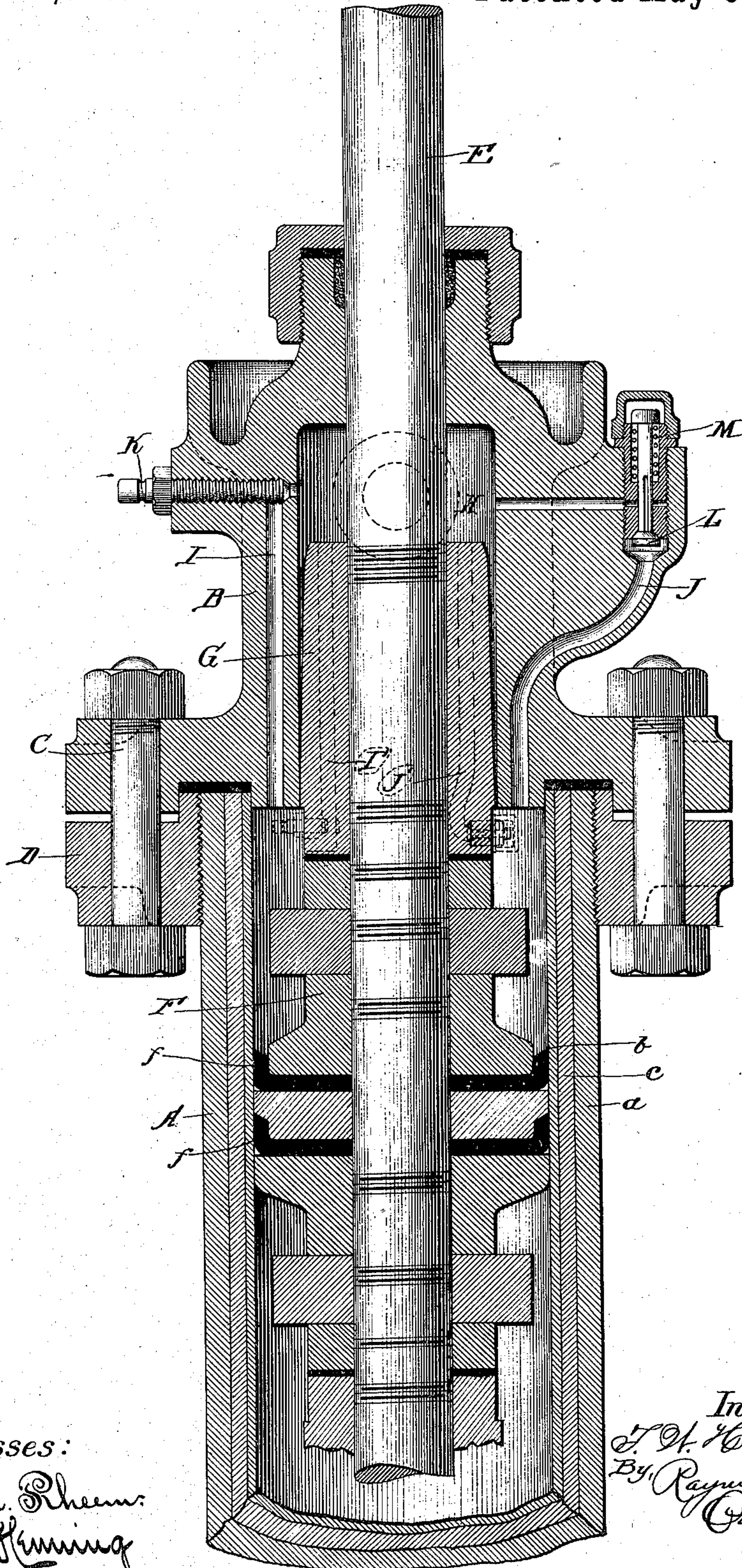


(No Model.)

T. W. HEERMANS.  
HYDRAULIC ELEVATOR.

No. 559,526.

Patented May 5, 1896.



Witnesses:

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# UNITED STATES PATENT OFFICE.

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## HYDRAULIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 559,526, dated May 5, 1896.

Application filed May 18, 1894. Serial No. 511,631. (No model.)

*To all whom it may concern:*

Be it known that I, THADDEUS W. HEERMANS, a citizen of the United States, residing at Evanston, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Hydraulic Elevators, of which the following is a specification, reference being had to the accompanying drawing.

The object of my invention is to provide for the certain and gradual stoppage of the car as the piston of the elevator approaches the limit of its stroke. Where high speeds are employed, and especially when they are employed in conjunction with high pressures, in order to stop the car automatically at the limits of its travel without jar it is necessary that a gradual and exactly-regulated closure of the passages leading to and from the cylinder should be provided. It is also desirable that when the car is started in the reverse direction no time should be lost on account of the closure of such water-passages.

It is the object of my present invention to provide means for regulating both the stopping and starting of the car, as above indicated.

In the accompanying drawing the figure represents a vertical central section of the cylinder of a hydraulic elevator and so much of its appurtenances as are necessary to illustrate my invention.

A is the cylinder, which may be of any desired construction. As shown, it consists of concentric tubes, the outer tube *a* being of steel and the inner tube *b* of brass. The intermediate layer *c* between the tubes *a* and *b* may be of any desired material. To the cylinder is secured the head B by means of bolts C, connecting it to a threaded collar D, screwed to the end of the cylinder.

E is the piston-rod, to which is affixed the piston F. Said piston, in order to resist the exceptionally high pressure employed, is provided with double-cupped leather packings *ff*. The piston, however, may be constructed in any well-known manner, the forms herein shown being merely illustrative.

Forming a part of or an extension from the piston F is a sleeve G, which is made tapering, as shown, and at its largest part fits closely in the cavity H in the head B, said cavity

forming a part of the water-passage leading to and from the cylinder A. The dotted outlines at the upper end of H indicate the point at which the said passage H leads to the water supply and discharge passage.

In the cylinder-head B are formed two auxiliary passages I and J, which open at one end into the cylinder and at the other end into the passage H at a point beyond that to which the sleeve G extends. The passage I is provided with means for regulating its effective area, said means, as shown, consisting of a screw K, whose beveled end forms a valve, seating itself at the bend in the passage I. The passage J is provided with an inwardly-opening check-valve L, normally held to its seat by a spring M.

The operation of the devices just described is as follows: As the piston approaches the end of its stroke the sleeve G enters the passage H and, owing to its tapering form, gradually closes the latter. The escape for the water above the piston is thus cut off, excepting such leakage as may take place past the sleeve G and except a small quantity forced through the passage I. By properly proportioning the passage I to the pressure and speeds employed and by means of the regulating-valve K the stoppage of the motion of the piston and the car connected thereto may be made as gradual as desired. During the process of stopping the piston there is an excess of pressure in the cylinder which tends to hold the valve L closed; but when the change-valve is shifted so as to introduce fluid under pressure to the passage H said fluid will open the valve L and flow through the auxiliary passage I to the cylinder. But for this provision the speed of the piston in starting would be limited by the amount of fluid which could pass through the passage I and leak out past the sleeve G, but with the additional passage J the reverse movement of the piston is sufficiently rapid.

For the sake of convenient access I prefer, especially on small-sized machines employing very high pressure, to make the auxiliary passages I and J through the cylinder-head; but it is obvious that they may be made through the piston without thereby affecting the result accomplished or the mode of ac-



completing it. I have indicated such a modification by the dotted lines in the drawing and have designated these passages by the letters I' and J', respectively.

5 Without confining myself to the precise details herein shown and described, I claim—

1. The combination of a cylinder having a passage for the inlet and exhaust of the fluid; the piston therein adapted to close said passage when near the limit of its stroke; auxiliary passages not closed by the piston and connecting the interior of the cylinder with the first-named passage; and a check-valve in one of said passages permitting an inflow to said cylinder but not a return, substantially as described.

2. The combination of a cylinder having a passage for the inlet and exhaust of the fluid; the piston therein adapted to close said passage when near the limit of its stroke; auxiliary passages not closed by the piston and connecting the interior of the cylinder with the first-named passage; means for regulating the flow through one of said passages at will; and a check-valve in the other of said passages permitting an inflow to said cylinder but not a return, substantially as described.

THADDEUS W. HEERMANS.

Witnesses:

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