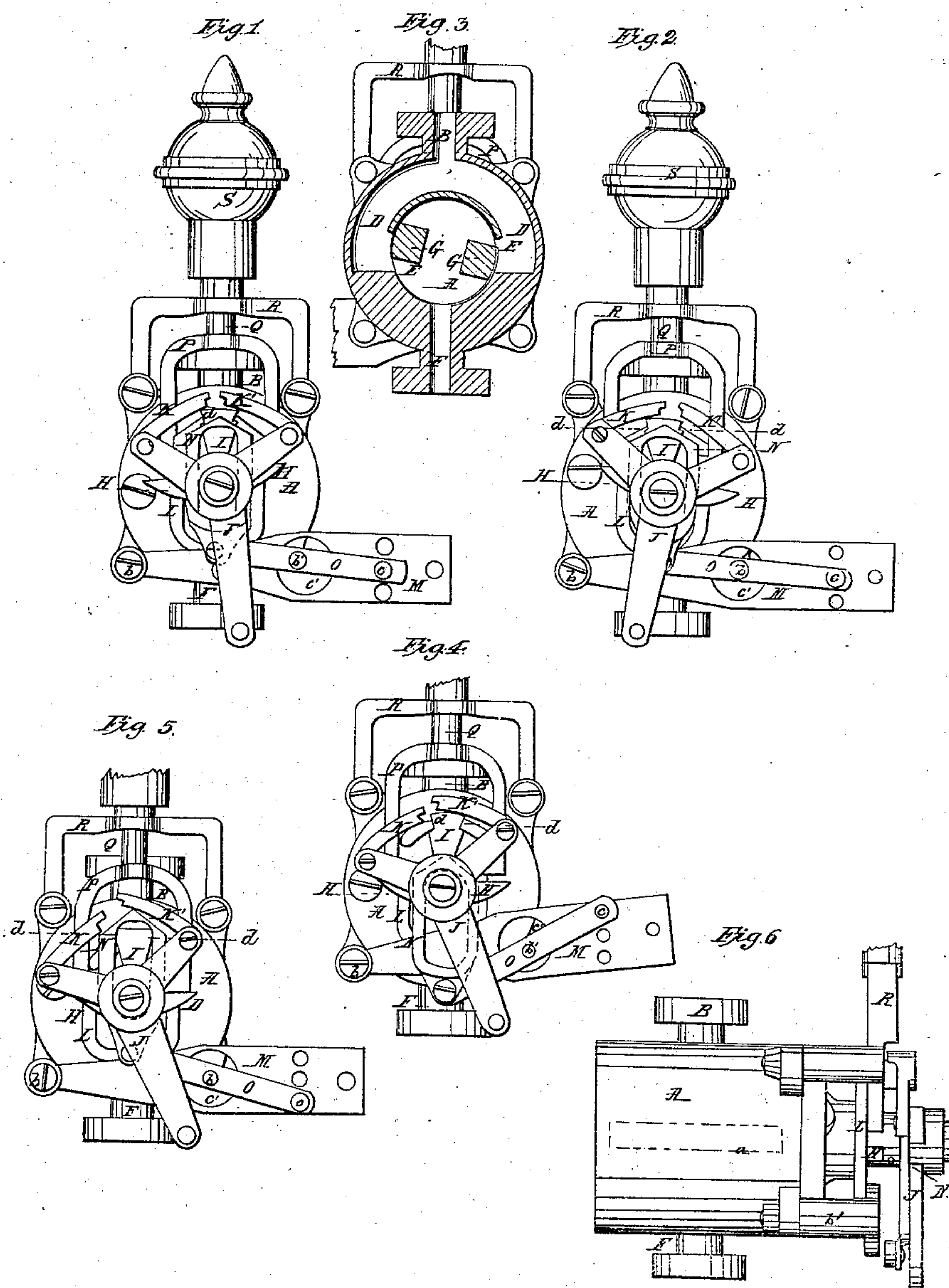


No. 61,266.

PATENTED JAN. 15, 1867.

R. SANDERSON.  
STEAM GOVERNOR.



Witnesses:  
W. H. Furness  
Frank Alden

Inventor:  
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# United States Patent Office.

ROBERT SANDERSON, OF CLEVELAND, OHIO.

*Letters Patent No. 61,266, dated January 15, 1867.*

## IMPROVEMENT IN STEAM GOVERNORS.

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

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, R. SANDERSON, of Cleveland, in the county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in a Combined Steam Cut-Off and Regulator; and I do hereby declare that the following is a full and complete description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a front view of the apparatus with the left-hand port open.

Figure 2 is also a front view with the right-hand port open.

Figure 3 is a transverse section of the valve-chamber.

Figure 4 is a front view with the ports partially closed by the governor.

Figure 5 is a front view with the ports closed.

Figure 6 is a side view of the apparatus.

Like letters of reference refer to like parts in the several views.

I am aware of the fact that a patent was granted to one Robert Stewart, January 23, 1866, for certain improvements in steam valves, but which I do not claim.

The nature of my invention relates to an improvement in governor-valves by an arrangement of an auxiliary lever and yoke, whereby the engine may be brought to a stop when by any accident the governor may cease to operate the valve, thereby preventing any accident resulting from the engine when under a full head of steam.

A, figs. 1 and 6, is the valve-chamber into which the steam is admitted through the induction-pipe B, passing down the port-ways D D to the ports E E, thence through the pipe F to the cylinder, and upon which the apparatus stands. These ports open lengthwise the chamber, as indicated by the dotted lines, a, fig. 6. G G, fig. 3, the valves, and so constructed as to play within the circle of the chamber in a rocking or oscillating movement; their position, as shown, represents the ports as partially open. One end of the shaft to which the valves are attached is projected through the front end of the chamber, and upon the end thus projected through is secured the toes H H. Extending upward at right angles with the toes is an arm, I, which will be hereafter referred to. Also, on the outer end of the shaft is placed the three-armed lever J; this lever is not fitted tight to the shaft, but moves loosely upon it, for the purpose of operating the valve, as will hereafter be shown. To the ends of the two upper arms of the lever are connected by a pivot joint the pawls K K', the use of which will be also hereafter explained. Between the end of the chamber and the above-mentioned toes and arm is a sliding yoke, L, the lower end of which is pivoted to the horizontal lever M, and by the means of which it is moved upward and downward for a purpose hereafter explained. N is a yoke constructed similar to the yoke L. This yoke is on the opposite side of the arm and toes from the yoke L; its lower end is also connected to a lever, O, while its upper end terminates in an angular point, as does the yoke L. It will be observed that one end of the lever M is connected to one side of the chamber by the bolts b, and that the lever O is also connected to the other side of the chamber by a pivoted joint, b'. This latter lever it will be seen is connected to the chamber nearly in the middle, and to one end of which, as above stated, is attached the yoke N, while the other end is attached to the lever M by the pin C. In order that the connection of the lever O with the chamber may not interfere with the movement of the lever M, a hole, c', is cut through the lever, and through which the attachment of the lever is made. By this arrangement, and attachment of the levers to each other, it follows that as the lever M is forced downward, it, as a consequence, carries with it in the same direction the yoke L; at the same time it carries with it the outer arms of the lever O, also in the same direction, while the shorter arm, to which the yoke is attached, moves in the opposite direction; hence, while the yoke L is descending the yoke N at the same time is ascending, and so on, alternately, as the one ascends the other descends. Reference will be made to this movement hereafter. As above stated, the valve in the chamber moves in oscillation, and is accomplished in the following manner: The arm I, above mentioned, is provided on each of its upper sides with a notch, d, and when the arm is in a vertical position, as shown in figs. 4 and 5, the ports in the chambers are closed by the oscillating valve F. The lower arm of the lever J is connected to the eccentric of the engine, and as it is drawn in the direction shown in fig. 2, the pawl K falls into the notch of the arm I, and forces it to the right, thereby opening the ports, as shown in fig. 3. When the ports are opened thus far the pawl slips from the notch and the arm I immediately returns to its vertical position, and when thus returned



the action of the eccentric upon the lever forces it in the opposite direction, and the pawl K', catching in the notch, forces the arm to the left, and thereby opens the ports in the reverse of that above described, and when opened the same distance the pawl slips from the notch and the arm again returns to its vertical place as before, and so on, alternately, the arm is moved from right to left and from left to right, and at each time returning to its vertical position before it is caught by the pawl; hence the ports are opened and closed alternately by the oscillating of the valve by means of the arm and pawls. The means by which the arm regains its vertical position and thereby closing the ports is by the weighted bail P. This bail consists of a pair of bent legs reaching down to and resting upon the toes H. Projecting upward from the top of the bail is a stem, Q; this stem passes through a frame, R, which serves as a guide, and by means of which it is stayed in place. This stem is mounted with a heavy weight or ball S, all of which, as above observed, rest upon the toes H, and thereby bringing them to a horizontal line across the front and the arm I into a vertical relation to them when released from the action of the pawls. It is obvious that when the pawl forces the arm from its vertical position in either direction, to the right or to the left, the weight of the bail is supported by the right or left toe only, and it is raised upward thereby until the pawl slips from the notch, the weight being thus on one side of the rock-shaft, causes it to turn until the opposite toe strikes its relative limb of the bail, which brings the two horizontally across the front, as seen in fig. 5, and as a consequence the arm is brought to a vertical position and at the same time closing the ports, thereby shutting off the steam. It will be remarked that the volume of steam admitted to the cylinder will be in proportion to the opening of the ports. This measure is regulated by the yoke L, above referred to, as follows: The governor being attached to the lever M, when the balls expand causes the lever to rise upward and at the same time raises up the yoke L, to which it is connected. The upper end of this yoke, as above mentioned, being made slanting or pointed, the pawls slide upon it and are thereby prevented from falling as deeply into the notch as they would do in the absence of the yoke, and are lifted out of the notch sooner, so that the oscillation of the valves is lessened as the yoke is raised up by the expanding of the governor, caused by the increased speed of the engine; the amount of steam is thereby diminished and the speed of the engine correspondingly retarded. On the other hand, when the volume of steam is small the balls drop and thereby cause the valve to open and admit more steam; hence the action of the valves is readily and at all times controlled by the governor, and the amount of steam truly and uniformly admitted to the cylinder. Should the action of the engine be so great as to cause the balls of the governor to expand to their full extent, the yoke is lifted above the arm so that the pawls cannot catch into the notch but slide over the end of the arm upon the yoke, and by these means the ports are closed, and as a consequence the engine is stopped or retarded, so that the yoke allows the pawl to again operate the valves as before. Should any accident occur to the governor, as a slipping or breaking of the belt, connecting-limbs, &c., and thereby cause a full opening of the ports and the admission of a full head of steam, causing by this means an intense action of the engine, which often results in a break-down or a dangerous straining of the machinery connected thereto, in order to prevent such results from the suspension of the action of the governor, the yoke N, above referred to, is introduced and operated, as above described, in connection with the lever M. As before stated, when the lever M is forced down by the action of the governor, the lever O rises, and in so doing pushes up the yoke N, and if the action of the lever M be sufficient, which would be the case should the governor cease to operate, the yoke is raised above the top of the arm I, as shown in fig. 5, and the pawls prevented from catching into the arm but slide backward and forward upon the top of the yoke, and thereby allows the weighted bail to bring the arm into a vertical position, and by this means shut off the steam; the engine, as a necessary result, comes to a stop, which would not be the case were it not for the yoke, for the ports are open when the yoke L is down, or rather may be operated by the pawls when in that position, and, as above stated, when the lever is not operated by the governor but falls down by its own weight in consequence of some accident to the governor, and thereby admitting a full head of steam. It is then, by the reverse action of the yoke N, cut off, as before mentioned, and all danger to the engine and machinery avoided.

What I claim as my improvement, and desire to secure by Letters Patent, is—

The auxiliary lever O, yoke N, and pivot joint b', extending through the lever M, in combination with the lever J, pawls K K, lifting toes H, bail P, and yoke L, as and for the purpose set forth.

ROBERT SANDERSON.

Witnesses:

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J. HOLMES.