

A. JOHNSTON.

Combined Governors, Steam-Valves, and Cut-Offs.

No. 152,750.

Patented July 7, 1874.

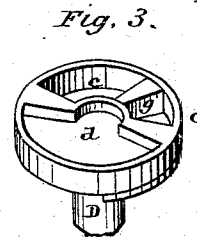
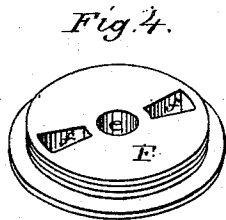
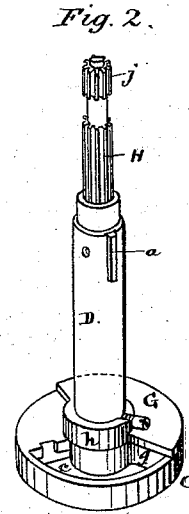
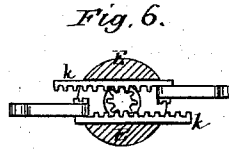
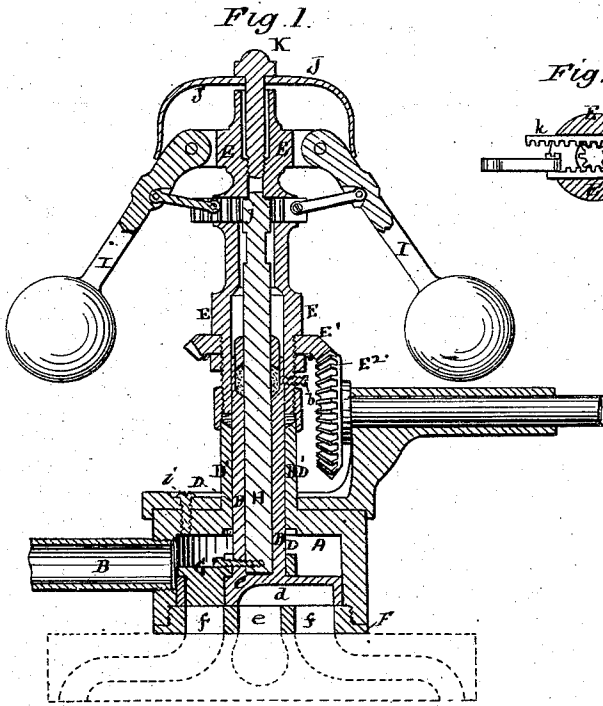
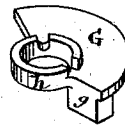


Fig. 5.



Witnesses.

Ernest A. Sick
John H. Wildman

Inventor

Allen Johnston
by atty. Howell

UNITED STATES PATENT OFFICE.

ALLEN JOHNSTON, OF OTTUMWA, IOWA.

IMPROVEMENT IN COMBINED GOVERNORS, STEAM-VALVES, AND CUT-OFFS.

Specification forming part of Letters Patent No. **152,750**, dated July 7, 1874; application filed May 16, 1874.

To all whom it may concern:

Be it known that I, ALLEN JOHNSTON, of Ottumwa, Wapello county, Iowa, have invented certain new and useful Improvements in Combined Governor, Steam-Valve, and Cut-Off for Steam-Engines, of which the following is a specification:

This invention, which relates to rotary valves, has for its object to maintain in the steam-cylinder full and uniform boiler-pressure, so long as the port in the chest leading to the cylinder is open, and to regulate the power by cutting off steam earlier or later in the stroke according to circumstances, the balance of the stroke being effected by expansion of the steam. To this end I combine with the rotary valve a cut-off which, while carried by and rotating with said valve, is, at the same time, connected with and operated by the governor to move independently of the valve, so as to decrease or increase, according to the speed of the engine, the length of the steam opening or slot in the valve, through which steam passes into the cylinder-ports.

The principal advantages of this arrangement are, first, that the steam-ports are at all times of the same size, so that as long as they are unclosed by the valve there is full and uniform boiler-pressure in the cylinder; and, secondly, that the exhaust is left more free and unobstructed than it would be were the cut-off combined not with the rotary valve, but with the steam-ports of the cylinder.

The nature of my invention, and the manner in which the same is or may be carried into effect, will be understood by reference to the accompanying drawings, in which—

Figure 1 is a vertical central section of a valve and regulating mechanism constructed and organized in accordance with my invention. Fig. 2 is a perspective view of the valve and its stem, detached. Fig. 3 is a view of the under side of the valve. Fig. 4 is a view of the valve-seat and steam and exhaust ports. Fig. 5 is a view of the cut-off, detached. Fig. 6 is a horizontal section through the hollow stem or sleeve to which the governor-balls are attached in the plane of the racks, by which the cut-off is operated.

The steam-chest is represented, at A, with steam-supply pipe B leading into the chest

from the boiler. C is the valve, having a tubular stem, D, fitting snugly in and passing up through a supporting-sleeve, D', which projects upward from the top of the steam-chest. This sleeve D' is prolonged by a rotary sleeve, E, which is grooved to receive a spline, a, on the valve-stem, and is also keyed or fastened to said stem by one or more screws or pins, b. The external sleeve E is rotated by suitable means, consisting, in this instance, of a beveled gear-wheel, E¹, fixed on it and meshing with a like wheel, E², to which motion is imparted from the engine. There should be a packing between D' and E, as seen in Fig. 1. The rotary movement of sleeve E causes a corresponding rotation of the valve. The valve C is formed with a steam-opening, c, extending entirely through it, and of the length nearly of a semicircle. The remaining half of the valve is occupied by an exhaust-space, d, formed on the under side of face of the valve. The valve-seat F is formed with the central exhaust-port e and the two steam-ports f, one on each side of the exhaust, and diametrically opposite one another. On top of the valve is the cut-off, consisting of a sectoral plate, G, provided with a vertical cut-off face, g, which fits in the steam-opening c and extends down therein so as to be flush at its lower end with the under face of the valve. The sectoral plate is provided with a hub, h, encircling and fitting the valve-stem, on which, as its axis, the said plate can turn. By moving the cut-off sector toward or away from the end of the steam-opening opposite to that against which the face g normally stands, the length of said steam-opening can be correspondingly decreased or increased. The cut-off is connected with the governor by means of a spindle, H, fitting and supported within the tubular valve-stem D, and attached to the hub of the sectoral plate by means of a pin or screw, i, inserted through the hub into the spindle, and passing through a horizontal slot and intermediate sleeve D, of such length as will permit the necessary independent movement of the cut-off. The cut-off spindle, at its upper end, is provided with a pinion, j, into which mesh two rack-bars, k, one on each side of the pinion, jointed, by connecting-rods, to arms or levers l, carrying the regulator-balls, and pivoted to

the rotary sleeve E, as seen in Fig. 1. To regulate the resistance to be offered to the spreading apart of the ball-levers, a governing-spring, J, may be attached to the top of sleeve E, as seen in Fig. 1, so as to bear at its ends on the two levers, its tension being regulated by means of a tightening nut or bolt, K.

Under the arrangement above described it will be noted that, while the cut-off rotates with the valve, it will independently of the latter be operated by the governor to more or less shorten the steam-opening according as the governor-balls are more or less spread apart.

The general operation of the valve in admitting and exhausting steam will be understood without further explanation.

By means of the combination described I obtain full boiler-pressure on the cylinder-piston all the time the steam-port is open, this pressure, so long as the port remains open, being always uniform, whatever may be the speed; and the power applied is regulated by a greater or less expansion of steam in the cylinder, this depending upon the cut-off. The screwing down of the regulating-spring will increase the power or speed by holding the governor-balls down, and thus leaving the ports open for a longer time. I would observe, however, that the spring is not absolutely essential, and may be dispensed with, if desired.

It will be also seen that the exhaust is left free and unobstructed under all conditions.

Having now described my invention, and

the manner in which the same is or may be carried into effect, what I claim, and desire to secure by Letters Patent, is—

1. The combination, in a steam-valve, of the following elements, namely: A rotary valve-disk having a steam-opening extending through it, and an exhaust-space on its under face; a valve-seat, with steam and exhaust ports against which the face of said valve bears, the steam-ports being shorter than the steam-opening in the valve; and a cut-off rotating with said valve, but connected with and operated by the governor, independently of the valve, substantially as shown and set forth.

2. The combination, with the rotary valve and valve-stem, of the cut-off and cut-off spindle, carried by and rotating with said valve, and racks connected with and operated by the governor-ball levers, substantially as and for the purposes described.

3. In combination with the cut-off, rotating with the valve, and the governor mechanism, connected with and operating said cut-off independently of said valve to regulate the length of steam-opening in the same, the regulating spring or springs, applied to the governor-ball levers, substantially as and for the purposes shown and set forth.

In testimony whereof I have hereunto signed my name this 12th day of May, A. D. 1874.

ALLEN JOHNSTON.

Witnesses:

A. G. HARROW,

J. T. HACKWORTH.