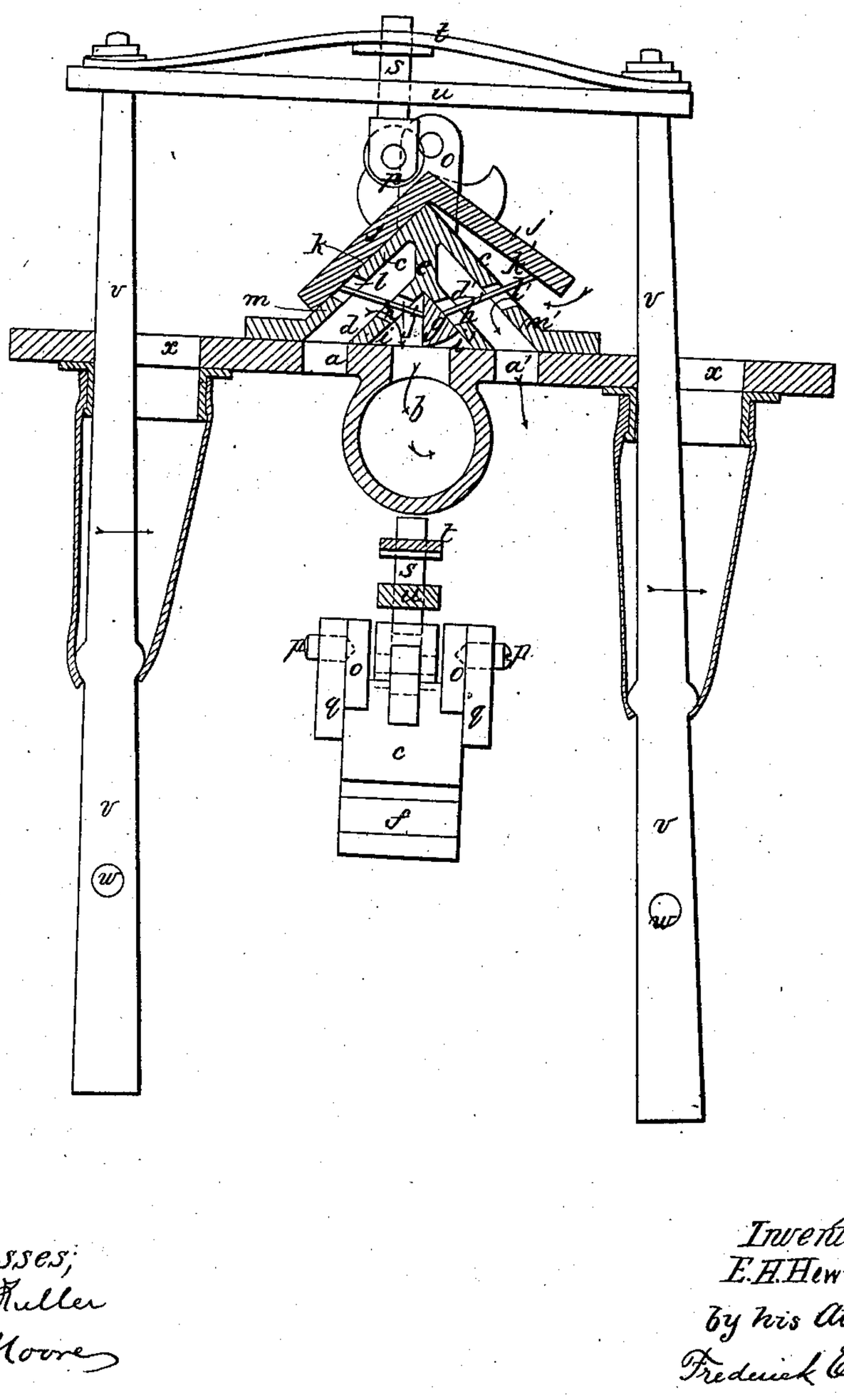
E. H. Hewins,

Steam Engine Valve.

No. 95,476. Patented Oct. 5. 1869.

Fig. 1.



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Letters Patent No. 95,476, dated October 5, 1869.

IMPROVEMENT IN VALVE-DEVICES FOR STEAM AND OTHER ENGINERY.

The Schedule referred to in these Letters Patent and making part of the same.

Be it known that I, EDMUND H. HEWINS, of Boston, in the county of Suffolk, and State of Massachusetts, have made an invention of certain new and useful Improvements in Steam and other Enginery; and do hereby declare the following to be a full, clear, and exact description of the same, due reference being had to the accompanying drawings, making part of this specification, and in which—

Figure 1 is a vertical and longitudinal view, and

Figure 2, a vertical and transverse section of a valve and valve-operating mechanism, embodying the principles of my invention.

The object of the invention herein described is to produce a valve for the various purposes of a steam or air-engine, gas or water-meter, or other machinery requiring a slide valve, so constructed that the pressure shall be equal upon all parts of it, thus enabling the valve to be easily and accurately operated, and diminishing wear between it and its seat, as well as preserving a perfectly tight joint between the two.

The inventive genius of the most skilled mechanics has been for years taxed to produce a device which shall travel over dead-points or centres, and where momentum from a fly-wheel or other analogous device cannot be obtained or applied.

In the drawings before mentioned as illustrating my present invention, *a a'* denote the two direct, and *b*, the exhaust-ports of a steam-engine, the arrangement of these ports being substantially the same as in ordinary steam-engines.

c, in the drawings, represents a block of metal placed over the ports *a a'* and *b*, such block, upon its exterior, being pyramidal in form, longitudinally of the path of movement of the valve, the interior of this block *c* being recessed upon opposite sides of its centre in order to produce apertures *d d'*, which form prolongations of the ports *a a'*, communication between the orifices or chambers *d d'* being cut off by a central partition, *e*.

The centre of the block *c* is chambered or recessed, as shown at *f*, this recess being pyramidal in outline, or corresponding to the general outline of the block, and forming a continuation of the exhaust-port *b*.

A valve, *g*, is placed within the valve-chamber *f*, and operates in conjunction with two twin valve-ports or orifices *h h'*, made through the partitions or valve-seats *i i'*, which divide or separate the said chamber *f* and the recesses or channels *d d'*.

Upon the outside of, and straddling the block *c*, I mount a V-shaped tilting valve, *j*, the inner faces of the two halves *k k'* of which act in conjunction with two twin orifices or ports *l l'*, formed through the inclined outer faces or sides *m m'* of the said block *c*, the sides thus becoming the primary or larger valve-seats.

The inner and smaller valve *a* is connected rigidly to the outer valve *j*, by rods, or their equivalents, by which means the two valves are induced to travel or move in unison.

The primary or larger valve *j* is suspended by means of two ears *o o*, formed upon its opposite sides, from a rod or fulcrum, *p*, which is supported, at its opposite ends, in posts or standards *q q*, erected upon opposite sides of the block *c*, or this fulcrum or rod *p* may be in two short pins upon each side.

Over the valve *j* I dispose a roller, *r*, such roller being pivoted within the lower end of a perpendicular rod or bar, *s*, which is suspended from a horizontal plate-spring, *t*, this spring being in turn supported upon the top of a cross-head, *u*, which unites the upper extremities of two vertical vibrating levers *v v*, these levers being fulcrumed at their lower ends, within the body of motor to which they are applied, these fulcra being denoted by the letter *w* in the drawings.

The vibrating levers pass upward through the tablet or shelf of the motor, in which the ports *a a'*, before mentioned, are formed, the orifices for the passage of such levers being shown at *x x*.

The rod *s*, which supports the roller *r*, should be provided with a suitable means of insuring its perpendicular condition, and should also be provided with suitable stops or rests to determine its proper lateral stoppages.

The operation of the above-described arrangement of parts will be readily understood by the intelligent reader.

Under the condition shown in the accompanying drawings, the port *a* is closed, the port *a'* being open presents a clear passage to one side of the cylinder or other motor, or a liquid meter, as the case may be.

At the same time the outer port *l* is closed by the valve *j*, while the port *h* is open, and a free passage is obtained from the opposite side of the cylinder, meter, or motor to the exhaust or discharge-pipe or outlet *b*.

The pressure thus obtained, whether by means of a piston or other suitable mechanism, gives motion to the arms *v v*, in the direction of the arrows thereon.

The levers or arms *v v*, being connected with the cross-head *u* and spring *t*, as explained, carry them also in the direction of the arrows, by this means forcing the roller *r* to mount the incline of the valve *j*, this elevation of the roll and its rod exerting a strain upon the spring.

The instant the roller *r* has mounted and passed over the summit of the valve *j*, the pressure of the roll upon the opposite incline or grade of the valve, through the power of the spring *t*, will suddenly throw the valve from off the seat which it is upon, and so as to cover the opposite seat, thus opening the port *l*, and closing the port *k*.

As the smaller and inner valve *g* is rigidly connected with the larger valve *j*, it travels with it, and consequently opens the port *h'* and closes the port *h*.

It will thus be seen that the currents, whether steam, water, or gas, are reversed, where there was before a passage from the supply-pipe to the body or measuring-chamber of the machine or cylinder, as the case may be, is now a passage from such body to the exhaust, and *vice versa*. Then would begin the movement of the levers *v v* back to their position shown in the drawings, reversing the operation.

In the case of a meter or any machine requiring a very slow motion without fly-wheel, or its equivalent, for aiding in passing the dead-point of the valve, it is necessary to have a spring or movable weight to change the valve, which motion should be secured in the least possible time.

Whenever it is desired to apply my invention to a steam or other motor, or whenever there is a sufficiently rapid motion, or sufficient momentum may in any way be obtained, the desired motion of the valve may be secured in the ordinary manner.

A very important peculiarity of this valve is that it is perfectly balanced, or as nearly so as is necessary.

It will be readily seen that when the ports are all of equal size, the valve will be perfectly balanced, whatever may be the pressure in supply or in the exhaust-pipes or ports.

Should it be necessary to have some pressure to keep the valve closed, the direct ports may be made of larger area than the outlet-ports, or the inlet-ports may be placed further from the centre or point of suspension from which the valve vibrates in changing than the outlet-ports, or by both means combined, but I think it will be better to keep the valve closed by mechanical means. In the case of the meter, this will be done by mechanical means, in the form of a spring pressure, or friction may be introduced in any convenient manner.

The faces of either direct or exhaust-ports, or both, may be provided with any elastic material, to secure certainty of closing the same.

In my construction of valve, I obviate the objection to the double puppet-valves now in use, wherein the valve and its seat expand in different degrees.

In a valve sufficiently large to create an appreciable amount of difference in expansion, in my invention the connections between the outer and inner valves *j* and *g* may be hung upon pins at either or each end, and any lengthening or contraction of these connections would move the exhaust-valve up or down, as the case may be, the inclination of the valve-faces being such that this movement of the exhaust-valve shall not carry it away from the seats.

In place of the above-described construction of valve, two single puppet-valves may be employed, connected by a lever pivoted at its centre, the exhaust-valve being made of such form as to fit the seats on each side.

I claim—

1. The two valves *j* and *g*, with their respective openings, ingress and egress-passages pertaining thereto, with the co-ordinate elements thereof, constructed, combined, and arranged substantially as above made known.

2. The combination and arrangement of the two valves *j* and *g*, when combined with suitable ports of entry and discharge for steam or other fluid, and with a proper actuating-mechanism, substantially as explained.

3. The duplex arrangement of the valves *j* and *g*, and the ports *i i'*, passages *d d'*, and ports *h h'*.

4. The valves *j* and *g*, as suspended from a point above the apex of the former, as represented, by which means one or both are retained upon the port closed by them until the roller *r* has passed over and beyond such apex, when the valve is suddenly shifted, the quantity of fluid which escapes in the interim being very slight, and of practically like amount under all conditions.

5. In combination with the above-described arrangement of valves and ports, a spring for effecting the reciprocations of the two valves *j* and *g*, for the purpose explained.

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