

UNITED STATES PATENT OFFICE.

BENJAMIN BRAZELLE, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE BRAZELLE ENGINE COMPANY, OF SAME PLACE.

IMPROVEMENT IN GOVERNORS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 208,149, dated September 17, 1878; application filed August 23, 1878.

To all whom it may concern:

Be it known that I, BENJAMIN BRAZELLE, of St. Louis, in the county of St. Louis and State of Missouri, have invented certain new and useful Improvements in Governors for Fluid-Pressure Engines, of which improvements the following is a specification:

My present invention relates to improvements upon the governor for which an application for Letters Patent of the United States was filed by me under date of March 7, 1878; and said improvements consist, first, in a novel construction of the inclosing-case and movable abutment, whereby I am enabled to dispense with the inner bearing of said abutment and to cause the pressure acting thereon to be transferred to the rock-shaft in a more convenient and advantageous manner, as well as to substitute an abutment of different area whenever necessary or advisable; and, second, in combining with the adjustable gate of said governor a weighted rod or pendulum, by which said gate is opened or closed coincidentally with and proportionately to variations in the position of said pendulum due to the action of gravity, in order to adapt the governor to use upon marine engines, in the operation of which the alternate immersion and exposure of the propeller due to the pitching of the vessel in a heavy sea entails sudden and great variations of resistance. The improvements claimed are hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a vertical transverse central section, partly in elevation, of the governor, and Figs. 2 and 3 vertical longitudinal sections of the same at the lines *x x* and *y y*, respectively, of Fig. 1.

My improved governor is, similarly to that described and claimed in my allowed application hereinbefore referred to, of the hydraulic class, and is likewise similar to the latter so far as the general principle of operation of a movable abutment in either of two directions by the revolutions of a cam-piston and by the tension of a spring, respectively, is concerned, and, while portions of the mechanism hereinafter set forth constitute no part of my present invention, I will, to insure perspicuity, proceed to describe the entire governor, claim-

ing only therein such improvements as properly relate to this application.

The governor-case A is of cylindrical form, having on its ends removable heads or covers A¹ A², secured by bolts *a*¹, and is supported by legs or standards A³ upon the cap or cover *a*³ of the valve-chest. The case A is divided by a vertical partition, A⁴, near its center, into two chambers or compartments, *a*⁴ *a*⁵, connected at bottom by a channel-way or passage, *a*², and also communicating by a curved slot, *a*, above the channel-way *a*². An opening is formed in the top of the chamber *a*⁴ for the introduction of oil to fill the chambers *a*⁴ *a*⁵, and is closed by a screw-plug, *a*⁷. An elliptical or cam piston, B, the longer diameter of which is such as to enable it to fit easily within the chamber *a*⁴, is secured upon a shaft, *b*, mounted in a bearing, *a*⁸, formed on the head A², and carrying a pulley, *b*¹, which is rotated by means of a belt passing around a pulley on the shaft of the engine. A cylinder, C, having a piston or abutment, C¹, formed upon its periphery, is secured upon a shaft, *c*, mounted in a bearing, *a*⁹, concentric with the bearing *a*⁸ of the cam-piston, and fits easily within the compartment *a*⁵, the outer surface of its abutment C¹ fitting against the inner surface of the chamber *a*⁵. A conical enlargement is formed upon the shaft *c*, which is pressed outward, so as to make a tight joint with its bearing *a*⁹ by a helical spring resting in a central hub in the partition A⁴. A spur-pinion, C², is secured upon the outer end of the shaft *c*, which carries the cylinder C, and meshes with a segment gear, D², upon an arm, D¹, of a horizontal rock-shaft, D, mounted in a bearing on one of the legs or supports A³ of the case A. Arms D³ D⁴ are likewise formed upon or secured to the rock-shaft D, one of which arms, D³, is connected with the upper end of the stem *d* of the governor-valve. A helical spring, D⁵, is attached at one end to the case A, and at the other to the arm D⁴ of the rock-shaft. A wiper or flap, E, is pivoted within the chamber *a*⁴, and extends completely across the same above the channel-way *a*², its free end being pressed against the periphery of the cam-piston B by a spring, *e*, said wiper controlling the passage of oil from the cham-

ber a^4 into the channel-way a^2 . The area of opening for the passage of oil from the channel-way a^2 against the side of the abutment C^1 , in the direction of the arrow, Fig. 2, is varied, as required, by a valve or gate, F, extending across the chamber a^5 , said gate being secured upon a pin, f , extending through the head A^1 of the case, by the proper adjustment of which pin the valve F may be made to stand wholly or partially across the annular passage between the cylinder C and the wall of the chamber a^5 , and, consequently, to intercept, to a greater or less degree, the movement of the oil therein. The traverse of the abutment C^1 , in either direction, is limited by stops c' , secured in the wall of the chamber a^5 , and stops may also be provided for limiting the movement of the valve F.

In order to adapt the governor to use upon marine steam-engines, I secure upon the pin f of the adjustable valve F a vertically-depending rod, G, having a weight, G' , upon its lower end, so that the oscillations of said weighted rod or pendulum will correspondingly move the valve F in the chamber a^5 .

In the operation of the governor, the case A being filled with oil and the cam-piston B rotated in the direction of the arrow, oil will be forced by such rotation out of the chamber a^4 , against the left side of the abutment C^1 , and drawn away from the right side thereof, passing through the opening a into the chamber a^4 . The induced pressure upon the left side of the abutment tends to move it in the direction of the arrow, such movement being transmitted through the gearing and rock-arms to the governor-valve stem, and being resisted by the spring D^5 until equilibrium is established, and changes in the normal position of the abutment for an adjusted rate of speed will accompany and compensate for tendency to either increase or decrease the same, and corresponding uniformity in the movement of the engine will be attained. The speed of the engine is regulated to a desired normal rate by means of the adjustable gate, by which greater or less pressure may be induced upon the abutment C^1 relatively to the velocity of the cam-piston B, and the power of the governor to overcome weight and friction of parts may likewise be increased, as required, by this device.

The construction and connection of the abutment C^1 to its shaft C—to wit, by means of its central cylinder, C—enables me to change the area of the abutment, whenever necessary, by the substitution of another, connected either to a smaller or a larger cylinder, according as

a greater or a less amount of pressure is required, which change of area would not be practicable with an abutment working in an annular passage, both walls of which are stationary, as shown in my former application.

When operating as a marine engine-governor, the oscillations of the pendulum G G' will close and open the gate F proportionately to and coincidentally with the vertical movements of the vessel, which alternately expose and immerse the propeller, and will correspondingly close and open the governor-valve proportionately to the variations of resistance induced by said movements.

I am aware that the employment of a pendulum connected with the throttle-valve of a marine steam-engine has been heretofore proposed and patented, and do not therefore claim such device; neither do I here broadly claim, in a hydraulic governor, a cam-piston, a movable abutment, a vibrating wiper, or an adjustable valve, the same and sundry combinations thereof being set forth in my aforesaid application for Letters Patent of the United States, filed March 7, 1878.

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

1. The combination, in an engine-governor, of an inclosing-case, divided vertically into two chambers or compartments connected by a lower channel-way or passage, and an opening above said channel-way, a cam-piston rotating in one of the chambers of the case, a movable abutment located in the other chamber, and a vibrating wiper and adjustable gate governing the passage of a liquid medium from one to the other chamber, the combination being and operating substantially as and for the purpose set forth.

2. The combination, in an engine-governor, of the inclosing-case, the movable abutment, the adjustable valve or gate governing the pressure on said abutment, and the weighted rod or pendulum connected to the pin or stem of said adjustable valve, substantially as set forth.

3. The combination, in an engine-governor, of a cylindrical inclosing-case and a movable abutment formed upon the periphery of a cylinder secured on a shaft concentric with said case, so as to enable the area receiving pressure to be changed, when required, without alteration of any other member of the governor, substantially as set forth.

B. BRAZELLE.

Witnesses:

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