No. 786,652. PATENTED APR. 4, 1905.

T. LARSSON.

PILOT VALVE FOR HYDRAULIC ELEVATORS.

APPLICATION FILED MAR. 13, 1902. RENEWED JAN. 12, 1905.

2 SHEETS—SHEET 1.

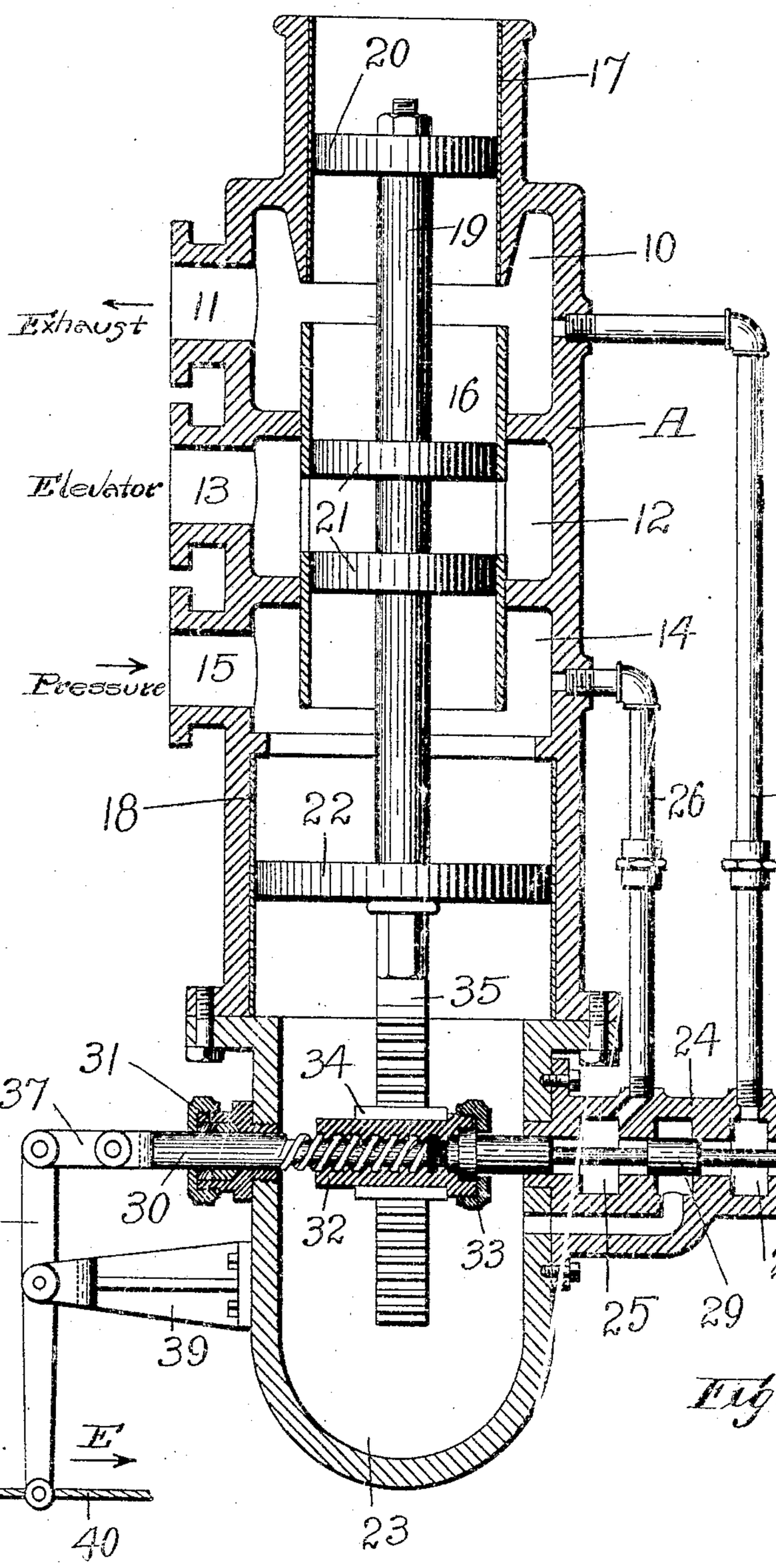

Fig. 1.

Fig. 2.

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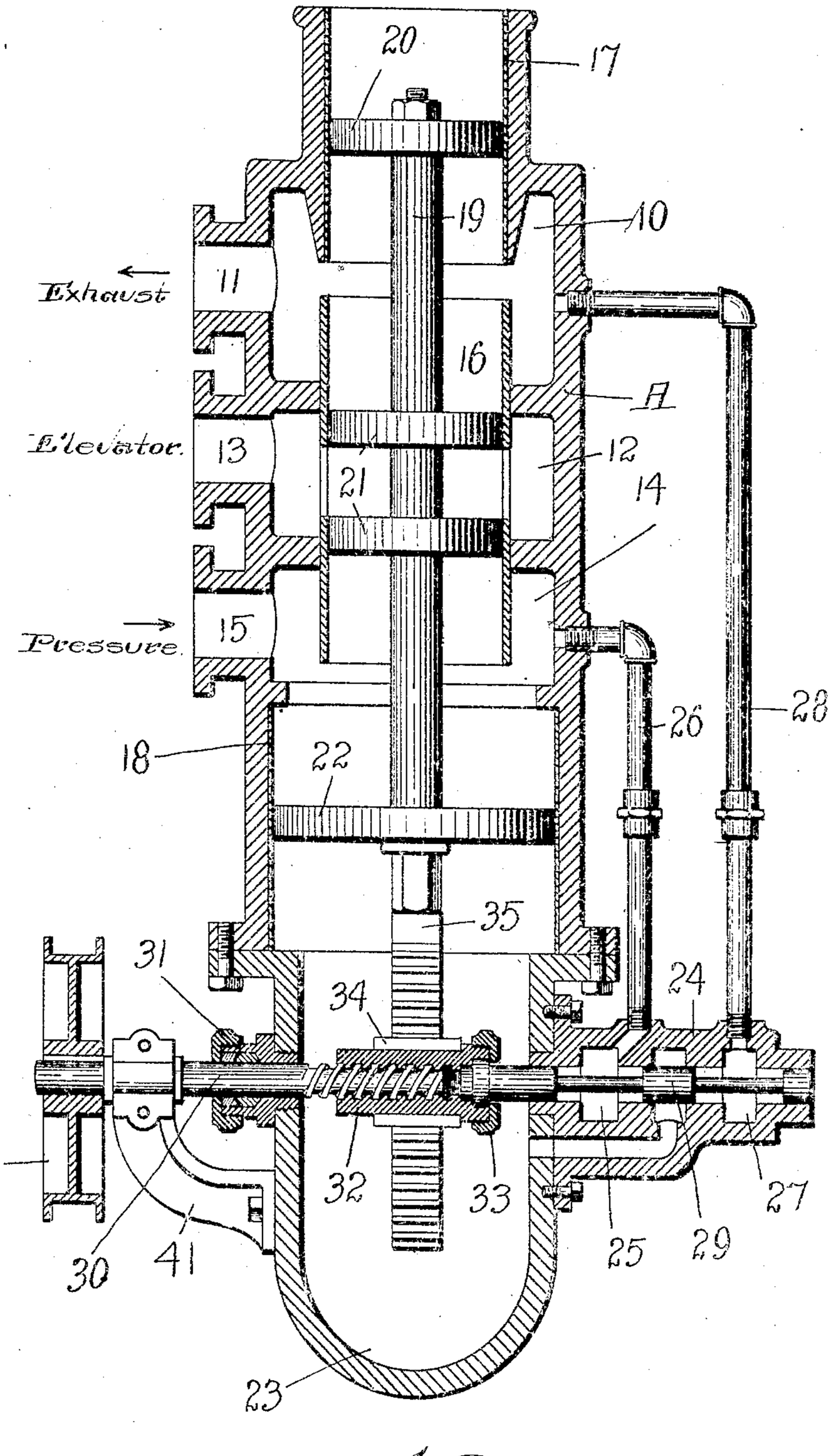

Fig. 3.

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UNITED STATES PATENT OFFICE.

THURE LARSSON, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO STANDARD PLUNGER ELEVATOR COMPANY, A CORPORATION OF NEW JERSEY.

PILOT-VALVE FOR HYDRAULIC ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 786,652, dated April 4, 1905.

Application filed March 13, 1902. Renewed January 12, 1905. Serial No. 240,739.

To all whom it may concern:

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

This invention relates to that class of hydraulic valves which are employed for controlling elevators or for similar purposes in which the position of the main valve is controlled by a smaller supplemental valve or pilot-valve.

The especial object of this invention is to provide a strong, simple, and efficient hydraulic-elevator valve of the class referred to which will occupy little room and which may be readily controlled from an elevator-car, to provide a novel connection between the main valve and the pilot-valve for closing the pilot-valve when the main valve has been moved to the desired position, and to house the parts, so that the same will be fully protected and not liable to be deranged.

To these ends this invention consists of the hydraulic-elevator valve and of the combinations of parts therein, 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 sectional view of a hydraulic-elevator valve embodying my invention. Fig. 2 is a detail view, partly in section, illustrating the connection between the main valve and one of the screw-threaded sections which operate the pilot-valve, and Fig. 3 is a sectional view illustrating a slightly-modified form of construction.

To control the action of hydraulic elevators, comparatively large heavy valves are necessarily employed, and when direct-acting connections are used for shifting one of these valves from the elevator-car the elevator can be controlled only by exerting a considerable amount of power. To overcome this objection, compound hydraulic valves are now employed, in which the main valve is controlled by a smaller supplemental valve, termed the "pilot-valve," which admits pressure to shift the main valve. In this class of constructions an arrangement of links or levers has heretofore usually been employed to close the pilot-valve when the main valve has been moved to the desired position. In these constructions the pilot-valves may be made comparatively small and easily moved, so that the connections from the elevator-car to the pilot-valve can be readily operated and the elevator controlled with comparative ease. The specific object of my present invention is to provide a compact and efficient form of hydraulic-elevator valve which is adapted for use in substantially all locations and which comprises a comparatively small number of working parts, and I accomplish this object by providing a screw-threaded connection between the main valve and the pilot-valve—that is to say, in the preferred form of hydraulic-elevator valve embodying my invention the pilot-valve is arranged to be operated by a rod or connection having two sections adjustably threaded to each other. One section is connected to be actuated from the elevator-car, while the other section is geared or connected to be turned from the main valve. The part of the screw-jointed connection which is shifted from the elevator-car may have a sliding or longitudinal movement, or, if preferred, the connections from the elevator-car may be arranged to turn or rotate the same.

Referring to the accompanying drawings for a detail description of a hydraulic-elevator valve constructed according to my invention, as shown in Fig. 1, A designates the casing of a main valve. The main-valve casing A is provided near its upper end with an exhaust-chamber 10, which may be connected by a passage 11 to a waste-pipe or other suitable outlet. The main-valve casing A is provided below the exhaust-chamber 10 with a central chamber 12, which may be connected by a passage 13 to a hydraulic elevator. Below the central chamber 12 the valve-casing A is provided with a pressure-chamber 14, which may be connected, through a passage 15, to any suitable source of hydraulic pressure.

Mounted in the valve-casing A is a lining or pipe 16, which is provided with slots or openings near its middle for permitting connection between the central chamber 12 and the pressure-chamber 14 or exhaust-chamber 10, according to the position of the main-valve pistons. The upper part of the valve-casing A may have a lining 17 fitted therein, and the lower part of the valve-casing A may have a lining 18 fitting therein.

Mounted in the valve-casing A is a main-valve stem 19. The main-valve stem 19 is provided with two controlling-pistons 21, which form the main valve. When the controlling-pistons 21 are in their central position, as shown in Fig. 1, the compartment 12 is shut off both from the exhaust-chamber 10 and the pressure-chamber 14. When the controlling-pistons 21 are moved up, a passage is opened between the pressure-chamber 14 and the central compartment 12, and when the controlling-pistons 21 are moved down a passage is opened between the central compartment 12 and the exhaust-chamber 10. At its lower end the main-valve stem 19 is provided with an operating-piston 22.

The parts as thus far described may be substantially of the same construction as employed in the ordinary main valves for controlling hydraulic elevators.

Secured on the lower end of the supplemental casing A is a casing 23, and bolted onto the casing 23 is a valve-casing 24, in which the supplemental valve or pilot-valve is mounted, the axis of the pilot-valve being preferably at right angles to the axis of the main valve, so that the pilot-valve is movable transversely with respect to the main valve. The pilot-valve casing 24 is provided with an inner chamber 25, connected by a pipe 26 to the pressure-chamber 14, and at its outer end the pilot-valve casing 24 is connected by a pipe 28 to the exhaust-chamber 10.

The pilot-valve is provided with a central piston 29, which normally closes the connection between the pressure-chamber 25 or the exhaust-chamber 27 with the passage leading into the casing 23. When the piston 29 of the pilot-valve is moved to the right from its normal position, (illustrated in Fig. 1,) a passage between the pressure-chamber 25 and the casing 23 will be opened, while when the piston 29 is moved to the left from its normal position a passage between the exhaust-chamber 27 and the casing 23 will be opened.

To operate the pilot-valve, I preferably provide a rod or connection comprising two sections adjustably threaded together. As shown in Fig. 1, one of the sections or rod 30 extends out through a stuffing-box 31 and is adjustably threaded into a second section or nut 32. The second section or nut 32 is provided at its end with a recess for receiving a collar on the end of the stem of the pilot-valve, and said parts are pivotally connected by a cap or collar 33, threaded onto the section or nut 32. The body portion of the section or nut 32 is provided with gear-teeth 34, which mesh with a rack 35, extending down from the piston 22. The geared connection between the nut 32 and the rack 35 permits an endwise travel of the nut 32, and the raising or lowering of the main valve-stem turns said nut 32 through said geared connection. To hold the rack 35 in mesh with the gear-teeth 34, I may, if desired, provide a guide piece or support 36 for the back side of the rack 35, as shown by dotted lines in Fig. 2. At its outer end the rod 30 is connected by a link 37 to a lever 38, pivoted in the bracket 39. At its lower end the lever 38 is connected to a rope 40, which may be carried around the usual sheaves to the elevator-car.

In the use of a hydraulic-elevator valve as thus constructed when the lever 38 is shifted by the controlling-rope 40 in the direction of the arrow P the pilot-valve will be shifted to admit pressure below the piston 22 to raise the main-valve stem and admit pressure to the elevator. When the main valve is moved up to the desired position, the rack-and-gear connection with the threaded section or nut 32 will have moved the pilot-valve back to its closed position. When the lever 38 is shifted by the controlling-rope 40 in the direction of the arrow E, the pilot-valve will be drawn in to vent the pressure below the piston 22, leaving an unbalanced pressure above the piston 22, which will move the main valve down to connect the elevator with the exhaust. The extent to which the main valve is shifted depends upon the extent to which the pilot-valve is shifted, a large movement of the pilot-valve requiring a correspondingly large movement of the main valve before the pilot-valve is brought to normal position.

One particular advantage of my construction is due to the fact that in all positions of the parts a constant ratio of travel is maintained between the main valve and the pilot-valve, whereas in constructions employing linkwork for connecting the main valve and pilot-valve there is no fixed ratio of travel between the main valve and the pilot-valve, the relative movement of said parts depending upon the different angular positions of the links or levers employed.

In the construction illustrated in the first sheet of drawings one section of the two-part connection which controls the pilot-valve is shifted or moved longitudinally, while the other section or nut is rotated. In some cases the movement of the pilot-valve may be caused exclusively by the threads between the parts of the operating rod or connection, and I have illustrated such a construction in Fig. 3. As shown in this figure, the rod 30 is journaled near its outer end in a bracket 41 and is held from longitudinal movement by means of suitable collars. Secured on the outer end of the

rod 30 I provide a sheave or pulley 42 for the controlling-rope, which extends to the elevator-car. The operation of this form of construction is substantially the same as that before described, except that the initial shifting of the pilot-valve is caused by the screw-threaded connection.

In the actual construction of my hydraulic-elevator valves I prefer to employ bronze or other non-corrosive metal for the operative parts, which are inclosed in the casing 23 and hence are submerged in water, although, if desired, the operative parts may be located outside of the casing by providing a suitable stuffing-box connection for carrying the rack 35.

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. An elevator-valve comprising a valve-casing, a main valve arranged therein, a pilot-valve arranged transversely to the main valve, a supplemental casing connected to the valve-casing, and connections between the main and pilot valves arranged in said supplemental casing.

2. In a hydraulic-elevator valve, the combination of a main valve, a pilot-valve, and a connection for operating the pilot-valve, comprising a part arranged to be shifted from an elevator-car, a second part threaded thereto, and a gear-and-rack connection between said second part and the main valve, said gear-and-rack connection being arranged to permit an endwise travel of said second part while the rotation of said second part closes the pilot-valve when the main valve has been shifted to desired position.

3. In a hydraulic-elevator valve, the combination of a main valve, a pilot-valve movable transversely with respect to the main valve, a rod or connection for operating the pilot-valve, comprising a section arranged to be shifted from an elevator-car, a second section or nut threaded thereon, and a gear-and-rack connection between the nut and main valve, said gear-and-rack connection being arranged to permit an endwise travel of the nut and to cause the rotation of the nut to close the pilot-valve when the main valve has been shifted to the desired position.

4. In a hydraulic-elevator valve, the combination of a main valve, a pilot-valve movable transversely with respect to the main valve, an operating connection for the pilot-valve, comprising sections threaded together, connections for sliding or shifting one of said sections longitudinally from an elevator-car, and a gear-and-rack connection between the other of said sections and the main valve, said gear-and-rack connection being arranged to permit a longitudinal movement and to rotate one of said sections to cause the screw-threaded connection to close the pilot-valve when the main valve has been shifted to the desired position.

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

THURE LARSSON.

Witnesses:
LOUIS W. SOUTHGATE,
PHILIP W. SOUTHGATE.