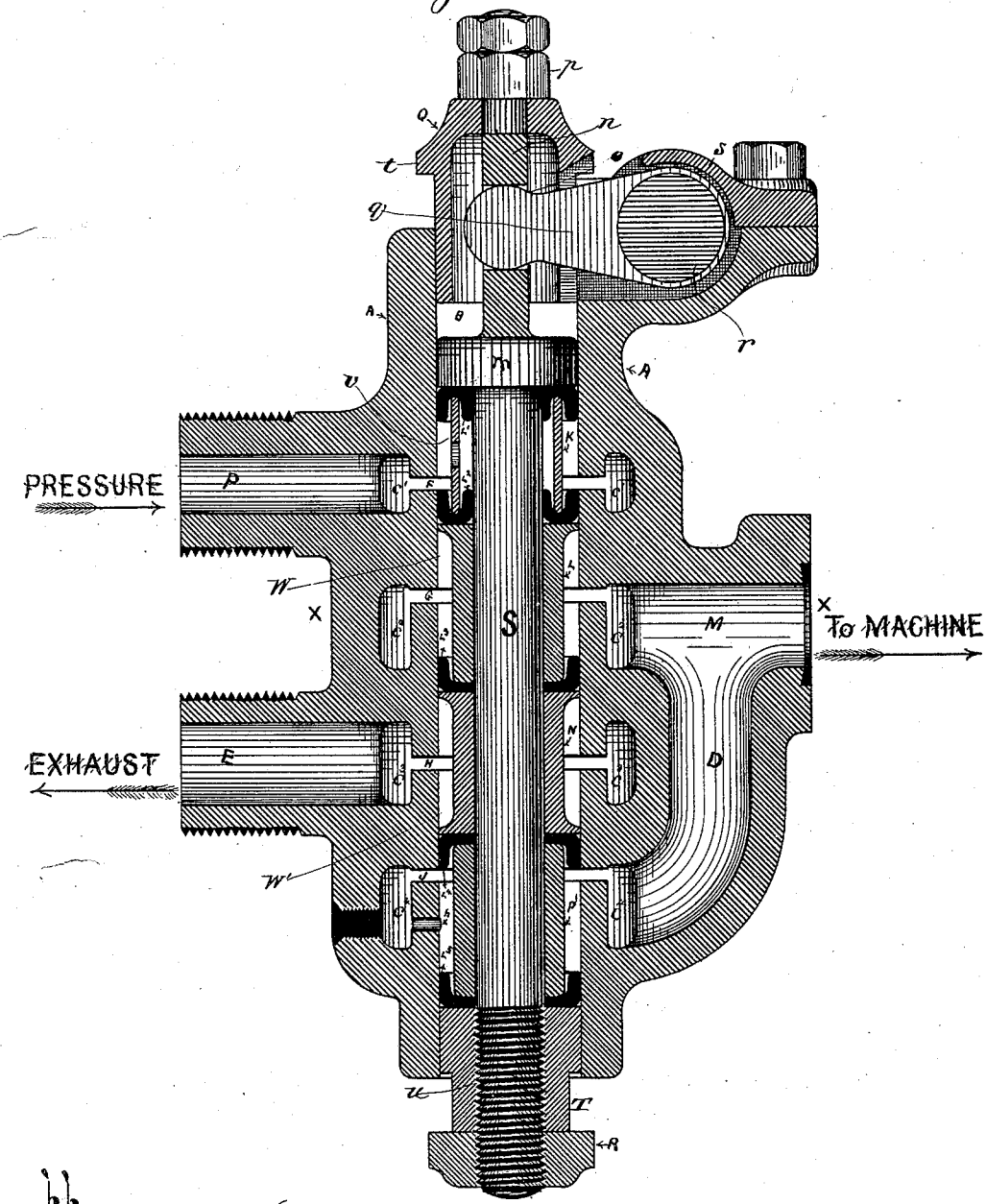
(No Model.) 2 Sheets—Sheet 1.

E. A. W. JEFFERIES.

VALVE.

No. 318,000. Patented May 19, 1885.

Figure, 1.



Witnesses: Jno. R. Morgan, Henry Heer

Inventor: E. A. W. Jefferies
By H. A. Seymour.
Atty.

N. PETERS, Photo-Lithographer, Washington, D. C.

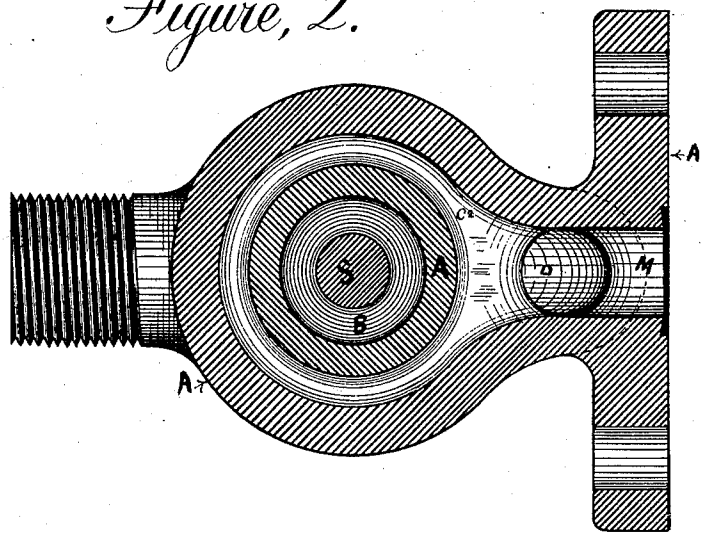
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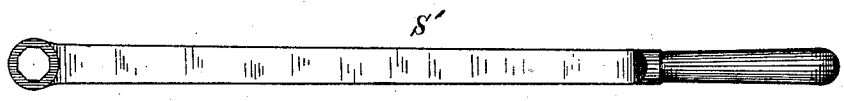
E. A. W. JEFFERIES.

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Figure, 2.





Fig, 3.

Witnesses: Jno. R. Morgan, Henry Heer

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UNITED STATES PATENT OFFICE.

EBENEZER A. W. JEFFERIES, OF ALLIANCE, OHIO.

VALVE.

SPECIFICATION forming part of Letters Patent No. 318,000, dated May 19, 1885.

Application filed October 29, 1883. (No model.)

To all whom it may concern:

Be it known that I, EBENEZER A. W. JEFFERIES, of Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in hydraulic valves.

Heretofore hydraulic valves have been provided with ports encircling the cylinder and communicating therewith. These ports have been made both circular and rectangular in form—that is to say, one port has been composed of a number of small circular or rectangular openings. When great pressure is exerted on the cup-leathers the latter will be forced snugly against the ports, and as the side walls of the port-openings, if rectangular, are in the same line as the movement of the cup-leather, and, if circular, the opposite side of the openings approximate closely to the line of movement of the cup-leather, the cup-leather becomes soon worn and abraded and must often be renewed.

The object of my invention is to obviate the objectionable features of the valves as heretofore constructed, and with that end in view I provide continuous narrow annular ports or openings, the upper and lower walls or edges of which are located at right angles to the line of movement of the valve, and thus the cup-leathers are at no time in contact with an edge or wall located in the line of their movement, and hence will not soon become worn or abraded. The inward pressure on the free end or edge of the cup-leather prevents the latter engaging the wall of the port and permits it to move freely over the port in opposite directions.

My invention consists in certain features of construction and combinations of parts, as will be hereinafter described.

In the accompanying drawings, Figure 1 is a view in vertical section of my improved valve. Fig. 2 is a transverse section through line *x x* of Fig. 1. Fig. 3 is a detached view of the operating-lever.

A represents the valve-cylinder, which is preferably made of gun-metal and provided with a central core, B, extending throughout its length.

Surrounding the core B are the four annular chambers C′ C^2 C^3 C^4. A pipe-coupling stem, P, connects with the core-chamber C′ and serves as an attachment for a pipe connecting with an accumulator. A stem, M, connects with the core-chamber C^2, by means of which the valve-chamber is connected to a machine to which the water, under pressure, is to be conducted. A stem, E, connects with the core-chamber C^3, for the attachment of an exhaust-pipe. A core chamber or passage, D, communicates with the core-chamber C^4 and the stem M.

Annular core-chambers C′ C^2 C^3 C^4 communicate with the central core, B, by means of the annular ports F G H J, which latter are formed by a suitable tool arranged to travel in the core B, while the cylinder revolves on the face-plate of a lathe. The inner edges of these annular ports are slightly rounded off to prevent the cutting of the packing on the piston as the valve is shifted.

A small port, *h*, is located below the annular port J, for a purpose hereinafter described.

S represents the valve-spindle, which is preferably made of steel, and is provided with a collar, *m*, near its upper end, which fits in the core B, and with an upward extension, *n*, provided with a slot, *o*, within which engages the arm or finger *q* for raising and lowering the spindle. The arm *q* is secured to a rock-shaft, *r*, supported in a suitable bearing, *s*, said rock-shaft having a handle, S′, secured to the end thereof outside of the valve-chamber for operating the valve.

To the upward extension *n* of the spindle S is secured by the nut *p* an inverted cup, Q, having a shoulder, *t*, said cup serving as a dust-cap, and also as a positive stop to the downward movement of the spindle.

The lower end of the spindle S is screw-threaded at *u*, and has secured thereto a cylindrical block, T, that fits within the lower end of the core B, and is secured against displacement by a nut, R.

On the spindle S are placed the four plain bushes or distance-pieces, K L N P′. The bushing K, located between the collar *m* and the bushing L, is provided at its opposite ends with the double cup-leathers L′ L^2. It is also

provided with one or more perforations, *v*, so that when it is in the position shown in Fig. 1, and the passage from the accumulator to the machine cut off or closed by the valve, the pressure from the accumulator will be exerted on the adjacent surfaces of the collar *m* and bushing L, which are of equal area, and hence the pressure is balanced and has no effect on the valve.

Between the bushings L N P′ and cylindrical block T are placed the single cup-leathers L^3 L^4 L^5.

Having described the construction and arrangement of parts of my improved valve, I will now describe its operation.

When the parts are in the position shown in Fig. 1, water can neither flow to nor from the machine with which the valve is connected. By raising the spindle S until the stop-nut R strikes the cylinder, the double cup-leather L^2 will have been carried above the annular port F, thereby allowing the water to flow from the accumulator through the stem P, annular core-chamber C′, annular port F, into the annular space W, from thence through the annular port G into the annular core-chamber C^2, and outwardly through the stem M to the machine. It will be observed that the double cup-leather L^2, in passing upwardly across the annular port F, is subjected to an inward pressure throughout its entire circumference, which has the effect of contracting its diameter, and thus it is prevented from being unduly worn or abraded by its passage over the port. By reversing the movement of spindle S to the position indicated in Fig. 1, the supply of water from the accumulator to the machine is cut off. By continuing the downward movement of the spindle until the positive stop *t* at the upper end of the spindle strikes the cylinder, the cup-leather L^4 will have descended below the annular port J, thereby allowing the water from the machine to exhaust through the core or passage D, annular core-chamber C^4, from thence into the annular chamber W′, around the bushing N, through the annular port H into the core-chamber C^3, and outwardly through the exhaust-stem E. Again, it will be observed that as the cup-leather L^4 moves over the port J it is subjected to a pressure on all points of its circumference which operates to contract its diameter, thereby preventing it from becoming unduly worn while in operation. Water under pressure inclosed between the cup-leathers L^4 L^5, when the spindle is depressed to allow the water to exhaust, is allowed to escape through the port *h* into the core-chamber C^4 through the port J, and from thence through the annular chamber W′, port H, port-chamber C^3, and outwardly through the exhaust-stem E, and thus relieve the cup-leather L^4 from outward pressure, and thereby being forced into the port J in repassing it on the next upward stroke.

It is evident that slight changes in the construction and arrangement of parts might be resorted to without departing from the spirit of my invention, and hence I would have it understood that I do not restrict myself to the exact construction and arrangement of parts shown and described; but,

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

1. In a valve, the combination, with an annular core-chamber communicating by a continuous narrow annular port or opening with the interior of the valve-chamber, and also communicating with the inlet or pressure stem, of a valve-spindle and cup-packing, the latter exceeding in width the width of said annular port, and adapted to be subjected to an inward pressure as it passes over said annular port, substantially as set forth.

2. In a valve, the combination, with an annular core-chamber communicating by a continuous narrow annular port or opening with the interior of the valve-chamber, and also with the exhaust stem or passage, of a cup-leather exceeding in width said annular port, and adapted to be subjected to an inward pressure as it passes over said annular port, substantially as set forth.

3. In a valve, the combination, with the pressure or inlet stem P, outlet-stem M, annular core-chambers C′ C^2, and the continuous narrow annular ports or openings F G, of the valve-spindle S, bushings K L, and double cup-leathers L′ L^2, the latter being of greater width than that of said narrow annular ports, substantially as set forth.

4. In a valve, the combination, with the exhaust-passages D E, annular core-chambers C^3 C^4, and continuous narrow annular ports H J, of the bushings N P′ and cup-leathers L^4 L^5, the latter exceeding in width that of said annular ports, substantially as set forth.

5. In a valve, the combination, with the exhaust-passages D E, annular chambers C^3 C^4, and ports H J *h*, of the valve-spindle S, bushings N P′, and cup-leathers L^4 L^5, substantially as and for the purpose set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EBENEZER A. W. JEFFERIES.

Witnesses:
JOHN H. LLOYD,
SAM. S. WEBB.