No. 785,889. PATENTED MAR. 28, 1905.

C. R. JONES.

HYDRAULIC AIR COMPRESSOR.

APPLICATION FILED JULY 21, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

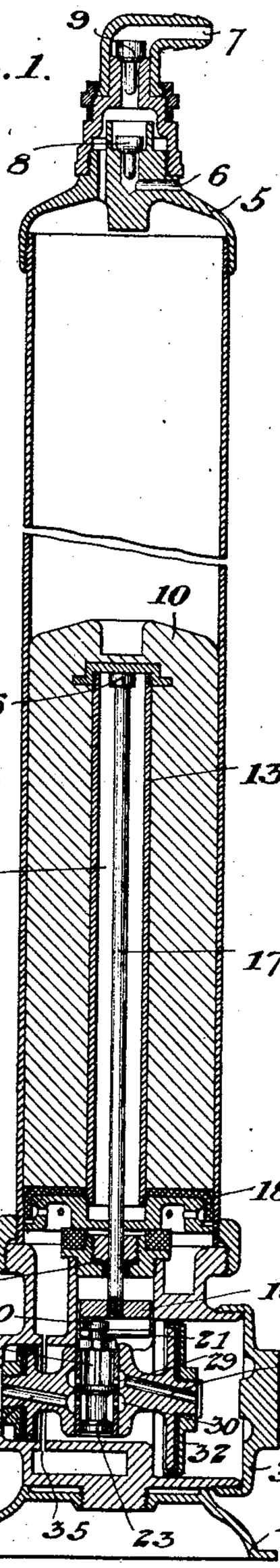


Fig. 2.

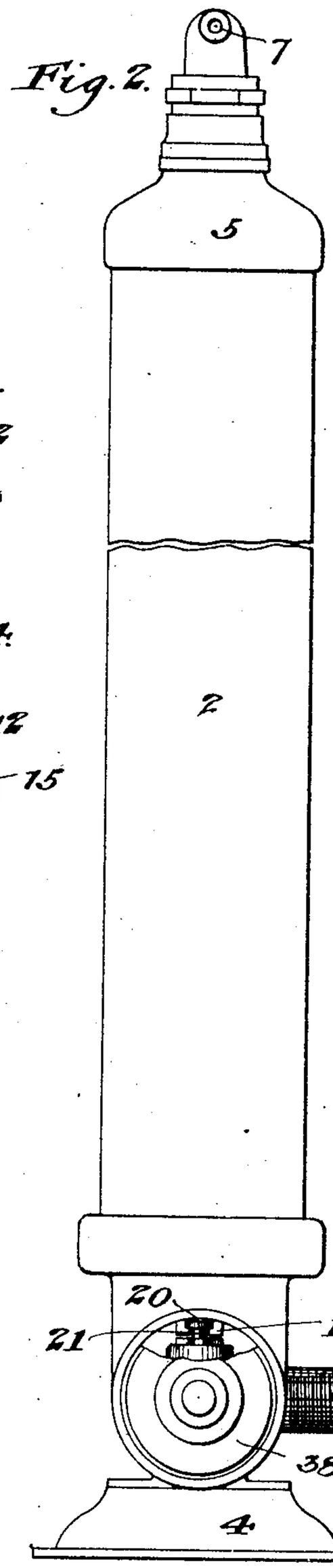


Fig. 3.

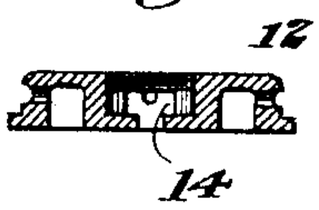
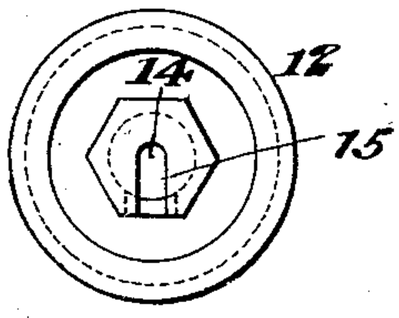


Fig. 4.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 5.

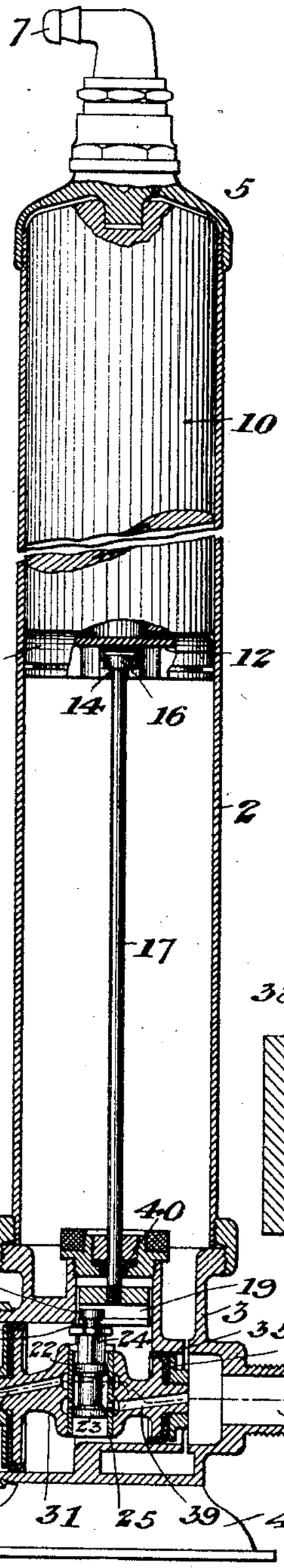


Fig. 7.

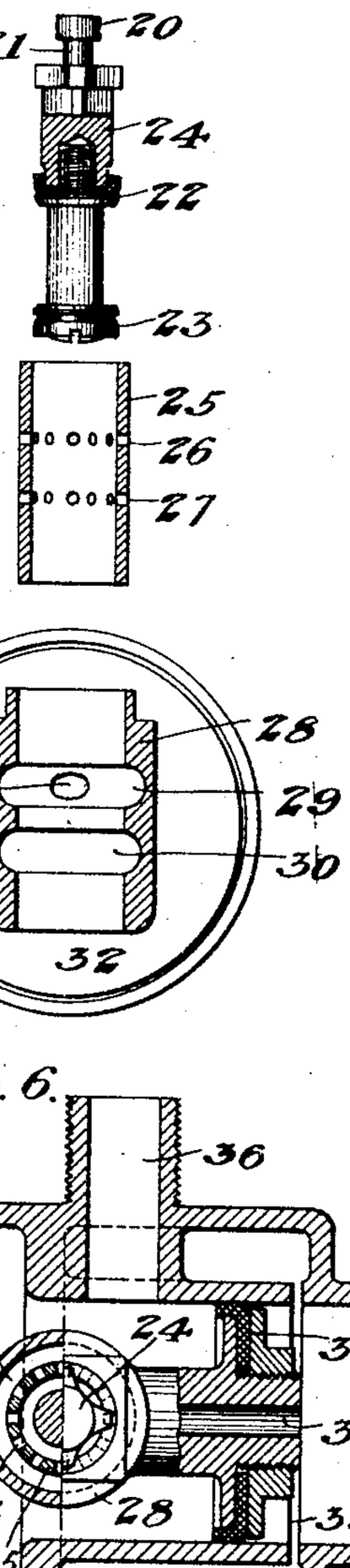
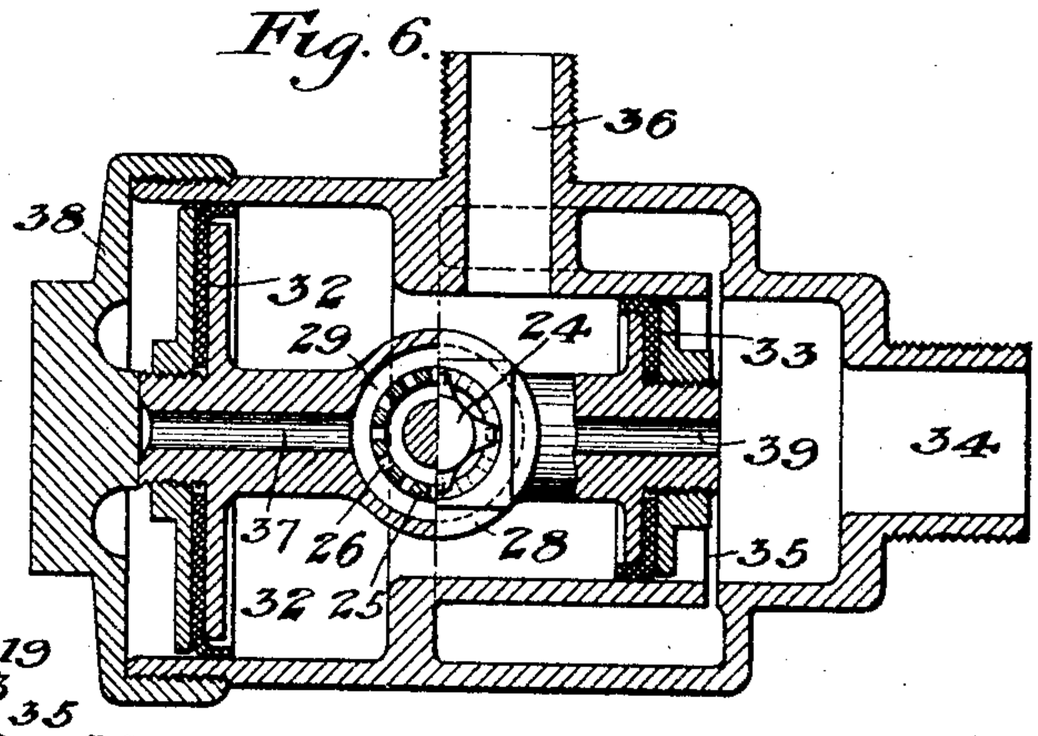


Fig. 6.



WITNESSES

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No. 785,889. Patented March 28, 1905.

UNITED STATES PATENT OFFICE.

CLARENCE R. JONES, OF PITTSBURG, PENNSYLVANIA.

HYDRAULIC AIR-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 785,889, dated March 28, 1905.

Application filed July 21, 1904. Serial No. 217,471.

To all whom it may concern:

Be it known that I, CLARENCE R. JONES, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Hydraulic Air-Compressor, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical central section of my improved compressor, showing the parts in starting position. Fig. 2 is a side elevation with the casing partly broken away. Figs. 3 and 4 are detail views showing the connection between the valve-stem and the weight. Fig. 5 is a sectional side elevation looking in the opposite direction to that of Fig. 1. Fig. 6 is a horizontal section on the line VI VI of Fig. 5, and Fig. 7 is an enlarged detail view of the primary valve parts separated.

My invention relates to the class of hydraulic air-compressors wherein water is employed to compress a gaseous fluid, such as air.

The object of the invention is to provide a simple and effective device of this character in which the primary valve may be easily withdrawn with the motor-valve for inspection. It is also designed to provide the easy withdrawal of the weight and separation of the weight from the valve-stem, and, further, to reduce the number of fluid-passages and improve the construction.

In the drawings, 2 represents the main cylinder, which extends vertically and is mounted upon the lower valve-casing 3, which rests upon the base 4. The upper head 5 of the cylinder is provided with an air-inlet 6 and air-outlet 7, these ports being controlled by valves 8 and 9 in the usual manner. The main piston 10, which is weighted or made of considerable length to descend by gravity, fits in the main cylinder and is provided with a central longitudinal bore or hole 11, having at its lower end a cap 12, which screws onto the brass tubing 13, secured in the bore, and is provided with a central opening 14, having a lower slot 15, forming a T-shaped slot arranged to receive the head 16 on the upper end of the valve-stem 17. A cup-leather packing 18 is secured between the cap 12 and the lower end of the piston. The lower end of the valve-stem 17 is provided with a horizontally-slotted nut 19, the slot being of T shape, open at both ends, and arranged to receive the head 20 of the primary-valve stem 21. This primary valve is provided with two pistons 22 and 23, having suitable cup-leathers or packings, the valve-body proper being preferably screwed into the guiding-block 24 at the lower end of the stem 21. The guide-block is of spider or cross shape to allow fluid to flow past it within the valve-cage 25. This cage is provided with two series of annular ports 26 and 27 and is secured within the casing 28, having annular channels 29 and 30 arranged to register with the ports 26 and 27. This valve-casing is formed as the intermediate hub member of the motor-valve 31. This motor-valve is provided at opposite ends with a larger piston 32 and a smaller piston 33, fitting in correspondingly-bored portions of the motor-valve casing. These pistons are packed by cup-leathers, as shown, or in any suitable manner. Between the smaller bore for the piston 33 and the outlet-port 34 is provided an annular exhaust and inlet port, this being controlled by the smaller piston. This annular port 35 leads into the main chamber and cylinder. The water-inlet is shown at 36 in Fig. 6 and in dotted lines in Fig. 5. A channel 37 is bored through the main motor-valve to connect the channel 29 of the primary-valve casing with the space on the outer face of the larger piston of the motor-valve. This space is closed by a large cap 38, which is screwed on and may be removed. When so removed, the entire motor-valve and primary valve may be pulled out through the opening, the head 20 of the primary valve sliding out of its T-shaped containing-slot which extends in line with the bore of the motor-valve casing. Another channel 39 connects the lower channel 30 of the primary-valve casing with the outer face of the smaller piston of the motor-valve. The valve-stem 17 extends through suitable packing 40 in a cap screwed into the upper central portion of the valve-casing.

In the operation of the device the water

enters through the port 36 with the parts in the position shown in Fig. 1. It passes in through the spider or guide of the primary-valve stem and thence down inside the valve-cage to the port 26. It flows through these ports into the upper channel 29 and thence through the channel 37 to the outer face of the larger piston of the motor-valve. This water moves the larger piston of the motor-valve over to the position shown in Fig. 1, and thereby opens the annular port 35, so that the water flows from around the casing of the primary valve up and into the cylinder. This causes the weight or main piston to be pushed up to the upper end of its travel in the main cylinder. As the piston nears the upper end of its travel the valve-stem 17 lifts the primary valve upwardly within its cage, and thereby connects the ports 26 and 27, which are then between the two pistons of this valve. This allows the water on the outer face of the larger piston to flow back through the passage 37 and ports 26 and 27 and channel 39 to the exhaust. This allows the motor-valve to move back to its original position, and thus opens the port 35 to the outside of the smaller piston. The water in the main cylinder then flows out through the port 35 and into the exhaust-port 34. The main piston descends and near the lower end of its movement moves the primary valve downwardly to the position of Fig. 1. The cycle of movement then begins again, as above described.

The advantages of my invention result from the simple and easily-accessible construction, which is not liable to get out of order. The placing of the primary valve in the motor-valve structure enables it to be drawn out with the motor-valve when the parts are lowered and the large cap is unscrewed. The movement of the motor-valve is not interferred with, as there is a sliding connection between the primary valve and its upper actuating-stem. The detachable connection between the stem 17 and the main piston is of advantage, as these parts can be easily detached by removing the casing 2 and pulling up the piston. The number of bored passages or water-channels is small and the device is simple, compact, and easily inspected and repaired.

Many changes may be made in the form and arrangement of the various parts, since I consider myself the first to locate the primary valve in the motor-valve and at an angle to the axis of the motor-valve, as well as the first to provide a sliding connection between the primary valve and the stem which actuates it.

I claim—

1. In a hydraulic air-compressor, a main cylinder, a piston therein, a water-controlling-valve chamber having different diameters, a motor-valve having pistons of different size fitting in the valve-chamber, a primary valve located wholly within the movable motor-valve and at an angle to the axis of the motor-valve, and a stem arranged to actuate the primary valve; substantially as described.

2. A hydraulic air-compressor comprising a main cylinder, a piston therein, a water-controlling-valve chamber having different diameters and extending across one end of the main cylinder, a motor-valve having pistons of different size fitting in the valve-chamber, a primary valve located within the motor-valve structure and extending at an angle to the axis of the motor-valve, a stem actuated by the piston and sliding connections between such stem and the primary valve; substantially as described.

3. In a hydraulic air-compressor, a main cylinder, a piston therein, a water-controlling-valve chamber having different diameters and extending across the main cylinder, a motor-valve having pistons of different size fitting in the valve-chamber, a removable closure for the larger end of the motor-valve chamber, and a primary valve located in the valve structure and removable therewith through the larger bore of the motor-valve chamber; substantially as described.

4. In a hydraulic air-compressor, a main cylinder, a piston therein, a water-controlling-valve chamber having different diameters and extending across the main cylinder, a motor-valve having pistons of different size fitting in the valve-chamber, a primary valve located in the motor-valve structure, and a stem arranged to actuate the primary valve, the motor-valve having passages leading from the outer faces of its piston to the primary valve therein; substantially as described.

5. A hydraulic air-compressor comprising a main cylinder, a piston therein, a water-controlling-valve chamber having different diameters and transversely of the main cylinder, a motor-valve having pistons of different size fitting in the valve-chamber, a primary valve located wholly within the motor-valve structure and extending at an angle to the axis of the motor-valve, a stem actuated by the piston, and a connection between said stem and the primary valve arranged to allow movement of the primary valve transversely to the axis of the stem; substantially as described.

In testimony whereof I have hereunto set my hand.

CLARENCE R. JONES.

Witnesses:

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L. A. CONNER, JR.