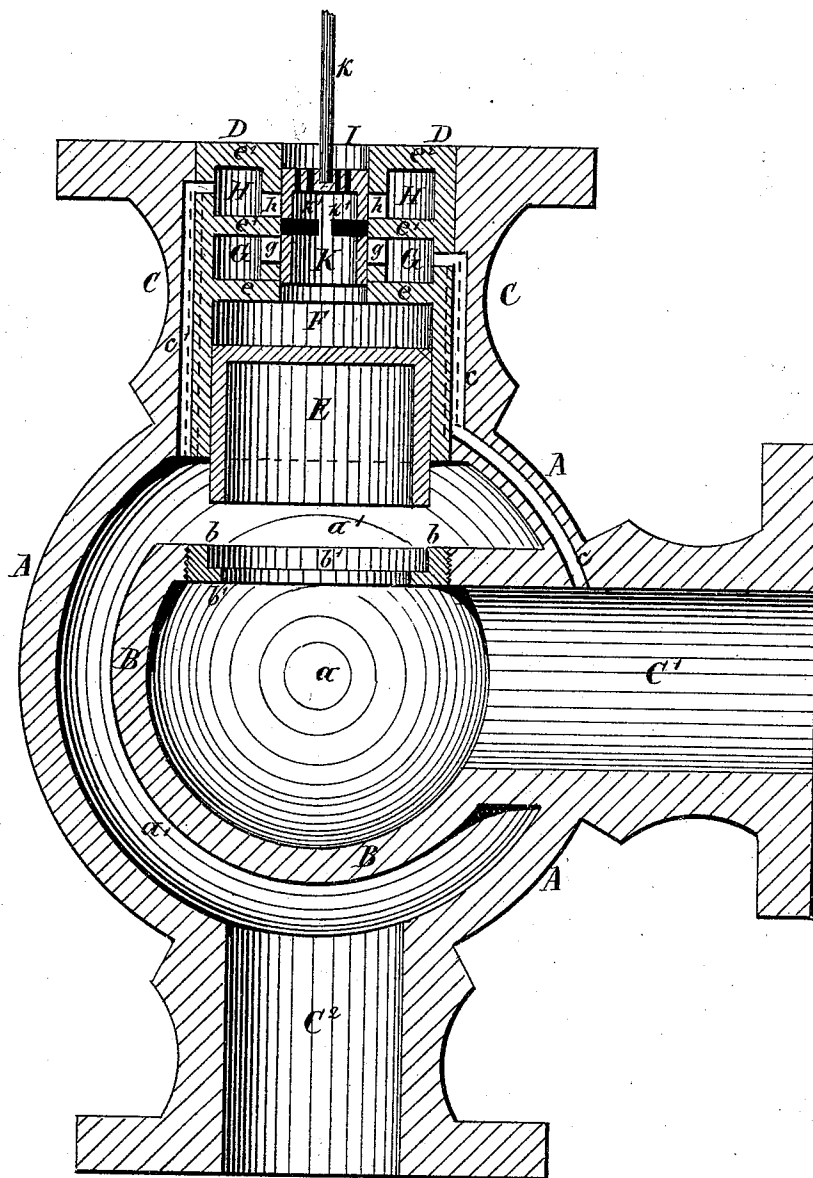


J. D. MIRACLE.
GOVERNOR-VALVE.

No. 175,485.

Patented March 28, 1876.



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UNITED STATES PATENT OFFICE.

JOHN D. MIRACLE, OF OSHKOSH, WISCONSIN.

IMPROVEMENT IN GOVERNOR-VALVES.

Specification forming part of Letters Patent No. 175,485, dated March 28, 1876; application filed September 6, 1875.

To all whom it may concern:

Be it known that I, JOHN DELLAMATTER MIRACLE, of the city of Oshkosh, in the county of Winnebago and State of Wisconsin, have invented certain new and useful Improvements in Globe-Valves, of which the following is a specification:

My invention has for its object the construction of a governor-valve for steam-engines in such a manner as to be very compact and simple, hence strong and durable, as well as cheap, and of smaller dimensions than those heretofore in use, and sensitive to the slightest variations of pressure, or to the variations of the position of the governor-balls—that is to say, to the slightest variations of the speed of the engine.

But that my invention may be fully understood, I will proceed to describe the same in detail by aid of the accompanying drawings, in which a vertical transverse section fully illustrates the construction and arrangement of the valve according to my invention.

The valve is one of that class or type known as the "spherical" or "globe" valve, and consists of a spherical shell, A, divided by a spherical partition, B, into two compartments, *a a'*, constituting one, *a*, the inlet, and one, *a'*, the outlet, chambers of the steam. The shell A has formed thereon, or is provided with, the valve neck or throat C, containing the valves, the neck or throat C¹ communicating with the generator, and the neck C² communicating with the cylinder or piston chest. D is the valve casing or bush, which is subdivided into four chambers or compartments, F G H I, by concentric diaphragms or partitions *e e'* *e''*. The diaphragm *e*, located about midway of the bush D, or nearly so, forms below it the chamber F, in which the valve proper, E, moves, and occupies the entire inner diameter of said bush D, below the diaphragm or partition *e*, and the latter and the diaphragm *e'* form between them a cylindrical expansion-chamber, G, a similar chamber, H, being also formed between the diaphragms *e'* and *e''*. These diaphragms *e e'* *e''* are concentric with the bush or casing D, and have a central circular aperture or opening forming a smaller cylindrical chamber, I, in which the secondary cylindrical valve K, actuated

by the governor-balls, moves. This chamber I is in communication with the valve-chamber F, as shown, and by means of steam-ports *g h* with the expansion-chambers G H, and consequently with the valve-chamber F. E is the valve proper, and consists of an inverted cylindrical cup, as shown, and has its seat in the detachable ring *b* in the spherical diaphragm or partition B, which has a circular opening formed therein, the inner periphery of which is screw-threaded for the reception of the valve-seat ring *b*, the outer periphery of which is also screw-threaded to fit the thread on the periphery of the aperture. Said ring *b* is provided with an inwardly-projecting flange or rim, *b'*, on which the valve E rests when closed. The ring *b* is made detachable, so as to facilitate its removal when worn out, and the insertion of a new one, and thereby avoid the necessity of employing a new casing or shell. K is the secondary smaller valve, consisting also of an inverted cup or cylinder, and is provided with a valve-stem or connecting-rod, *k*, by means of which it is connected to the governor-head and balls in any usual or preferred manner. The valve K has its top perforated by a series of holes or passages, for the purpose of allowing steam to pass freely through it, and thereby annulling the pressure or action of such steam on said valve K, and enabling the latter to move freely in its chamber I, and respond instantaneously to the slightest variation in the position of the governor-balls when the engine is running. The valve K has its seat in the partition or diaphragm *e'*, and has a concentric steam-port, *k'*, formed about midway of its length, and of a diameter equal to or not quite equal to the thickness of the diaphragm *e'*, said port *k'* extending almost around the entire circumference of said valve, leaving just sufficient metal to hold the two parts securely together, as plainly shown by the drawing. The valve throat or neck C has two steam-ports or vertical grooves formed therein, one, *c*, communicating with the inlet-chamber *a* and the expansion-chamber G, the other, *c'*, communicating with the outlet-chamber *a'*, and the expansion-chamber H, as plainly shown, and for this purpose the neck or throat C is made of increased thickness of

metal; or, if preferred, the grooves or ports *c c'* may be formed one-half in the neck C, and the other half in the bush or casing D, as shown by dotted lines in the drawing.

The movements of the valves E K are independent of each other, and the valve E is controlled by the valve K through the action of the governor-balls, and by the steam called into action through the movements of said valve K, through the expansion of the chambers G H, when the engine is running, or the valve K is actuated when the engine is at rest by the initial pressure of the steam not affecting the valve K.

The arrangement of the steam-ports *c c'*, as described and shown in the drawings, is adapted to that class of governors in which the rise of the balls depresses the valve. For the other class the ports *c c'* have their communications with the expansion-chambers G H reversed—that is to say, the port *c* communicates with the chamber H, and the port *c'* with the chamber G.

The operation of the valve is as follows: Assuming the engine to be at rest, and the spool or other communication of the ball arms or levers with the engine being so adjusted that the port *k'* of the valve K and the port *h* of the expansion-chamber H are opposite to each other, and thus form a continuous steam-passage from the outlet-chamber *a'* in the spherical shell A, up the port *c'*, into said chamber H, and thence by port *h* into the valve K, through port *k'*, and above said valve through the perforations, and below it to the upper face of the valve E, an open steam-passage, *c*, being also formed on the opposite side, communicating with the inlet-chamber *a* and the expansion-chamber G, the port *g* of which is, however, closed when the valve K is in the position described. On the admission of steam into the chamber *a* the valve E is raised, and steam is admitted to the cylinder-chest through the chamber or passage *a'*. Steam will also be admitted into the chamber G through port *c*, and through port *c'* into the chamber H, and through ports *h* and *k'* into the valve K, as well as above it through the perforations in its upper face, and below it to the upper face of the valve E. Under these conditions the valve E will oscillate up and down until the pressure of the steam above and below said valve is equal, when it will necessarily be suspended in equilibrium, and would remain in that position if the pressure were maintained—that is to say, if the speed of the engine were uniform. So soon, however, as the engine commences to work, the governor-balls also will commence to be revolved, depressing the valve K toward or into its seat, thereby closing the connection between the valve K and the chamber H, consequently shutting off the steam from above the valve E. When the speed of the engine is now further increased, the valve K will be depressed still more, and the port *k'*, coming opposite to the port *g*, admits steam under high pressure on the upper face of the valve E,

which will at once move downward toward its seat, shutting off the steam from the outlet-chamber *a'*, until, by the slackening of the revolution of the governor-balls, the valve K is again raised. The steam-port G will then be closed and the regulated speed of the engine restored, the valves E and K remaining in this relative position so long as that speed is maintained. Of course it will be understood that the action of the valves is gradual, according to the increase or decrease of the speed of the engine, opening or closing the valve E accordingly. It will thus be seen that the valve E is actuated by the expansive force of the steam directly acting on its upper face, and called into action by the movements of the secondary valve K, actuated by the governor-balls, which is a feature new in governor-valves; and it is also obvious that the very slightest variations of speed—that is to say, increase in pressure and volume of steam—at once act upon the valves through the governor-balls and the expansion-chamber G, and immediately restore the engine to its adjusted working condition. The valve, owing to its simplicity in construction, and especially its great sensitiveness, may be made of much smaller dimensions than those heretofore in use, and, consequently, the governor may also be made of reduced dimensions, nor is it so liable to get out of repair. The necks C C¹ C² may be made separately from the spherical shell A, and, by preference, I make the bush also separate, so that it may be removed and replaced by a new one when worn out. The parts are constructed of any suitable metal capable of withstanding the action of steam, and put together in any usual or preferred manner.

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

1. In a governor for steam-engines, the combination, with the main valve E, of a secondary valve, K, acting independently of and controlling the movements of the main valve E, said valve K having its upper face perforated, for the purposes specified, and provided with the circular port *k'*, as set forth.

2. The valve throat or neck C, having steam-port *c'* formed therein, as described, in combination with the bush D, expansion-chamber H, and outlet steam-chamber *a'*, and the valve K, constructed and operating substantially as shown and described.

3. The valve throat or neck C, having steam-port *c* formed therein, as described, with the bush D, expansion-chamber G, inlet steam-chamber *a*, and the valve K, constructed to operate substantially as shown and described.

4. The valve throat or neck C, having steam-ports *c c'*, the bush D, expansion-chambers G H, steam-chambers *a a'*, and the valves E K, when constructed and combined to operate substantially as described, and for the purposes specified.

5. The spherical shell A, necks or throats

C C¹ C², spherical diaphragm B, removable valve-seat *b*, steam-ports *c c'*, with the bush D, having expansion-chambers G H, and the valves E K, when combined and constructed to operate substantially as shown, and for the purposes set forth.

In witness that I claim the foregoing I have

hereunto set my hand and seal this 19th day of August, 1875.

JOHN DELLAMATTER MIRACLE. [L. s.]

Witnesses:

D. B. ALVERSON,
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