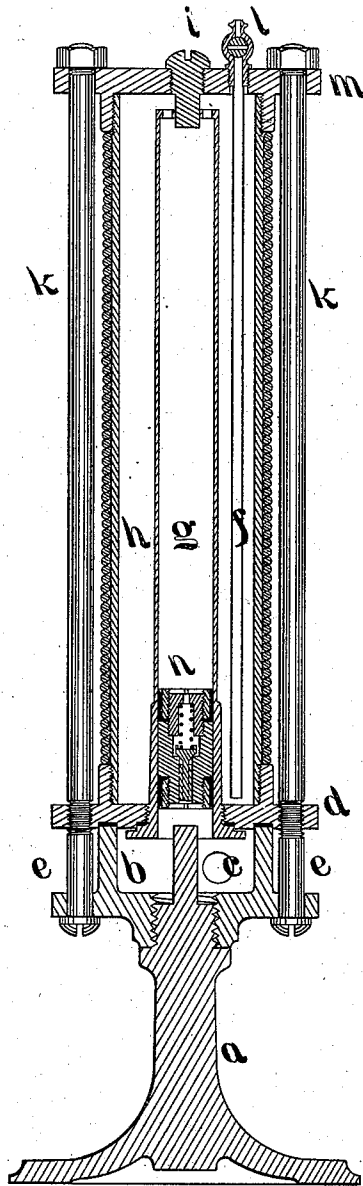


T. SHAW.
Hydraulic Pressure Accumulator.

No. 214,716.

Patented April 22, 1879.



WITNESSES: *Elias J. Shaw*
J. J. Richards

Thomas Shaw INVENTOR

ATTORNEY

UNITED STATES PATENT OFFICE.

THOMAS SHAW, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN HYDRAULIC-PRESSURE ACCUMULATORS.

Specification forming part of Letters Patent No. **214,716**, dated April 22, 1879; application filed April 19, 1878.

To all whom it may concern:

Be it known that I, THOMAS SHAW, of the city and county of Philadelphia, Pennsylvania, have invented a new and Improved Hydraulic-Pressure Accumulator; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing, and to the letters of reference marked thereon.

My invention consists in the provision of a pressure floating piston in an air-chamber cylinder, and in the inclosing of a light piston-cylinder within a powerful hydraulic cylinder, and in the construction of hydraulic cylinders and operating the same, all for the purpose hereinafter described.

The object of the invention is to store up fluid-pressure by the compression of gases, and to utilize the same without loss of the elastic medium, and to construct the device in a cheap and durable manner, as hereinafter described.

In order to enable others to use and practice my invention, I will proceed to describe its construction and operation.

On reference to the accompanying drawing, which forms part of this specification, the sketch represents a vertical section through the center of apparatus, of which—

a is a pillar supporting the entire apparatus, and is firmly secured to cylinder *b*, which is provided with an inlet and outlet aperture, *c*, and is firmly secured to cylinder-head *d* by screws *e*. *g* is a drawn-brass or light cylinder-tube, provided with a screw-thread at its lower end, to enable a firm attachment to cylinder-head *d*, and is supported from any lateral motion by screw *i*, projecting through the upper cylinder-head, *m*. The said tube *g* is provided with apertures at the top, opening into the space formed by cylinder *h*, and is open at the lower end into chamber *b*, and contains a moving piston, *n*, which piston is provided with ordinary cup-packing at both ends, and with a central aperture through the same, with an ordinary valve in said aperture opening upward, all for the purpose as hereinafter described.

The cylinder *h* is constructed of a light lap-welded tube, screwed into cylinder-heads *d* and *m*, and the longitudinal strain of internal

pressure is taken up upon bolts *k*, and the cross-strain of internal pressure is taken up upon successive coils of wire wound in a uniform and permanent manner around said tube, the ends of said wire being secured in a firm manner, all for the purpose as hereinafter described.

f is a small tube that leads to the bottom of chamber *h*, for the purpose of drawing off fluid from said chamber through cock *l*, for the purpose hereinafter explained.

The device is operated in this wise: Air or other gas is forced into chamber *h* through cock *l*, or other convenient inlet, until a pressure of air shall have accumulated in said chamber equal to the minimum or desired hydraulic pressure. The pressure of air within chamber *h*, having access to the interior of tube *g* through the aperture in the top of said tube, presses heavy upon piston *n*, and forces down upon the supporting end of pillar *a*, which projects up through chamber *b*. The slender tube *g* is not injured by any pressure applied in this manner, by reason of the pressure being the same on both sides, rendering it competent to use cheap drawn tubes for this purpose. After the chamber is charged with air the apparatus is in working condition, and ready for attachment to any hydraulic machine, wherever it is desirable to accumulate, store up, and give out hydraulic force.

The attachment is made by ordinary tube to aperture *c*, and an excess of pressure fills the chamber *b* and forces against the lower end of piston *n*, and whenever the pressure is slightly in excess of the air-pressure within chamber *h* the piston will rise, making room for the storage of fluid-pressure, which is expelled and fed to the hydraulic machine whenever there is a demand for the same, made evident by release of pressure in chamber *b*. The piston *n* floats between the two extremes of pressure, and makes a movable wall between the fluid and gas pressures, that prevents absorption of the gas by the fluid, and prevents the escape of gas on the release of the fluid-pressure.

The piston on the extreme upper stroke meets an obstruction in screw *i*, which limits its motion, and any further forcing of fluid is prevented from bursting tube *g* by the escape-

valve in piston *n*, which in that case permits the fluid to flow through the piston until chamber *h* be filled with the maximum pressure.

The said valve in piston *n* is provided with an ordinary spiral spring, that presses upon the valve, preventing its opening on all occasions except in the emergency described, and for which it is provided as a measure of safety against the bursting of tube *g*.

The tube *f* and cock *l* enable the drawing off of any accumulated fluid in the base of chamber *h*.

What I claim, and desire to secure by Letters Patent, is—

1. The combination of the receptacle *h*, internal light-metal tube, *g*, communicating with the receptacle *h* at the upper end, and the piston *n*, sliding in the tube *g*, and provided with an inlet-valve, substantially as set forth.

2. The combination of the tube *g*, its outlet-

openings and piston, and self-acting inlet-valve, constructed and arranged to permit the fluid to pass through the piston when the pressure below is excessive, and when the motion of the piston is arrested.

3. The combination of the tubes *g h*, heads *d m*, bolts *k k*, sliding piston *n*, and pillar *a*, supporting the whole, substantially as set forth.

4. The combination, with the cylinders *g h* and piston *n*, of the tube *f* and cock *l*, substantially as specified.

5. The chamber *b*, in combination with the chamber *h*, stationary tube *g*, and piston *n*, sliding in said tube *g*, substantially as set forth.

THOMAS SHAW.

Witnesses:

ELIAS J. SHAW,
T. J. RICHARDS.