B. BRAZELLE.

Governors for Fluid-Pressure Engines.

No. 208,067. Patented Sept. 17, 1878.

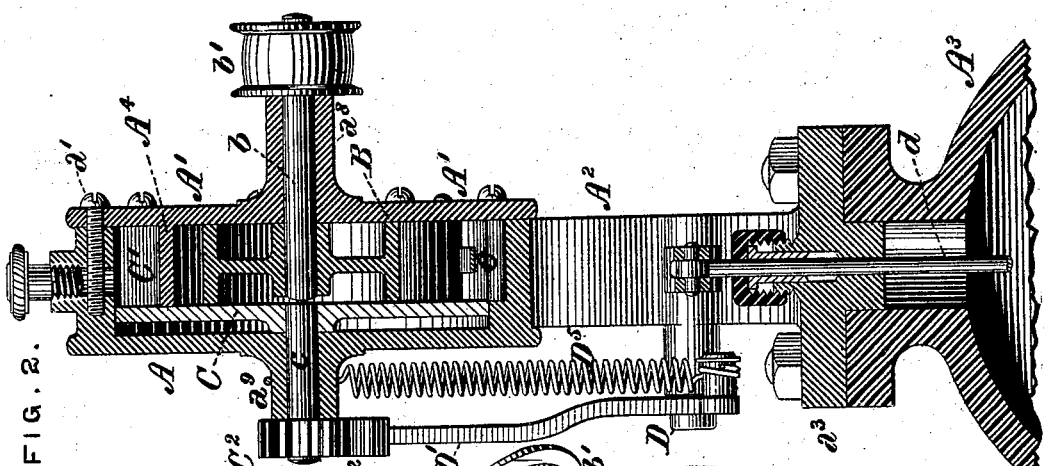

FIG. 2.

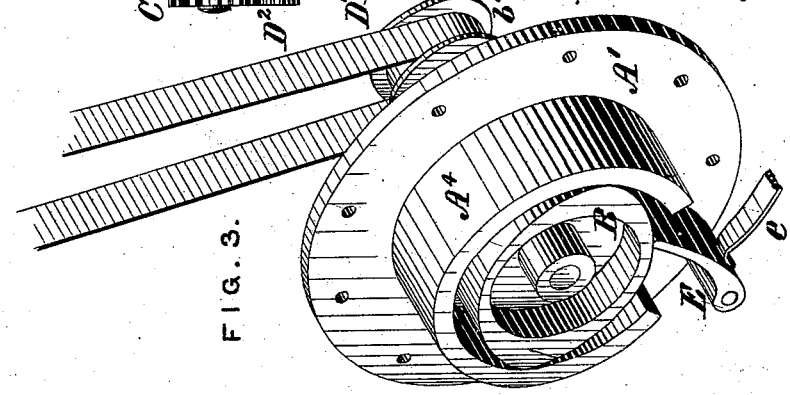

FIG. 3.

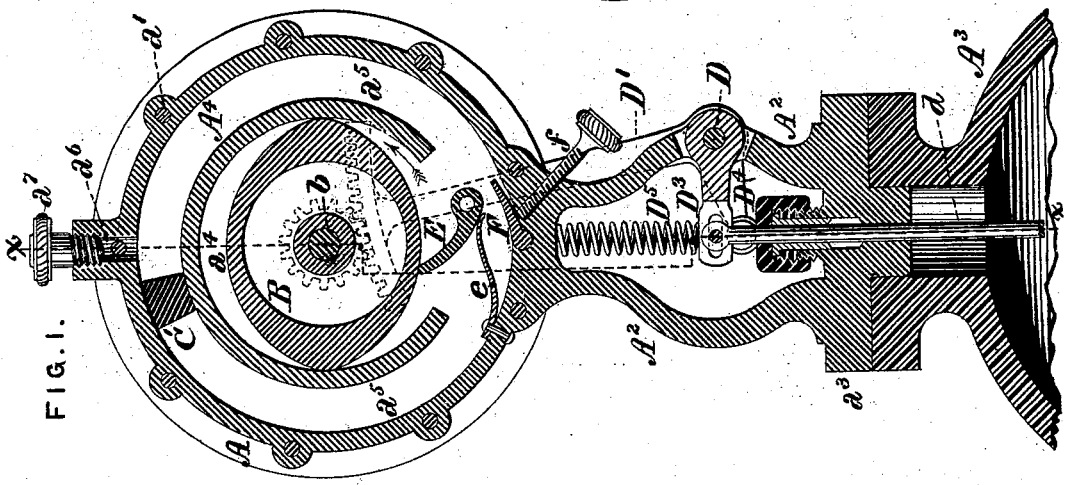

FIG. 1.

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

IMPROVEMENT IN GOVERNORS FOR FLUID-PRESSURE ENGINES.

Specification forming part of Letters Patent No. **208,067**, dated September 17, 1878; application filed March 7, 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 the following is a specification:

My invention relates to that class of governors ordinarily known as "hydraulic governors," in which regulation of the supply of motive fluid is effected through the variations of resistance to the rotation of a wheel or series of rotary abutments in an incompressible liquid medium induced by changes in the velocity of such rotation.

The object of my invention is to provide a governor of this description which shall be cheap, simple, and durable in construction, and both sensitive and powerful in action, so as to insure, as far as practicable, uniform speed under variations of load in the engine to which it is connected.

To these ends my improvements consist in the combination of an inclosing-case, to be filled with oil or other liquid, a cam-piston or rotary abutment revolving in a central chamber therein, a movable disk carrying a piston or abutment fitted to an annular channel or passage surrounding the chamber of the cam-piston and provided with mechanism for actuating a governor-valve, a vibrating wiper or flap, having its free end continuously maintained in contact with the periphery of the cam-piston, and an adjustable valve or gate, by which the area of opening for the passage of oil from one to the other portion of the annular channel may be increased or diminished at pleasure, all as hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is a vertical longitudinal central section through a governor embodying my improvements; Fig. 2, a vertical transverse section through the same at the line *x x* of Fig. 1; and Fig. 3 a view in perspective of the cam-piston, wiper, and portion of the case, detached.

To carry out my invention, I provide a cylindrical case, A, having a removable head or cover, A^1, secured upon it by bolts a^1. The case A is supported by legs or brackets A^2 upon the cap or cover a^3 of the chest A^3 of the governor-valve, which is not here shown, as it, *per se*, forms no part of my present invention, and may be of any approved construction. The case A is divided by a segmental partition-flange, A^4, into a central chamber, a^4, and a surrounding annular channel or passage, a^5. The flange A^4 does not extend entirely around the case, so that a free opening is left between the lower portion of the chamber a^4 and the channel a^5, for a purpose presently to be described. An opening, a^6, is formed in the top of the case for the introduction of oil, and is closed by a screw-plug, a^7. A cam-piston, B, so termed because of its elliptical or cam shape, and having its longest diameter such as that it will fit easily within the central chamber, is secured upon a shaft, *b*, which is mounted in a bearing, a^8, formed on the head A^1, and carries a driving-pulley, *b'*, by which it is rotated through a belt passing around a pulley on the shaft of the engine. A disk, C, secured upon a shaft, *c*, mounted in a bearing, a^9, concentric with the bearing a^8 of the cam-piston B, fits neatly within the case A, its inner face bearing against the partition, and having a piston or abutment, C^1, formed upon or secured to it, said piston fitting easily within the annular channel a^5. A spur-pinion, C^2, is secured upon the outer end of the shaft *c*, which carries the disk C, and meshes with a segment-gear, D^2, upon an arm, D^1, of a horizontal rock-shaft, D, mounted in a bearing on one of the legs or supports A^2 of the case A. Arms D^3 D^4 are likewise formed upon or secured to the rock-shaft D, one of which arms, D^3, is connected with the upper end of the stem *d* of the governor-valve. A helical spring, D^5, is attached at one end to the case A and at the other to the arm D^4 of the rock-shaft. A wiper or flap, E, is pivoted within the case A, and, extending upward through the opening formed in the flange A^4 below the cam-piston B, has its free end pressed against the periphery of said piston by a spring, *e*. The width of the wiper E is equal to the distance between the inner faces of the head or cover A^1 of the case and the disk C, so that the liq-

uid contained in the case can have no passage from one side to the other of the wiper except below it. The area of opening for such communication may be varied by a valve or gate, F, of the same width as the wiper, and pivoted below it to the case A. A screw, *f*, serves to elevate the gate F, so as to reduce, as required, the opening between its free end and the wiper E.

In the operation of the governor, the case A being filled with oil, and the cam-piston B being rotated in the direction of the arrow through its driving-pulley *b'*, the oil will be forced by such rotation out of the central chamber a^4 and against the left side of the piston or abutment C^1 of the disk C, and at the same time oil will be drawn away from the right side of said abutment C^1, passing through the opening between the wiper E and gate F. This displacement of the oil induces a pressure upon the left side of the abutment, which tends to move it, with the disk C, to which it is attached, in the direction of the arrow, such movement being transmitted through the pinion C^2 and segment gear D^2 to the rock-shaft D and governor-valve stem *d*, and being resisted by the spring D^5, which is thereby drawn out until an equilibrium is established between its contractive tension and the pressure induced by the rotation of the cam-piston, which equilibrium will be maintained during a uniform desired speed of the engine. A decrease of the pressure upon the abutment C^1, induced by a reduction of the speed of the cam-piston, is coincidently compensated for by the tension of the spring D^5, which acts in an opposite direction and correspondingly raises the stem *d* of the governor-valve to admit more steam to the engine; and, conversely, by an increase of speed of the cam-piston, the abutment C^1 will be pressed farther forward in the direction of the arrow, and will proportionately lower the governor-valve stem, and thereby reduce the supply of steam. These alternate 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 F, as greater or less pressure repectively upon the abutment C^1, relatively to the velocity of the cam-piston B, is induced by reducing or enlarging the area of opening for the passage of the oil between the wiper E and gate F by corresponding adjustments of said gate through its screw *f*. The power of the governor to overcome weight and friction of parts may likewise be increased, as required, by this device, so that one size of governor may be, as required, rendered adaptable for use upon governor-valves of different sizes.

It will be observed that the object of making the piston B in cam or elliptic form is to enable it to be maintained, without jar or shock, constantly in contact with the wiper E, and as these, as well as the other internal moving parts, are constantly surrounded by oil, ample lubrication is provided. Moreover, from the relation of the parts very close fitting is not essential, and corresponding economy in construction and ease in action are attained. I have found in practice that the governor possesses the qualities both of sensitiveness and actuating power required for an efficient and reliable regulator of a steam or other engine.

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

1. The combination, in an engine-governor, of an inclosing-case, a piston rotating in a liquid medium therein, and a movable abutment in said case, connected with the governor-valve, and operated in one direction by pressure induced by the rotation of the piston and in the other by the tension of a spring, substantially as set forth.

2. The combination of the inclosing-case, the cam-piston revolving in a central chamber therein, the annular surrounding channel, and the vibrating wiper, substantially as set forth.

3. The combination of the inclosing-case, the cam-piston revolving in a central chamber therein, the annular surrounding channel, and the movable disk and its abutment, substantially as set forth.

4. The combination of the inclosing-case, the cam-piston revolving in a central chamber therein, the vibrating wiper, the movable abutment, and the adjustable valve or gate, substantially as set forth.

5. The combination of the inclosing-case, the movable disk and its abutment, the pinion on the shaft of the movable disk, the segment gear on the rock-shaft arm, the rock-shaft and its arms, the spring, and the governor-valve stem, substantially as set forth.

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