therein, one above the other and the valve rods extending one through the other, and through the cap of the case, in combination with the guide standards G, secured to the case cap, the racks H, H′, fitted to slide in said standards, one of said racks being connected to the supply and the other to the exhaust valve rod, the pinion I, arranged between the racks and meshing with the teeth of both, the rope wheels J, J′, secured upon the pinion shaft, and the valve ropes j, j', secured to said wheels and passing around them in opposite directions, to rock the shaft and alternately open the valves substantially as shown and described.

5. The combination of valve case, the valves arranged therein one above the other, the valve rods b^2, b^3, projecting through the cap of the case, the valve actuating mechanism consisting of the vertically sliding racks connected to the valve rods, the pinion I, arranged between the racks, the sector K, secured upon the pinion shaft, the pins k, projecting from said sector and the pivoted pendent arm L, passing down between the pins k,

and along side of the rope carrier to receive motion from the rope carriage, substantially as shown and described.

6. In combination with the valves and valve actuating mechanism, the sector K, secured upon the valve moving shaft, the pins *k*, adjustably secured in said sector the pendent arm L, pivoted upon said shaft passing down between the pins, the rock shafts M, M′ journaled in bearings upon the rope carrier frame, the arms *m*, *m′*, secured upon said shaft, the rod O, connecting said arms, and connected to the pendent arm L, and the arms m^3 m^3 secured upon the rock shafts M, M′ and projecting down in the path of the rope carriage, whereby the shafts M, M′ are rocked the arm L, vibrated and the valves automatically closed.

7. In combination with the controlling valve of a hydraulic elevator and its valve lever mechanism, the cable connected with and directly operating the valve through its lever mechanism, an engine having a piston, and means substantially as described engaged by the piston and normally disconnected from the valve-lever mechanism but actuated to engage the same by the piston in moving to the end of its stroke to produce closure of the valve without thereby interfering with the independent operation of the valve lever mechanism, substantially as and for the purpose set forth.

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