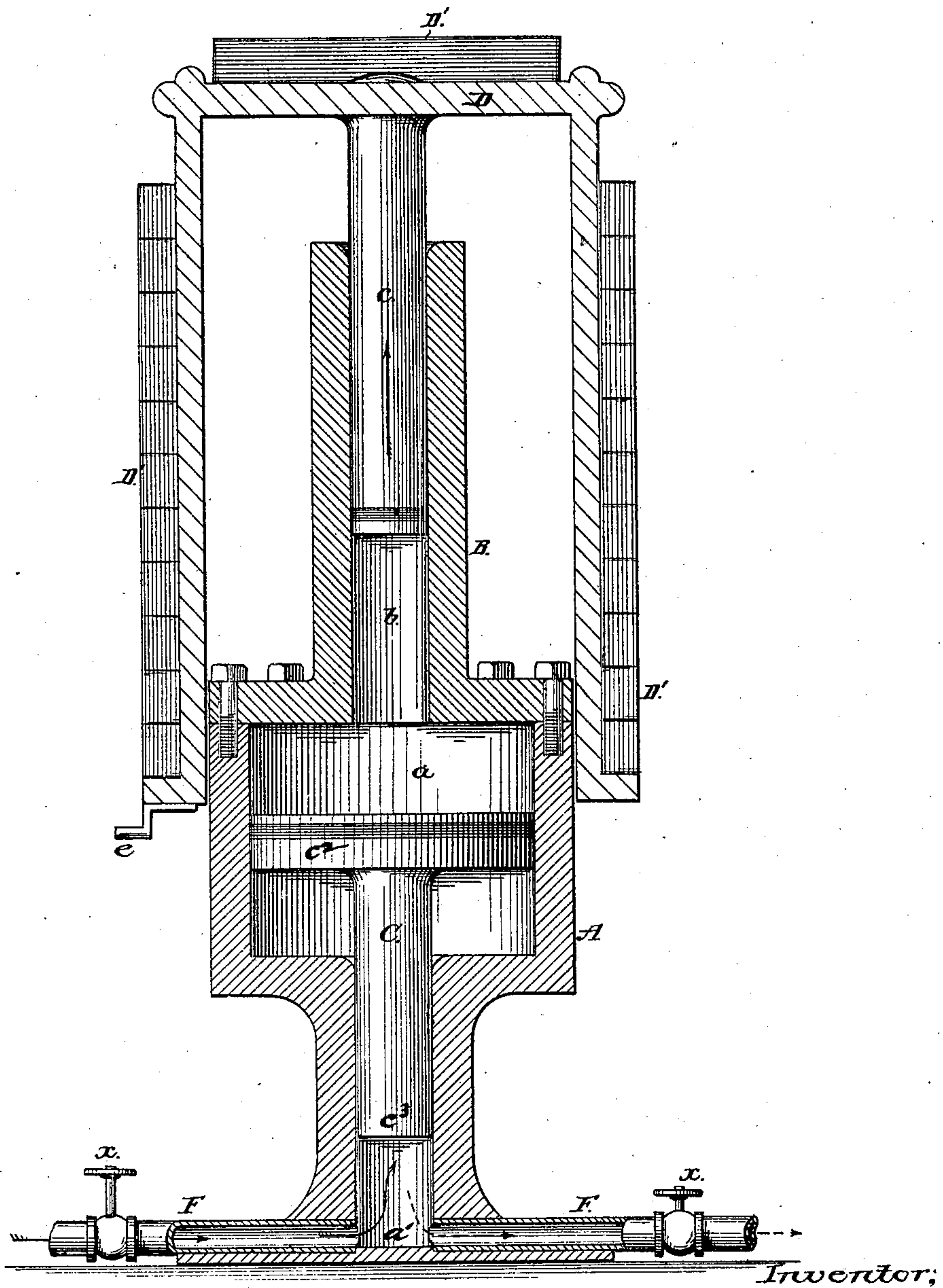


W. D. GRIMSHAW.  
Hydraulic-Power Accumulator.

No. 202,435.

Patented April 16, 1878.



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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN HYDRAULIC POWER-ACCUMULATORS.

Specification forming part of Letters Patent No. 202,435, dated April 16, 1878; application filed March 6, 1878.

*To all whom it may concern:*

Be it known that I, WILLIAM D. GRIMSHAW, of the city, county, and State of New York, have invented a new and useful Improvement in Power-Accumulators for Hydraulic Presses; 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 a part of this specification, in which the figure represents an elevation, partly in section, of an apparatus embodying my invention; and, in order to enable others to understand and use the same, I will proceed to refer to the state of the art relating to its kind, and describe the construction and operation.

This invention relates to that class of power-accumulators composed of a hollow cylinder, within which a plunger is free to move, and to which is connected or suspended a weight proportional to the power required, water or other fluid being introduced into said cylinder, by a suitable injecting apparatus or pump, in such manner as to act upon and elevate said weighted plunger, and be subsequently utilized, under such pressure, to operate the rams or pistons of hydraulic presses, or for other purposes where such fluid-pressure may be required.

The invention consists in the introduction and adaptation of a differential piston, arranged within a compound chamber between the weighted plunger and outlet of said cylinder, with sufficient space on either side of said piston to contain water or other fluid, all as hereinafter described and claimed.

In the drawing, A represents that portion of the cylinder containing the differential piston, and B the upper portion, in which the weighted plunger C is arranged. D represents a frame, connected to the top or extended part of the plunger, for supporting the weight D'. This frame may be constructed of any convenient form relative to the accumulator, or to the surrounding space, to support the weight, and, if preferred, an annular or other shaped receptacle for containing a weighty substance, such as metal scrap, may be substituted.

The inlet and discharge orifices are located near the base of the accumulator, as shown, and connect respectively, by suitable pipes F, provided with stop or check valves *x x*, with

the pumps and press-cylinders. The chamber *b* should be constructed of such capacity as to contain the weighted plunger C, and the displacement of said plunger should be about equal to the capacity of that portion of the communicating-chamber *a* above the head *c*<sup>2</sup> of the differential piston *c*, and the capacity of the lower portion *a'* of said chamber beneath the head *c*<sup>3</sup> of the differential piston should be great enough to contain a quantity of water sufficient to supply any number of press-cylinders in connection therewith, for example.

The relative proportions of the various parts composing this invention will, of course, be determined by the requirements of the work to be performed, and with a given pressure and length of stroke and number of such strokes in a given time, and the number of press-cylinders to be supplied, the capacity of the accumulator beneath the differential piston may be determined, and from this the necessary strength and the relative size of the remaining parts to fulfill the above conditions can be readily ascertained.

With a given weight the introduction of the differential piston increases the fluid-pressure in proportion to the difference in the areas of the ends of its respective heads, while the travel of such pistons is correspondingly lessened.

The function of this well-known form of piston being well understood, it is not deemed necessary herein to enter further into the details of its application to this purpose, and in the use of this invention, as compared to the class to which it relates, heretofore referred to, there is no difference, except the maintenance of a fluid substance (either oil, water, or other analogous fluid) to fill the space between the weighted plunger C and the differential piston.

This fluid may be introduced through an aperture leading to said space and a suitable plug or cock inserted therein, and the plunger and piston may be provided with any well-known form or kind of fluid-tight packing.

The accumulator may be charged with a continuously-acting force-pump, and when the desired elevation of the weighted plunger is attained the pump may be automatically

caused to cease delivering water to the accumulator by means of a device attached to the frame D, connecting at the desired part of its upward movement with, and operating to close, the induction-valve of the pump, or to operate its delivery-valve to direct the water elsewhere, thus preventing an overcharge of the accumulator and avoiding all accident from this source.

Various methods may be devised to effect this result, and in the return or descending movement of the frame the pump may be automatically caused, in like manner, to recharge the accumulator.

When the advantages attending the use of this class of accumulators are considered, as regards safety, constant and uniform pressure throughout the entire stroke of the plunger,

and the greatly-increased power attainable as compared with other known types of accumulators, my improvement, which greatly increases the efficiency of the invention, will be readily appreciated.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

A power-accumulator consisting of a compound hollow cylinder, provided with a weighted plunger, a differential piston arranged between said plunger and the inlet and discharge openings of the cylinder, and an intermediate fluid, substantially as described.

WILLIAM D. GRIMSHAW.

Witnesses:

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L. W. SLOAT.