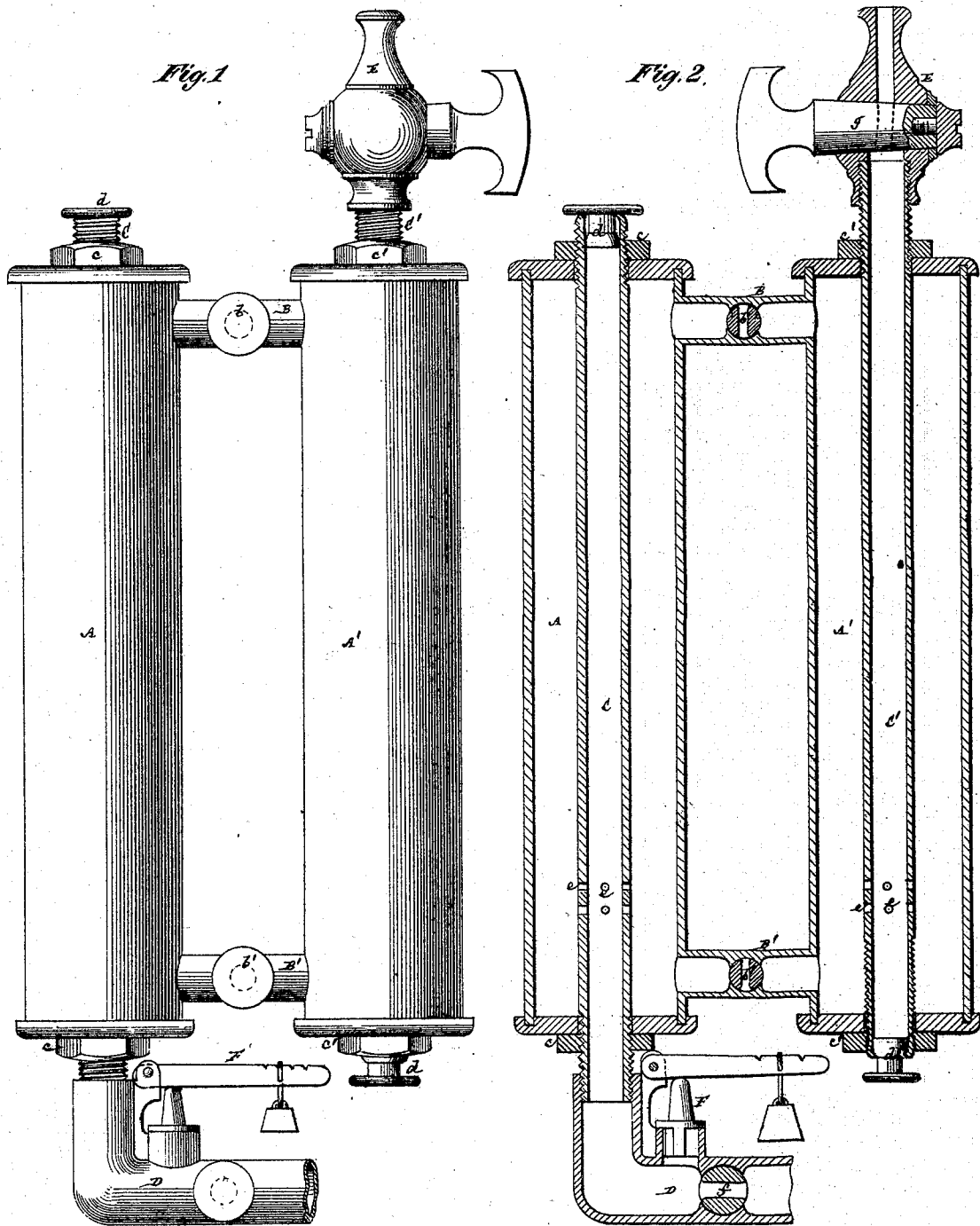


W. D. GRIMSHAW.

Pressure Accumulator for Hydraulic Presses.

No. 123,169.

Patented Jan. 30, 1872.



Witnesses:

Fred Hayes
R. Rabear

W. D. Grimshaw

UNITED STATES PATENT OFFICE.

WILLIAM D. GRIMSHAW, OF ANSONIA, CONNECTICUT.

IMPROVEMENT IN PRESSURE-ACCUMULATORS FOR HYDRAULIC PRESSES.

Specification forming part of Letters Patent No. 1-3,169, dated January 30, 1872.

To all whom it may concern:

Be it known that I, WILLIAM D. GRIMSHAW, of Ansonia, in the county of New Haven and State of Connecticut, have invented a new and useful Improvement in Pressure-Accumulators for Hydraulic Presses and other purposes; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing forming part of this specification, and in which—

Figure 1 represents a side elevation of a pressure-accumulator constructed in accordance with my invention, and Fig. 2 a sectional elevation thereof.

Similar letters of reference indicate corresponding parts in both figures of the drawing.

This invention relates to devices for accumulating power, by means of compressed air, in hydraulic presses and other apparatus of a similar description, in which water is forced by the action of a pump into a cylinder or cylinders and caused to act upon a plunger or plungers therein to produce a compressive force. In such presses and apparatus there is naturally an irregularity of action and temporary stoppage each beat of the pump, which is very detrimental and objectionable in some kinds of work; hence the use of compressed air between the pump and plunger of the press has been found very advantageous by accumulating pressure and giving a steady and elastic action to said plunger. But in cases where a heavy pressure is required much difficulty has been experienced in storing the air, owing to the heat generated in compressing it, which interferes with the close fit and working of the valves of the pump employed in producing it, and is otherwise objectionable; also, when such compressed air acts upon the surface of the water through the intervention of pistons much difficulty is experienced in keeping the latter tight, and the complication of such an arrangement is a drawback to its adoption.

My invention consists in a novel construction of pressure-accumulator, in which a series of reservoirs in valvular communication above and below are used, the one of said reservoirs being provided with an inlet at its lower end, and the other or succeeding reservoir having an outlet at its upper part arranged to extend downward within it, whereby a charge of com-

pressed air may be stored in the reservoirs through the direct agency of the water without the intervention of pistons, and a highly-compressed force be conveniently obtained upon the surface of the water in its way to the press, free from all overheating of the valves of the pump and other objections. The invention also consists in a combination with said devices of perforated dip-pipes or tubes arranged to extend through the reservoirs and serving as braces to strengthen the latter.

In the accompanying drawing but one pair of air-compression chambers or reservoirs is shown, but the accumulator may be made up of any greater number in a series; or provision may be made for working separate series at different pressures, as in hydraulic apparatus employing a series of plungers to work under different loads. A A' are the two cylinders or reservoirs, connected, top and bottom, by means of pipes or passages B B', fitted with cocks or valves *b b'*. Running longitudinally through said reservoirs are tubes C C', secured, by nuts *c c'*, outside the ends of the reservoirs, and serving to brace or strengthen the reservoirs. The one end of each of these tubes may be fitted with a valvular or other stopper, *d*, and said tubes are perforated at their lower portions within the reservoirs, as at *e e*, whereby they are made to form dip-tubes or passages. D is a pipe fitted with a stop-cock, *f*, and connecting the lower end of the tube C with the pump. E is an attachment fitted with a cock, *g*, connecting the upper end of the tube C', with the cylinder of the press. F is a safety-valve for regulating the pressure in the reservoir.

The operation is as follows: The several valves being properly adjusted and cock *g* closed, air is first pumped by the pipe D into the reservoir A or reservoirs A A' till a certain amount of pressure has been obtained, beyond which it would be inconvenient or impracticable, on account of the heat generated, to continue the compression by an air pump. The cocks *b b'* are then closed and the pump made to force water into the reservoir A through the perforated tube C until a pressure is attained of air in the upper portion of said reservoir in excess of that of the compressed air in the reservoir A', after which the cock *b* is opened and the more densely compressed air in A, or a large

portion of it, allowed to pass into the reservoir A' and commingle with and add to the pressure of the air in the reservoir A'. The cock *b* is then again closed, the water run back from or lowered in the reservoir A, and afterward a fresh charge of still more highly compressed air deposited in the upper portion of the reservoir A by forcing water up into said reservoir, as before, and the cock *b* subsequently opened to give increased force to the air in A'. This operation is repeated until a pressure of sufficient force has been obtained in the reservoir A', when, the cocks *b b'* being both opened, the water is caused to stand at the same level in both reservoirs and the spaces above the water equally charged with compressed air of much greater density than it would be practicable, owing to the overheating of the valves, to attain by a mere air-pump. The cock *g* is then opened and the water supplied to the press up the pipe C', subject to the controlling action of the highly-compressed air in the upper portions of the reservoirs A A', and whereby an accumulated pressure is obtained that serves to maintain the working-power of the piston

or plunger of the press, free from all perceptible irregularity consequent on the alternate action of the pump or otherwise, and this without the necessity of accurately-fitting pistons in the accumulator, the water, in the present case, forming a sealed joint that prevents escape of the compressed air.

What is here claimed, and desired to be secured by Letters Patent, is—

1. A pressure-accumulator composed of a series of reservoirs in valvular communication above and below, and provided with an inlet at the lower end of one reservoir and an outlet arranged at the upper part of a (or the succeeding) reservoir, and with one or more dip-tubes or passages, substantially as and for the purpose or purposes herein set forth.

2. The combination of the perforated tubes and braces C C' with the reservoirs A A', the inlet D, the outlet E, and the valvular connections B B', essentially as shown and described.

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Witnesses:

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