

(No Model.)

HYDRAULIC AUTOMATIC SAFETY VALVE.

No. 509,992.

Patented Dec. 5, 1893.

Fig. 1.

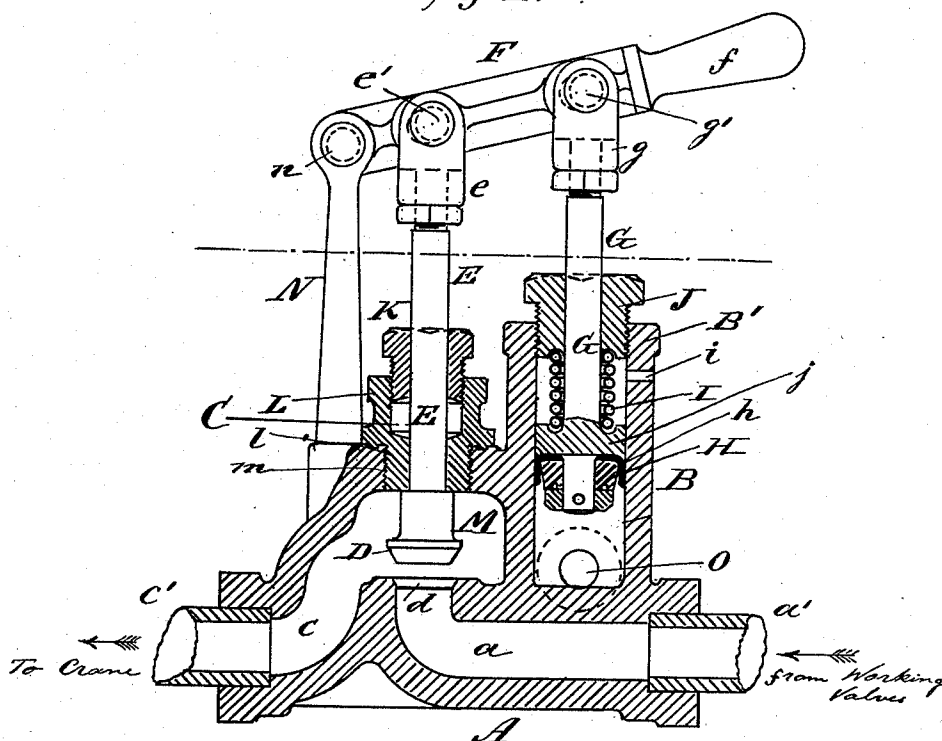
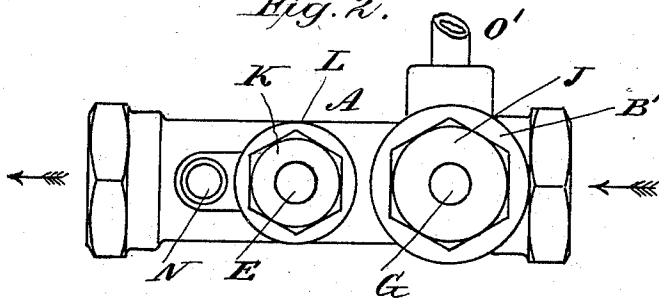


Fig. 2.



WITNESSES:

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INVENTOR:

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UNITED STATES PATENT OFFICE.

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HYDRAULIC AUTOMATIC SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 509,992, dated December 5, 1893.

Application filed January 10, 1893. Serial No. 457,929. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. WOOD, a subject of the Queen of Great Britain, and a resident of Media, in the county of Delaware and State of Pennsylvania, have invented certain new and useful Improvements in Hydraulic Automatic Safety-Valves; and I 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 appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a sectional view, on a longitudinal vertical plane, of my automatic safety-valve for hydraulic machines; and Fig. 2 is an external view of the same in plan, the parts above the broken line in Fig. 1 having been removed.

Like letters of reference designate corresponding parts in both the figures.

This invention has relation to hydraulic cranes, accumulators, and other hydraulic machinery, and has for its object to remove the danger and injury incident to the use of that class of machines through the breakage of the supply pipes or other parts of the hydraulic connections by which water under heavy pressure is fed to the machine from the accumulator or pressure reservoir.

With this object in view, my invention consists in the novel construction and combination of parts of an improved automatic safety-valve, as will be hereinafter more fully described and particularly pointed out in the claim.

Referring to the drawings, the reference letter A denotes a substantial casing of the shape shown, and containing the valve-chamber M, which communicates on its under side, through a circular aperture forming the beveled valve-seat *d*, with the throat *a*, and on one side with another curved throat *c*. The latter has screwed into it a pipe, *c'*, leading to the working cylinder of the crane or other hydraulic apparatus, and throat *a* is similarly provided with a pipe *a'*, connecting it with the working valves by which the water under pressure is admitted to and exhausted from the working cylinder of the crane, accumu-

lator or other hydraulic machine, via the safety-valve and its outlet *c c'*. The casing A is further cast with a cylindrical extension B, and the valve-chamber M has at its upper end an interiorly threaded neck *m*, into which is screwed, by means of its screw-headed depending part *l*, a stuffing-box L, the enlarged upper end of which is also threaded to receive and seat the gland K, the lower rim of which bears against packing C placed within the stuffing-box around the valve-stem E. By screwing down the gland K, the packing may be compressed so as to make a tight joint around the valve-stem and prevent leakage. The stem E carries at its lower end a valve D, turned to fit the beveled valve-seat *d*, and, after passing through the stuffing-box and gland, which also serve as guides for the stem, giving it a true up-and-down motion, is attached at its upper end to a head *e*, which is hung loosely on a pin or fulcrum *e'*, projecting on one side from the hand lever F. This lever has its fulcrum *n* in a post or upright N, fastened upon the casing A, and is provided at its free end with a handle *f*. The cylinder B is cast with an open top, B', which is screw-threaded on the inside to receive a threaded cap or cover J, having a smooth central bore for the passage of a piston-rod G, carrying a piston H at its lower end, which is provided with a cup-shaped leather packing *h*, to insure a tight fit within the cylinder. Piston-rod G, above the piston, has a circular disk *j*, which forms the lower abutment or bearing for a spiral spring I, the upper end of which takes against the under side of the threaded adjusting-cap J. It follows that by screwing this cap farther down into the threaded mouth B' of the cylinder, the tension of the spring may be increased, while it may be proportionately reduced by screwing the cap up so as to relieve tension on the spring and thus reduce the spring-pressure on piston H. On one side of cylinder B, above the piston and below the cap J, is a vent-hole *i*, to provide for the escape of air above the piston. The piston-rod G is connected at its upper end to a head *g*, which, in like manner as the head *e* of valve-stem E, has its fulcrum, movably, upon a stud or pin *g'* which projects laterally from the side of lever F. At the

bottom of cylinder B is an orifice O, connecting with a pipe O', which communicates with the hydraulic main.

From the foregoing description, taken in connection with the drawings, the operation of my safety appliance will readily be understood. Normally, the parts of the device are approximately in their relative positions illustrated in Fig. 1, that is to say, the water under pressure flows freely in the direction of the arrows through pipe a', throat or inlet a, valve orifice d, chamber M, throat c and pipe c', into the working cylinder of the crane, accumulator, or other machine to which the device has been applied. After starting the machine and as long as the hydraulic connections remain intact, the parts will be maintained in this position, because when the stop-valve which governs the water supply from the accumulator is opened, the water enters cylinder B by the pipe O' and orifice O and forces piston H upward, compressing the spring I and lifting lever F, and, with it, the valve-stem E and valve D. But if a break should occur in the hydraulic main or other connections, or in the reservoir of the accumulator, the water pressure within cylinder B will be instantly reduced, due to the leakage caused by the break, so that the tension of spring I will preponderate over the water pressure on the under side of the piston, forcing the same down and, with it, lever F and valve-stem E, which results in the instantaneous closing of valve D and stoppage of the flow of water through the device. The water contained in cylinder B now flows back into the main through the orifice O and pipe O', while the water in the throat a also flows back through pipe a'; but the water under its full pressure, as before the accident occurred, standing in chamber M, throat c, pipe c', and the working-cylinder of the machine connected therewith, cannot flow back as valve d D is closed, and the result is, that there will be no collapse of the machine, but its plunger or plungers (as the case may be) will remain stationary in the position or at the elevation to which they had been raised just before the accident, instead of coming down suddenly with a thud and probably causing great damage, and perhaps even loss of life, as must necessarily be the

case in the absence of my safety appliance, if the collapse of the accumulator or supply pipes should be (as sometimes happens) of such magnitude as to cause a sudden leakage of a considerable volume of water. By then raising the free end of lever E by means of its handle f, this water may be let out gradually through valve d D, thus gradually and slowly lowering the plunger of the machine to which the device is applied and avoiding all danger and injury, or it may remain closed until the pressure mains have been repaired.

It will be obvious to any skilled mechanic that the detailed construction of the device itself may be varied in unimportant particulars from the precise construction herein described and illustrated on the drawings without departing from the spirit of my invention.

What I claim, and desire to secure by Letters Patent of the United States, is—

A safety-valve or appliance for hydraulic machines comprising the following elements in combination, viz: a casing containing a valve-chamber provided with a port or inlet from the accumulator or pressure reservoir and a port or outlet communicating with the working cylinder of the machine, said ports being connected by an annular orifice forming a valve-seat; a cylinder disconnected from the valve-chamber and ports, but connected through a port near its bottom with the pressure-reservoir or source of supply; a lever of the second class; a piston and piston-rod working in the cylinder and articulated to the outer end of the lever; a valve-stem also articulated to the lever and carrying a valve at its lower end adapted to close the seat or orifice within the valve-chamber; a stuffing-box closing the valve-chamber on top and encircling the valve-stem, and an adjustable screw-cap closing the mouth of the cylinder and bearing against the spring within the same; all constructed and combined to operate substantially as and for the purpose herein shown and described.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

WILLIAM H. WOOD.

Witnesses:

AUGUST PETERSON,
BENNETT S. JONES.