(No Model.) 2 Sheets—Sheet 1.

A. KIECKHEFER & G. CADMAN.

ELEVATOR VALVE.

No. 477,055. Patented June 14, 1892.

Fig. 1.

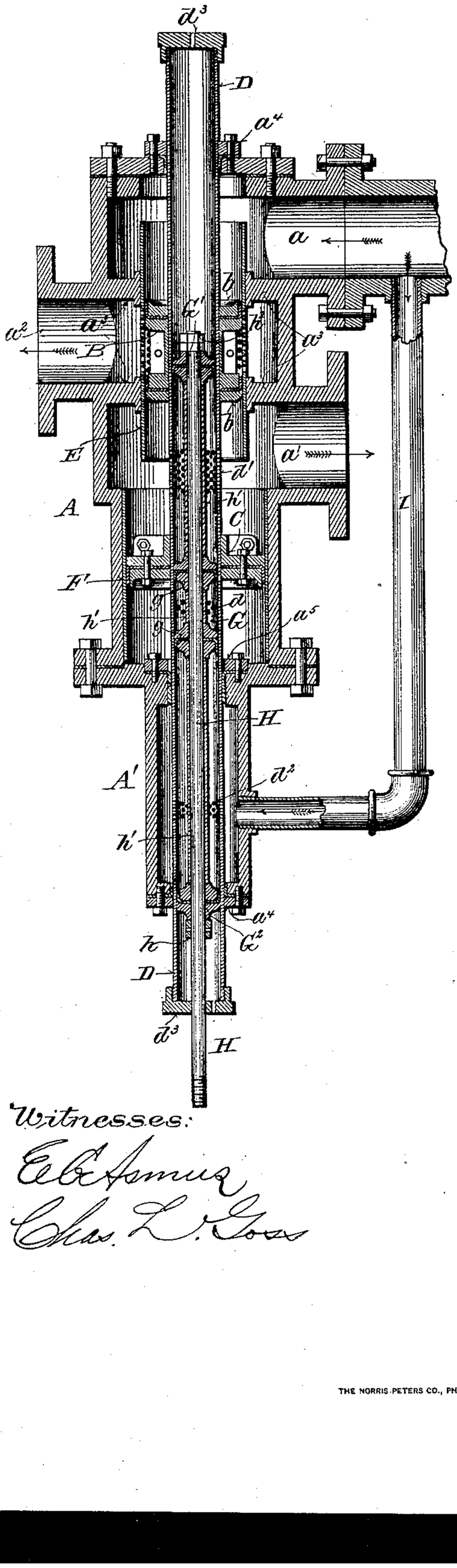
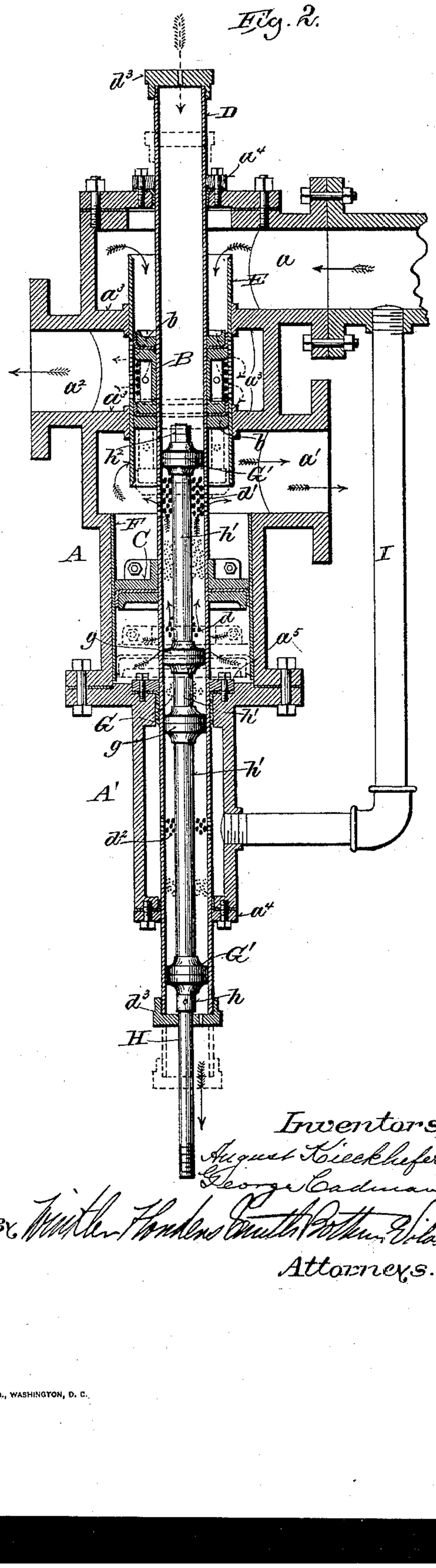


Fig. 2.



Witnesses:
E. C. Tamus
Chas. L. Goss

Inventors:
August Kieckhefer,
George Cadman
By Wright Brown Quinby & Potter, Their
Attorneys.

(No Model.) 2 Sheets—Sheet 2.

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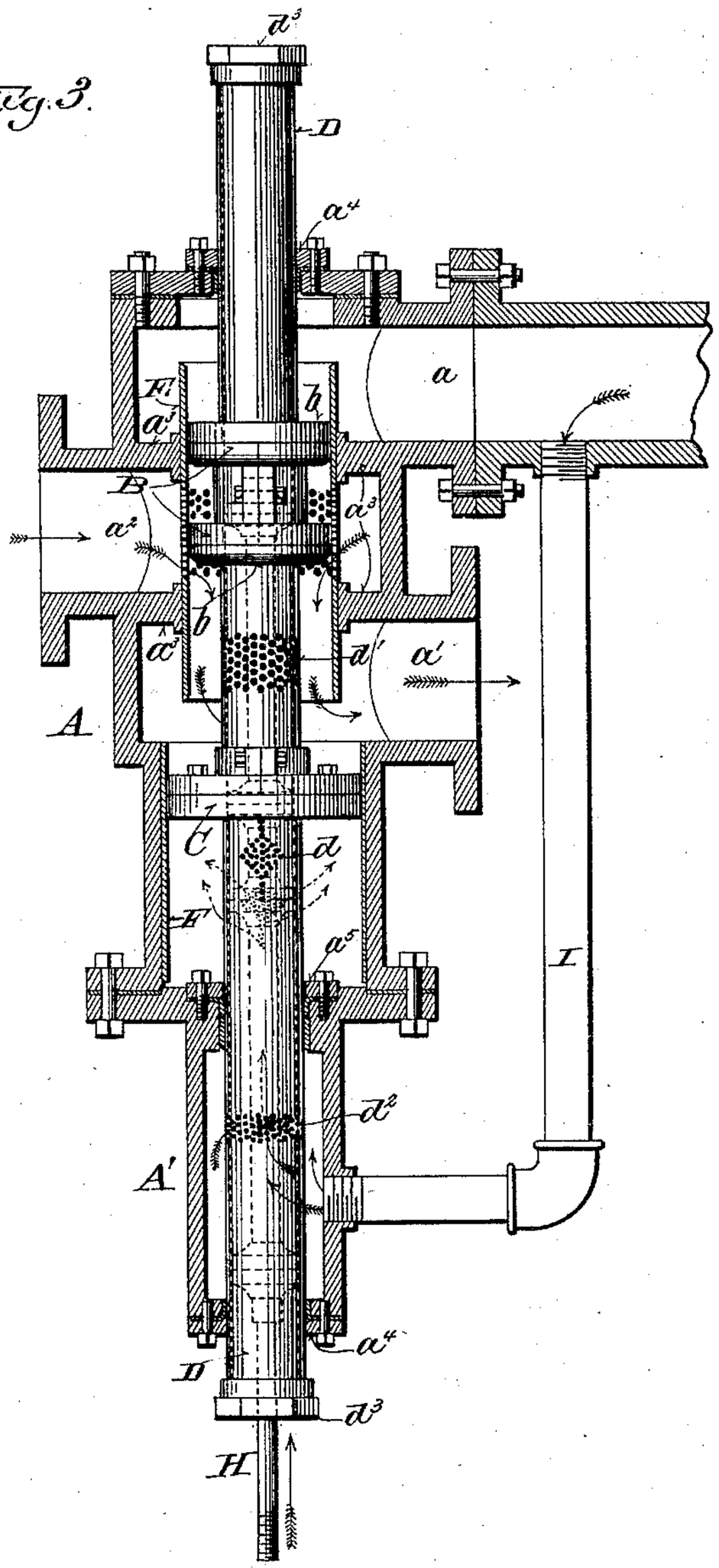
Fig. 3.



Witnesses:
E. C. Tamm
Chas. L. Goss.

Inventors:
August Kieckhefer,
George Cadman,
By Wright Brown Quinby & Woodruff
Attorneys.

UNITED STATES PATENT OFFICE.

AUGUST KIECKHEFER AND GEORGE CADMAN, OF MILWAUKEE, WISCONSIN;
SAID CADMAN ASSIGNOR TO SAID KIECKHEFER.

ELEVATOR-VALVE.

SPECIFICATION forming part of Letters Patent No. 477,055, dated June 14, 1892.

Application filed January 5, 1891. Serial No. 376,700. (No model.)

To all whom it may concern:

Be it known that we, AUGUST KIECKHEFER and GEORGE CADMAN, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Elevator-Valves; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The main objects of our invention are to start and stop the main valve gradually, and thereby avoid the abrupt starting and stopping of the elevator when the controlling mechanism is suddenly shifted, and to bring the main and auxiliary valves and their connections within a small compass, so that they may be placed in the limited space frequently afforded for the purpose.

It consists, essentially, of a cylinder having supply and exhaust ports and an intermediate port, a valve controlling communication between said ports, in combination with an actuating-piston mounted upon a tubular rod, which is provided on opposite sides of said piston with ports, one having a constant communication with the supply and the other with the exhaust, and an intermediate port in constant communication with a closed chamber on one side of said piston and an auxiliary valve within said tubular rod controlling communication between either extreme port and the intermediate port therein, and of certain novel features hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings like letters designate the same parts in the several figures.

Figure 1 is an axial section of our improved valve, showing the main and auxiliary valves in their middle or normal positions. Fig. 2 is a like view showing the main valve in its middle position and the auxiliary valve at the extreme limit of its movement in the direction required to establish communication between the supply-port and the port communicating with the cylinder of the main or working piston, and Fig. 3 is a similar view showing the main valve and its actuating-piston in elevation and in position to partially open the port leading to the cylinder of the main piston to exhaust.

A is the main cylinder, provided with the supply and exhaust ports a and a' and an intermediate port a^2, which are in practice connected, respectively, with the water-supply main, the sewer, and the cylinder of the main piston. (Not shown.) The cylinder is formed on each side of the port a^2 with inwardly-projecting flanges a^3, which support concentrically in said cylinder a smaller cylinder E, having open ends and perforated with small holes between said flanges. It is preferably formed of brass a little longer than the travel of the main valve and projects at the ends beyond said flanges, forming, with the cylinder A, annular chambers, which communicate with the adjacent ports a, a', and a^2. The cylinder A is extended beyond the exhaust-port a' and is preferably provided with a brass lining F, and to the end of this extension is attached a supplemental cylinder or chamber A′, which is connected by a pipe I with the water-main.

B represents the main valve, preferably composed of two heads b b, each comprising two disks, between which are sandwiched cup-packing disks of leather or other suitable material. These disks are preferably formed in halves and bolted together upon the valve rod or stem. The two heads b are set at such a distance apart that when the valve is in its middle position, as shown in Fig. 1, they will completely cut off communication between the ports a and a' and the port a^2.

D is the tubular stem or rod, upon which the valve B is mounted. It projects at its ends through suitable packing-rings a^4 a^4 or stuffing-boxes in the ends of the cylinder A A′, and passes through a similar packing-ring a^5 or stuffing-box between the main cylinder A and the auxiliary cylinder or chamber A′.

C is a piston of somewhat greater diameter than the valve B, mounted upon the tubular valve-rod D in the extension of cylinder A, within which or the brass lining F it is fitted. It may be conveniently constructed like the heads b of the main valve.

G is the auxiliary valve, preferably comprising two heads *g g*, each composed of two disks holding between them a flexible cup-shaped packing-washer of leather or other suitable material. They are fitted within the tubular valve rod or stem D, which serves as a cylinder therefor. They are mounted upon a stem H, which projects through one end of the tubular rod D and is connected in the usual or any suitable manner with the controlling-lever on the elevator-car or with any other suitable actuating device. (Not shown.) The tubular valve-rod D is perforated between the piston C and the end of the extension of cylinder A, opposite the exhaust-port *a'*, with small holes arranged to form a graduated port *d*, through which communication is established between the interior of said tubular valve-rod and the cylinder-chamber below the piston C. The valve-rod D is also perforated between the valve B and piston C with a belt of small holes constituting a port *d'*, opening into the cylinder A, in communication with the exhaust-port *a'*. It has a similarly-formed port d^2, opening into the chamber A', in communication with the supply-pipe I. On opposite sides of the ports *d'* and d^2 from the valve G pistons G' and G^2, like or similar to the heads *g* of said valve, are fixed on the stem H, so as to exclude water from the ends of the tubular rod D, which are preferably closed by caps d^3. The heads *g* of which the valve G is composed are set at such a distance apart that they will completely cover or embrace between them the port *d* when the two valves are in their middle or normal positions, as shown in Fig. 1. They are held in place with the pistons G' and G^2 by the collar *h*, fixed on the stem H, sleeves *h' h'* of suitable lengths, and nuts h^2, as clearly shown in Fig. 1. The port *d* is made of approximately the same length as the perforated belt in the cylinder E, controlled by the main valve B, and the exhaust-port *d'* is preferably made of greater area than the supply-port d^2.

Our improved valve operates as follows: In the position in which the valves are shown in Fig. 1 the port a^2 is closed and the main piston is held quiescent. If now it is desired to introduce water under pressure to the cylinder of the main piston and run the elevator up, the auxiliary valve is moved in the direction indicated by the arrow in Fig. 2 toward or into the position in which it is shown in full lines. Communication is thus established through the tubular valve-rod D and the ports *d* and *d'* between the exhaust-port *a'* and the cylinder-chamber below the piston C, and the water confined in said chamber is allowed to pass out through said tubular valve-rod and ports, as indicated by arrows. The pressure upon the upper head *b* immediately moves the valve B and piston C in the same direction, thus establishing communication between the supply-port *a* and the port a^2. If the auxiliary valve G is carried to the extreme limit of its movement, as shown in Fig. 2, the main valve B and the piston C will also be carried a corresponding distance to the extreme limit of their movement, as indicated by dotted lines. To arrest the ascent of the elevator, the auxiliary piston is returned to its middle position shown in Fig. 1. The graduated port *d* is thereby brought into communication with the supply-port d^2 and water under pressure is admitted into the chamber below the piston C. The opposing pressure upon the upper valve-head *b* is thus overbalanced by the pressure on the piston C, which is of greater area, and the valve B is thereby moved into its middle position, as shown in Fig. 1, in which position the graduated port *d* is carried between the heads of valve G and cut off from communication with the supply-port d^2. To discharge the water from the cylinder of the main piston and to allow the elevator to descend, the auxiliary valve is moved in the direction indicated by the arrow in Fig. 3, thereby establishing communication between the ports *d* and d^2 and admitting water under pressure from chamber A' into the chamber below the piston C, which moves the valve in the direction indicated and establishes communication between the port a^2 and the exhaust-port *a'*, thereby allowing the water to escape from the cylinder of the main piston and the elevator to descend. If the auxiliary valve G is moved, as indicated by dotted lines in Fig. 3, to a position midway between its middle and extreme positions, the main valve B will follow it to a corresponding position, partially opening the port a^2 to exhaust. It will be observed that any movement of the auxiliary valve G in either direction produces a corresponding consecutive movement of the main valve B. The openings or area of the port *d*, diminishing from the center toward the ends, produces a gradual opening and closing of the same and a consequent gradual opening and closing of the main valve B, thereby avoiding a sudden and violent starting and arresting of the elevator. By placing the auxiliary valve within the cylinder of the main valve the device is comprehended within the smallest possible compass and can be placed where there would be insufficient space for a more cumbersome device.

Various changes in the details of construction and arrangement of the valve may be made without affecting its mode of operation or departing from the principle of our invention.

We claim—

1. The combination of a cylinder having supply and exhaust ports and an intermediate port, a valve controlling communication between said ports, and an actuating-piston mounted upon a tubular rod which is provided on opposite sides of said piston with ports, one having a constant communication with the supply and the other with the exhaust, and an intermediate port in constant communication with a closed chamber on one

side of said piston, and an auxiliary valve within said tubular rod controlling communication between either extreme port and the intermediate port therein, substantially as and for the purposes set forth.

2. The combination of a cylinder having supply and exhaust ports and an intermediate port, a chamber at one end of said cylinder having a supply connection, a valve controlling communication between either supply or exhaust port and the intermediate port, and an actuating-piston mounted upon a hollow rod having three ports, one opening into said cylinder in constant communication with the exhaust, one opening into said chamber in constant communication with the supply, and the intermediate port opening into the closed end of said cylinder on one side of said piston, and an auxiliary valve movable axially in said hollow rod and controlling communication between the port, opening into the closed end of the cylinder and either of the other ports in said rod, substantially as and for the purposes set forth.

3. The combination, with a cylinder having supply and exhaust ports and an intermediate port, of a chamber at one end of said cylinder having a supply connection, a tubular valve-rod extending from the cylinder into said chamber, a valve and an actuating-piston mounted upon said tubular rod, which has a port on each side of said piston opening into said cylinder and a port opening into said chamber, and an auxiliary valve within said tubular rod, which serves as a cylinder therefor, substantially as and for the purposes set forth.

4. The combination, with the main valve-cylinder having supply and exhaust ports, an intermediate port, and an extension beyond the exhaust-port, of a chamber at the end of the extension of said cylinder having a supply connection, the main valve and an actuating-piston of greater area than said valve mounted upon a tubular valve-rod which extends from said cylinder into said chamber and has ports on opposite sides of said piston opening into said cylinder and a port opening into said chamber, and an auxiliary valve within and movable lengthwise of said tubular rod, substantially as and for the purposes set forth.

5. The combination, with the main valve-cylinder having supply and exhaust ports and an intermediate port, of a smaller cylinder within the main cylinder communicating at the ends with said supply and exhaust ports and through lateral openings with said intermediate port, the main valve placed within the smaller cylinder, and an actuating-piston of larger area mounted upon a tubular rod which is movable lengthwise of the cylinder and provided with ports opening into the same on opposite sides of said piston, an auxiliary valve within and movable lengthwise of the tubular valve-rod, and a supply connection with said tubular rod, substantially as and for the purposes set forth.

6. The combination, with the main valve-cylinder having suitable ports and a reciprocating valve controlling communication between said ports, of an actuating-piston by which said valve is moved, a tubular rod upon which said valve and piston are mounted, provided on opposite sides of said pistons with ports for supplying water to and discharging the same from said actuating-piston, a supply connection with said tubular rod, and an auxiliary valve movable within and lengthwise of said tubular rod, so as to control the ports therein, substantially as and for the purposes set forth.

In testimony that we claim the foregoing as our own we affix our signatures in presence of two witnesses.

AUGUST KIECKHEFER.
GEORGE CADMAN.

Witnesses:
CHAS. L. GOSS,
E. G. ASMUS.