

No. 785,065.

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E. S. FARWELL.
GOVERNOR.

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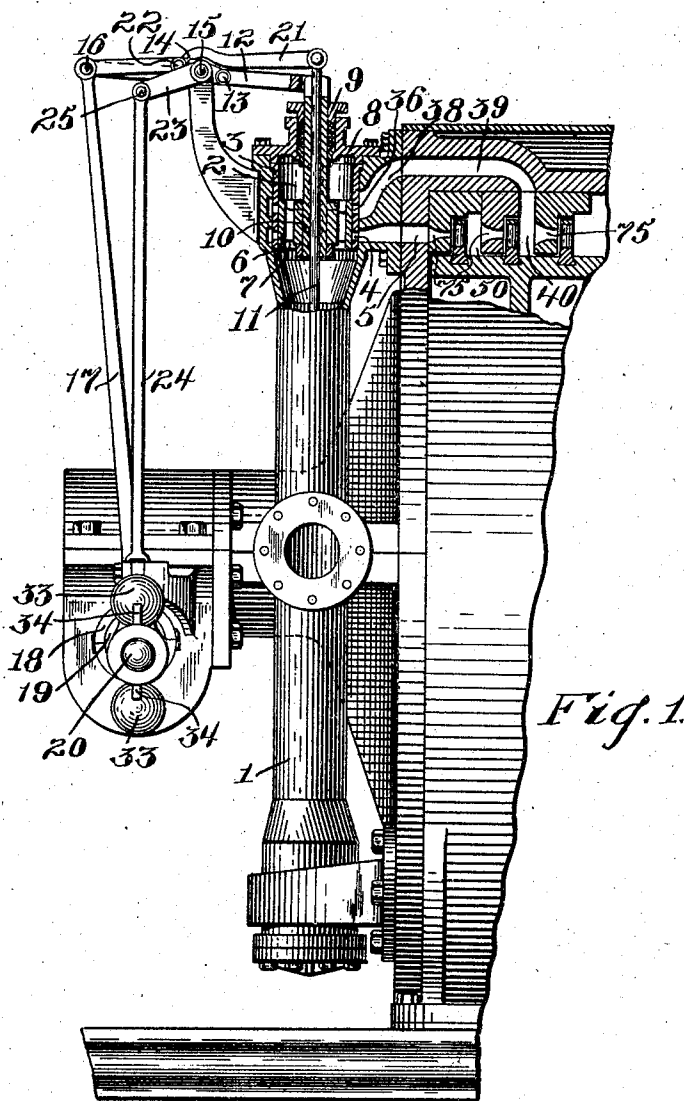


Fig. 1.

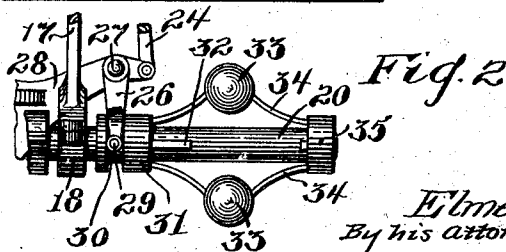


Fig. 2.

Witnesses:
Gordon C. Foss.
Charles J. Russell.

Inventor:
Elmer S. Farwell,
By his attorney,
F. H. Richard.

UNITED STATES PATENT OFFICE.

ELMER S. FARWELL, OF RIDGEWOOD, NEW JERSEY, ASSIGNOR TO
EDWIN H. LUDEMAN, OF BROOKLYN, NEW YORK.

GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 785,065, dated March 14, 1905.

Original application filed December 22, 1903, Serial No. 186,191. Divided and this application filed February 11, 1904. Serial No. 193,059.

To all whom it may concern:

Be it known that I, ELMER S. FARWELL, a citizen of the United States, residing in Ridgewood, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Governors, of which the following is a specification.

This invention relates to and has for an object an improved governing device, and is a division of my application for United States Letters Patent filed December 22, 1903, No. 186,191, (series of 1900,) for turbine-engines.

In the drawings accompanying and forming a part of this specification, Figure 1 shows a side view of a broken-away end portion of a turbine-engine, and some of the parts of the casing are broken away to reveal the operative mechanism; and Fig. 2 is a detail of the governor.

The upper ports and slide-valve only are shown, the casing at that point being broken away. In the lower compartments the parts will be substantially the same. The pipe 1 comprises a steam-chest, in which is located a suitable slide-valve. The port by which the steam passes to the first chamber comprises an annular chamber 2, protected to a certain extent by a bushing 3. The port leads into a chamber 4 in direct communication with the first chamber 5, having the first nozzle 75. The bushing 3 acts as a bearing for the slide-valve 6, which has ports 7 through it to admit steam to the top of the chamber or steam-chest, which is closed by a cap 8, having a gland or stuffing-box 9, through which the stem of the slide-valve passes. The stem 10 is shown as hollow and permitting the passage of the stem 11 of the lower slide-valve. The stem 10 is pivoted to a lever 12, which is pivoted at 13 to one end of an arm 14, carried upon a rock-shaft 15, and is pivoted at 16 to an eccentric-rod 17, having an eccentric-strap 18, embracing an eccentric 19 upon a shaft 20, which is geared by reducing-gear to the main shaft of the engine.

The stem 11 is connected to a lever 21, which is pivoted at 22 to the other end of the arm 14, and is pivoted at 16 to the eccentric-

rod 17. The rock-shaft 15 has fast thereon an arm 23, which is pivoted to a link 24, pivoted at 25 to one end of a bell-crank lever 26, which is pivoted at 27 to a bracket 28 from the frame of the engine, the other end of which bell-crank lever has forked ends embracing pins 29 on a collar 30, running in a groove in a sleeve 31, mounted upon the shaft 20 and constrained to rotate therewith by a spline 32. Such collar is connected to a ball-governor, comprising balls 33 and springs 34 and a collar 35. The length of the two ends of the arm 14 are so proportioned to the relative length of levers 12 and 21 that the thrusts on the pins 13 and 22 neutralize one another and produce no prejudicial shock upon the governor. Upon the rapid rotation of the shaft and the flying apart of the balls the link 24 will be raised and the position of the fulcrum 22 and 13 will be changed. The fulcrum 13 will be lowered and the fulcrum 22 raised, thus changing the position of the path of movement of the slide-valves without changing their length of stroke, so that the amount of the uncovering of the valve from the steam-chest will be regulated or the strokes of the slide-valve may be idle, owing to the position thereof, until the speed of the wheel has been sufficiently reduced to permit the governor-balls to assume their normal position, when the slide-valve will port and unport in regular order.

Upon the governor-balls falling sufficiently to change the fulcrum the port may remain open continuously, there being sufficient lead respectively above and below the ports for the slide-valves to move without covering the ports at all.

When the governor drops below the position to keep the ports continuously open, it may open a port 38 in the bushing 3, leading to a port 36 in the pipe 1, which port 38 leads into a passage-way 39, leading into a chamber 40 larger than the chamber 5, whereby the steam will pass to a nozzle, where it will be discharged in a much larger jet than the jet of the first nozzle, permitting the steam to be used in greater volume, but also requiring, as

is obvious, a larger amount of steam. This would happen when the governor-balls drop below the normal condition of low rotation—as, for instance, falling off in steam-pressure, increased load being thrown upon the engine, or loss of vacuum in the condenser. In such emergencies increased amount of steam is thrown into the engine, and in case of loss of vacuum it may be desirable to exhaust it at an earlier period, and a port may be provided for such exhaust.

As was before pointed out or indicated, the slide-valve will be reciprocated with strokes of constant length, the governor having a tendency to shift the path in which such excursions take place or the region of their happening, accordingly as the speed may rise or fall. At certain conditions of the governor the slide-valve will reciprocate and will maintain both the ports 4 and 36 closed. At other times it will reciprocate and regularly open and close the port 4, holding the port 36 closed, at which time the steam will act at intervals or by impulses. Still greater change in the condition of the governor will hold the port 4 continuously open and the port 36 closed, and a still further change in condition will still leave the port 4 continuously open and will open and close regularly the port 36, so that the steam will work from the chamber 39 at intervals or in impulses, and in cases of abnormally excessive load, according to the present organization, both ports may remain continuously open. Assuming that the steam admitted into the chamber or by-pass 39 is at boiler-pressure, no steam will pass through the chamber 5; but steam at boiler-pressure will remain idly in such chamber and in chamber 50, the steam then passing, as it is permitted by the slide-valve, through the by-pass 39 and through the nozzle 75 from the chamber 40. When steam is admitted by intermittent partial openings of the port 36, the steam passing through the by-pass 39 will be below boiler-pressure. Then it may be assumed that a certain amount of steam will pass through the passage 5, and when the two streams meet they will be at the same pressure. The amount of steam which will pass through the passage 5 when communication is open to the by-pass will be dependent upon the pressure in the by-pass below boiler-pressure.

Having thus described my invention, I claim—

1. In a governing device the combination with a steam-chest having two ports of varying function, a slide-valve, means to reciprocate the slide-valve with excursions of constant length, and means to control the region of reciprocation thereof to permit the same to cover and uncover either or both of said ports.

2. In a governing mechanism for turbine-engines, the combination with a steam-chest

having two ports of varying function; means adapted to open and close either of said ports at intervals; means for operating the same; and means for varying the periods of such opening.

3. In a governing mechanism for turbine-engines, the combination with a steam-chest having two ports of varying function; means adapted to open and close one of said ports at intervals; means for operating the same; and means to open and close the other port and permit the first-mentioned port to remain open continuously.

4. In a turbine-engine having a number of ports of progressively-increasing area to admit steam at its successive steps of expansion to the turbine, the combination of a steam-chest having a port to supply steam to said turbine at the port of least area and an adjacent port to supply steam to a port of larger area, means adapted to open and close either of said ports at intervals; means to operate the same, and means embodying a governor to vary the period of such opening.

5. In a turbine-engine having a number of ports of progressively-increasing area to admit steam at its successive steps of expansion to the turbine, the combination of a steam-chest having a port to supply steam to said turbine at the port of least area and an adjacent port to supply steam to a port of larger area, means adapted to open and close one of said ports at intervals, means to operate the same, and means embodying a governor to open and close the port of larger area and permit the port of least area to remain open continuously.

6. In means to govern a turbine-engine having a number of ports of progressively-increasing area to admit steam at its successive steps of expansion to the turbine, the combination of a steam-chest having a port to supply steam to said turbine at the ports of least area and an adjacent port to supply steam to a port of larger area, a slide-valve adapted to cover both ports, means to continuously reciprocate said valve, and means embodying a governor to change the region of reciprocation thereof to open and close the respective ports.

7. In means to govern a turbine-engine having a number of ports of progressively-increasing area to admit steam at its successive steps of expansion to the turbine, the combination of a steam-chest having a port to supply steam to said turbine at the ports of least area, and an adjacent port to supply steam to a port of larger area, a slide-valve adapted to cover both ports, means to continuously reciprocate said valve and means to change the region of reciprocation thereof to open and close the port of larger area and permit the port of least area to remain open continuously.

8. In means to govern an engine organized to receive steam at two points, the combina-

tion of a steam-chest having a fixed port at each of such points and connected with a source of supply; slide-valves for said ports; means to reciprocate said valves with constant length of stroke, and means to change the position of stroke relative to said fixed ports to control the steam supplied to the engine.

9. In means to govern a turbine-engine having a number of series of ports of progressively-increasing area to admit steam at its successive stages of expansion to the turbine; the combination of a steam-chest having a port to supply steam to each of said series of ports at the port of least area, and an adjacent port to supply steam to a port in the series of larger area; a pair of slide-valves each adapted to cover both ports to one of the

series; means to continuously reciprocate said slide-valves and means embodying a governor to change the region of reciprocation thereof to open and close the respective ports.

10. In a governing device the combination of a steam-chest, of a pair of slide-valves therein, stems connected to the slide-valves, levers to which the slide-valves are pivoted, an eccentric-rod pivoted to both slide-valves and fulcrums for such levers, and means to shift the fulcrums.

Signed at Nos. 9 to 15 Murray street, New York, N. Y., this 8th day of February, 1904.

ELMER S. FARWELL.

Witnesses:

CHAS. LYON RUSSELL,

FRED. J. DOLE.