No. 655,096. Patented July 31, 1900.

F. A. LARGE.

GOVERNOR CUT-OFF VALVE FOR ENGINES.

(Application filed Oct. 27, 1899.)

(No Model.)

Fig 3.

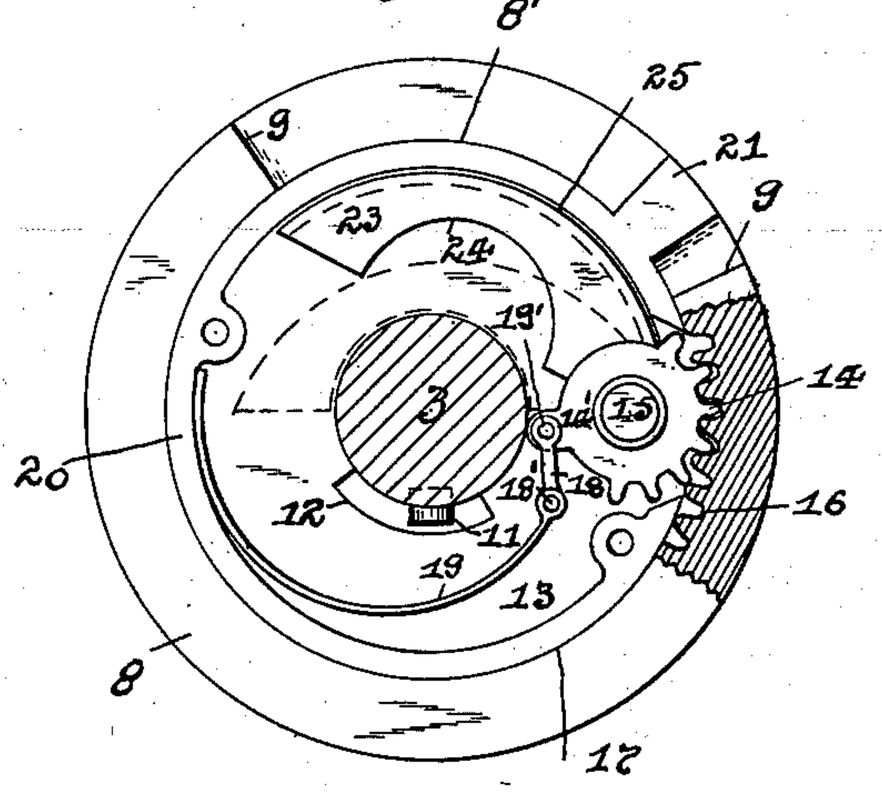


Fig 2.

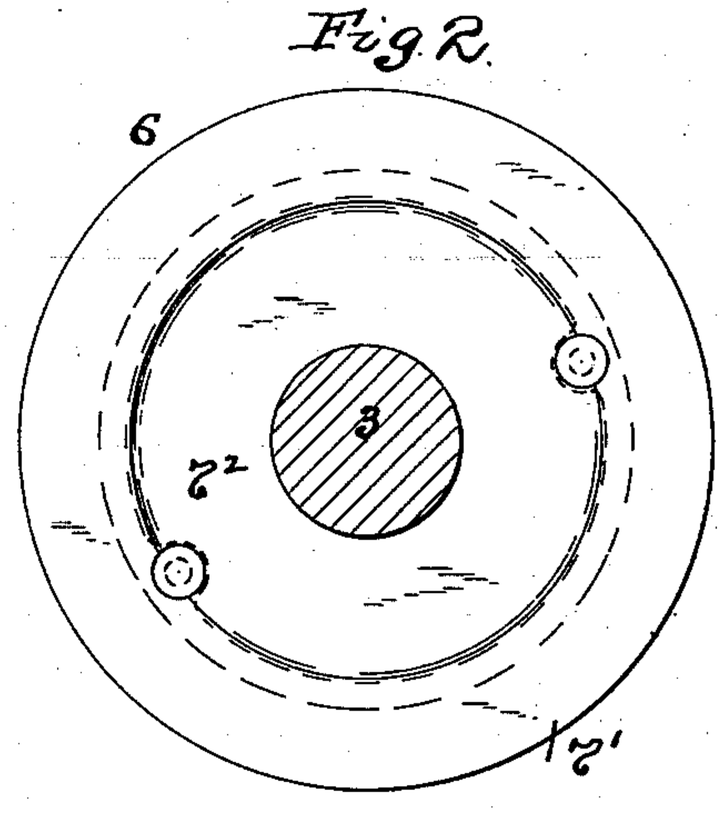
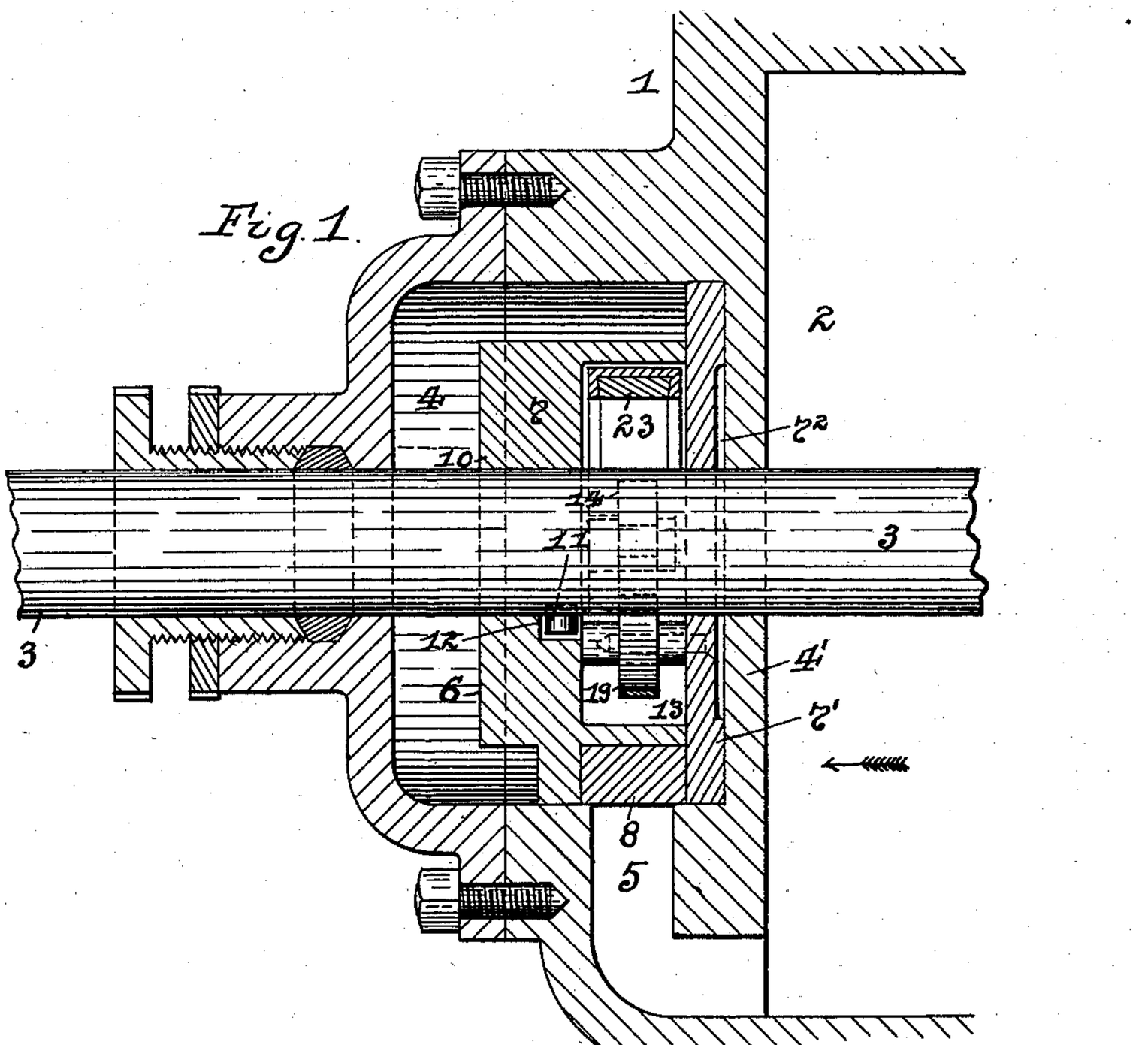


Fig 1.



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UNITED STATES PATENT OFFICE.

FRANK A. LARGE, OF PITTSBURG, PENNSYLVANIA.

GOVERNOR CUT-OFF VALVE FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 655,096, dated July 31, 1900.

Application filed October 27, 1899. Serial No. 734,916. (No model.)

To all whom it may concern:

Be it known that I, FRANK A. LARGE, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Governor Cut-Off Valves for Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to governor cut-off valves for steam-engines, and has special reference to a self-contained governor for rotary steam-engines.

The object of my invention is to provide a variable length to the opening in the valve of the governor for the purpose of regulating the supply of steam and the expansion thereof in the cylinder or piston-chamber of the engine by a simple and compact device.

My invention consists, generally stated, in the novel arrangement, construction, and combination of parts, as hereinafter more specifically set forth and described, and particularly pointed out in the claims.

To enable others skilled in the art to which my invention appertains to construct and use my improved governor, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 represents a sectional view of the steam-chest of a rotary engine, showing my improved governor applied thereto. Fig. 2 is a plan or face view of the governor looking in the direction of the arrow shown in Fig. 1 and showing the same removed from the steam-chest of the engine, and Fig. 3 is a like view looking at the same side of the same and showing the face-plate thereof removed.

Like numerals herein indicate like parts in each of the figures of the drawings.

My improved governor is illustrated as applied to a rotary engine, such as shown and described in an application for United States Letters Patent filed by Isaac V. Large on the 2d day of July, A. D. 1898, Serial No. 685,008. A portion of such rotary engine is shown at 1, which has a cylinder or piston-chamber 2 therein, through which passes the main shaft 3, and a steam-chest 4 is formed on one side of the piston-chamber 2, through which said shaft 3 passes and which communicates with said piston-chamber 2 by the steam-port 5. Fitting around the shaft 3, within the steam-chest 4, is the valve 6, which is formed of the circular casting 7, having the face-plate 7′ secured thereon, which is adapted to fit against the inner wall 4′ of said steam-chest 4 and form a steam-tight connection therewith. The face-plate 7′ is provided with an annular recess 7^2, which is adapted to form a steam-space 7^3 between the face-plate 7′ and the inner wall 4′ of the steam-chest 4. Around the periphery 8′ of said circular valve-casting 7 is the loose ring 8, which is provided with a segmental opening or slot 9 therein, which slot 9 opens into the steam-chest 4 on one side of the loose ring 8, so leaving said slot 9 entirely open on the periphery of said loose ring 8 or on a radial line from center of shaft 3. The valve-casting 7 of the valve 6 fits loosely around the shaft 3, but gets its motion and is held in place through a pin 11, secured on said shaft 3, engaging a segmental slot 12, formed in the bore 10 of the valve-casting 7. The valve-casting 7 is formed hollow, as at 13, having placed therein a segmental pinion 14, which is mounted on a stud 15, secured within the casting 7, and is adapted to mesh with an internal segmental gear-face 16, formed on the inner face 17 of the loose ring 8 around the outer face 8′ of the valve-casting 7. Pivoted at one end 18′ to a link 18, which is pivoted at 19′ to the body portion 14′ of the segmental pinion 14, is the spiral or leaf spring 19, the opposite end of which is adapted to be secured or bear against a collar 20 on the valve-casting 7, and this collar 20 has a lug or flange 21, which fits within the slot 9 of the loose ring 8. A centrifugal weight 23, having a recess 24 therein for fitting around the shaft 3, is connected to and formed as part of the body 14′ of the pinion 14, and the outside face 25 of said weight 23 corresponds to the same radius as the inner face of the collar 20 in the casting 7.

The use and operation of my improved governor for steam-engines is as follows: Steam being supplied to the steam-chest 4 in any desired manner will act on said valve 6, and when the slot 9 is opposite the steam-port 5, leading from the steam-chest 4 to the piston-chamber 2, the steam will flow or pass through the port 5 during the fraction of the revolution of the valve 6 equal to the length of the slot 9. As the steam-port 5 is at right angles

to the axis of the valve 6, the steam flowing into the side of the slot 9 from the steam-chest 4 will pass from said slot 9 into the port 5 and through the same into the piston-chamber 2 in a radial direction during the time the slot 9 is passing across the face of the port 5. As the shaft 3 is thus revolved by the entrance of steam into the piston-chamber 2 from the steam-chest 4 through the port 5, the valve 6, loosely surrounding said shaft 3, is made to operate therefrom by means of the pin 11, engaging the slot 12 in the casting 7 of said valve, and such slot 12 is of sufficient length to provide for the different positions of the valve 6 when the engine is reversed. When an abnormal high speed of the engine is attained, the centrifugal force generated from the revolution of the shaft 3 will act to throw out the weight 24 on the pinion 14 from the center or axis of the pinion 14 and shaft 3, so overcoming the tension on the spring 19, pivotally connected to the pinion 14 and link 18, and causing the loose ring 8 to move around on the casting 7 within the steam-chest 4 in an opposite direction from that of the piston within the piston-chamber 2 by reason of said segmental gear-face 16 on the internal face 17 of the ring 8 being in mesh with the segmental pinion 14. This reverse movement of the loose ring 8 will cause the closing up or shortening of the steam-slot 9 in the ring 8 of the valve 6 by means of the lug or flange 21 on the collar 20, which travels within said slot 9, thereby cutting off the steam from the steam-chest 4 to the piston-chamber 2 through the slot 9 and port 5 at an earlier point in the revolution of the piston in the chamber 2. When the speed of the engine drops below normal, the conditions are exactly reversed, and the falling or dropping of the weight 24, by reason of the tension on the spring 19 being greater than the centrifugal force of said weight 24, will increase the length of the slot 9 in the ring 8 from the flange 21 on the collar 20, caused by the reverse movement of the said ring 8, through the medium of the pinion 14 engaging the gear-face 16 on said ring 8 and the weight 24 and spring 19 being connected to said pinion 14. The steam-space 7^3 between the face-plate 7′ and the inner wall 4′ of the steam-chest 4 acts as a cushion for the steam therein, which passes from the steam-chest 4 around the shaft 3 and so acts to balance the valve 6.

It will thus be seen that my improved governor for steam-engines is cheap and simple in its construction and operation, and by its use the steam from the steam-chest of the engine can be so regulated or supplied to the cylinder or piston-chamber of the engine from the valve of the governor as to insure the running of the engine at the normal speed required. The device is effective and practical in its operation and contains very few parts, so insuring its being less liable to get out of order and allowing such parts to be made strong and durable.

Various modifications in the construction and design of the various parts of my improved governor may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages.

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

1. In governors for steam-engines, the combination with a steam-chest having a supply-port leading therefrom to the cylinder or piston-chamber of the engine, a shaft passing through said steam-chest and cylinder or piston-chamber, and a circular valve loosely mounted around said shaft within the steam-chest for regulating the supply of steam and the expansion thereof in the cylinder or piston-chamber.

2. In governors for steam-engines, the combination with a steam-chest having a supply-port leading therefrom to the cylinder or piston-chamber of the engine, a shaft passing through said steam-chest and cylinder or piston-chamber, and a circular valve loosely mounted around said shaft within the steam-chest and provided with a segmental opening or slot therein for regulating the supply of steam and the expansion thereof in the cylinder or piston-chamber.

3. In governors for steam-engines, the combination with a steam-chest having a supply-port leading therefrom to the cylinder or piston-chamber of the engine, a shaft passing through said steam-chest and cylinder or piston-chamber, a valve casting or collar loosely mounted around said shaft and within said steam-chest, and a loose ring fitting around said casting or collar having a segmental opening or slot therein for regulating the supply of the steam and the expansion thereof in the cylinder or piston-chamber.

4. In governors for steam-engines, the combination with a steam-chest having a supply-port leading therefrom to the cylinder or piston-chamber of the engine, a shaft passing through said steam-chest and cylinder or piston-chamber, a valve casting or collar loosely mounted around said shaft and within said steam-chest, a loose ring fitting around said casting or collar having a segmental opening or slot therein for regulating the supply of steam and the expansion thereof in the cylinder or piston-chamber, and mechanism connected to said casting or collar and loose ring for varying the size of the segmental opening or slot in the loose ring according to the speed of the engine.

5. In governors for steam-engines, the combination with a steam-chest having a supply-port leading therefrom to the cylinder or piston-chamber of the engine, a shaft passing through said steam-chest, and cylinder or piston-chamber, a valve casting or collar loosely mounted around said shaft and within the steam-chest, a loose ring fitting around said casting or collar having a segmental opening or slot therein for regulating the supply of steam and the expansion thereof in the cyl-

inder or piston-chamber, a flange or lug on said casting or collar extending across the segmental opening or slot in the loose ring, and mechanism connected to said casting or collar and loose ring for varying the size of the segmental opening or slot in the loose ring by the flange or lug on casting or collar.

6. In governors for steam-engines, the combination with a steam-chest having a supply-port leading therefrom to the cylinder or piston-chamber of the engine, a shaft passing through said steam-chest and cylinder or piston-chamber, a valve casting or collar loosely mounted around said shaft and within the steam-chest, a loose ring fitting around said casting or collar having a segmental opening or slot therein for regulating the supply of steam and the expansion thereof in the cylinder or piston-chamber, a flange or lug on said casting or collar extending across the opening or slot in the loose ring, and a pinion on said casting or collar adapted to engage with the loose ring for varying the size of the opening or slot in the said loose ring by the flange or lug on the casting or collar.

7. In governors for steam-engines, the combination with a steam-chest having a supply-port leading therefrom to the cylinder or piston-chamber of the engine, a shaft passing through said steam-chest and cylinder or piston-chamber, a valve casting or collar loosely mounted around said shaft and within the steam-chest, a loose ring fitting around said casting or collar having a segmental opening or slot thereon for regulating the supply of steam and the expansion thereof in the cylinder or piston-chamber, a flange or lug on said casting or collar extending across the opening or slot in the loose ring, a pinion on said casting or collar adapted to engage with the loose ring to vary the size of the opening or slot in said loose ring by the flange or lug on the casting or collar, said pinion having a weighted arm connected thereto, and a spring pivotally connected to said weighted pinion and to the casting or collar.

8. In governors for steam-engines, the combination with a steam-chest having a supply-port leading therefrom to the cylinder of the engine, a shaft passing through said steam-chest and cylinder, a circular valve loosely mounted around said shaft within the steam-chest for regulating the supply of steam and the expansion thereof in the cylinder, and a cushioning steam-space between the valve and wall of the steam-chest for balancing said valve.

9. In governors for steam-engines, the combination with a steam-chest having a supply-port leading therefrom to the cylinder of the engine, a shaft passing through said steam-chest and cylinder, a circular valve loosely mounted around said shaft within the steam-chest for regulating the supply of steam and the expansion thereof in the cylinder, and a plate secured to said valve having a recess therein adapted to form a steam-space between the plate and wall of the steam-chest for balancing said valve.

In testimony whereof I, the said FRANK A. LARGE, have hereunto set my hand.

FRANK A. LARGE.

Witnesses:
J. N. COOKE,
JAMES L. WEHN.