

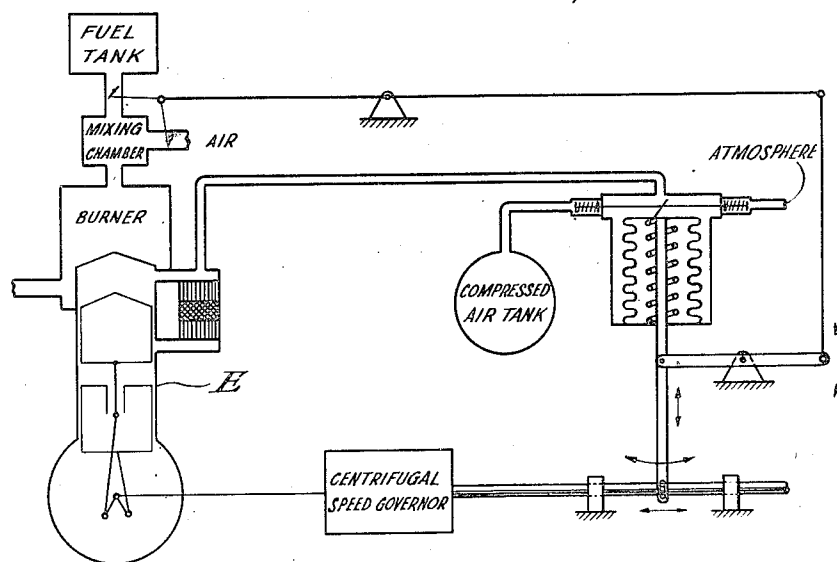
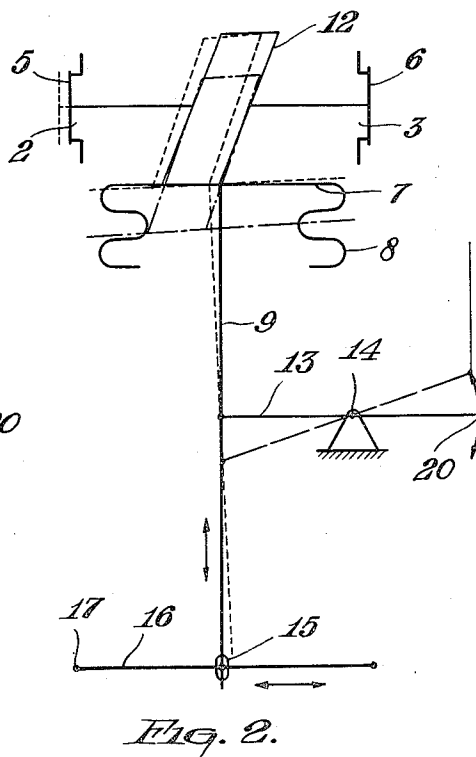
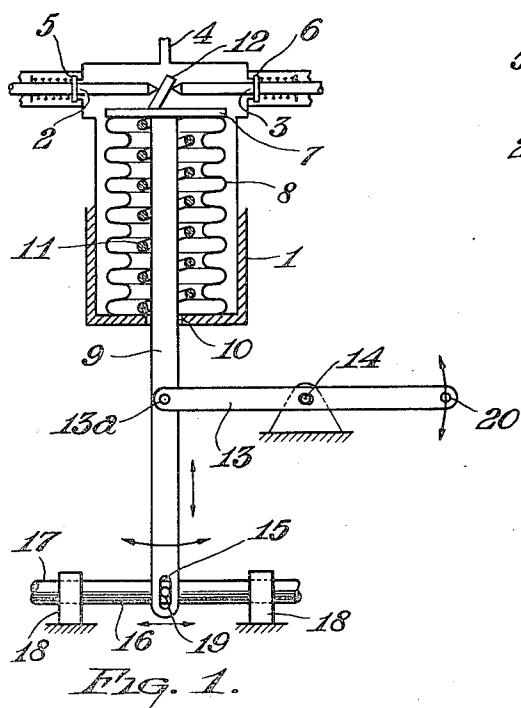
Sept. 23, 1952

A. HOROWITZ

2,611,234

CONTROL FOR ENGINES EMPLOYING A PRESSURE FLUID MEDIUM

Filed May 13, 1948



INVENTOR.
ALEXANDRE HOROWITZ
BY *Hea M Vogel*
AGENT

UNITED STATES PATENT OFFICE

2,611,234

CONTROL FOR ENGINES EMPLOYING A
PRESSURE FLUID MEDIUM

Alexandre Horowitz, Eindhoven, Netherlands, as-
signor to Hartford National Bank and Trust
Company, Hartford, Conn., as trustee

Application May 13, 1948, Serial No. 26,812
In the Netherlands June 18, 1947

5 Claims. (Cl. 60—24)

1

2

This invention relates to an engine control device and has for its object to provide a construction which is fundamentally simple and with which the different manipulations required for the said control are commanded by a simple and cheap mechanism. According to the invention a control device for an engine in which a gaseous working medium is used, is constructed in such manner that the engine comprises a device regulating exclusively the pressure of the working medium in the engine by supplying or carrying off this working medium, whereupon the newly adjusted pressure provides for the control of one or more other factors influencing the operation of the engine and at the same time restores the members supplying or carrying off the medium, directly or indirectly to their initial position.

In one embodiment of the invention, a vessel having at least one movable wall is preferably provided. Under the influence of the pressure of the working medium this wall provides for the control of one or more other factors influencing the operation of the engine and at the same time restores the members supplying and carrying off the medium, directly or indirectly to the initial position.

The invention may be used with advantage in a hot-gas engine in which the movable wall, under the influence of the pressure of the working medium in the engine, provides for the control of the fuel and/or combustion air supplied to the engine. In a suitable embodiment of the invention, the movable wall may be connected elastically to the remaining parts of the vessel.

The movable wall has preferably secured to it a body which is able to rotate about a point which is substantially stationary with respect to the longitudinal axis of the body. In a suitable embodiment of the invention this member, owing to this rotation, is capable of opening the members supplying or carrying off the medium, the supply of fuel and/or combustion air being controlled by a movement in the direction of the longitudinal axis of the body.

In one embodiment of the invention the rotary movement about the stationary point is governed by speed variations of the engine, the manner of transmission of these variations being of no importance to the present invention and being effected in any known manner. The movement of the body in the direction of the longitudinal axis is governed by the movable portion of the wall of the vessel. Finally, the point which is stationary with respect to the longitudinal axis of the body is preferably located on a second body which is

pivotaly connected to the first-mentioned body at the stationary point and which, in turn, is capable of rotating about a fixed point by which rotation the fuel and/or the combustion air is directly or indirectly controlled.

In order that the invention may be clearly understood and readily carried into effect it will now be described more fully with reference to the accompanying drawing, given by way of example, in which Figs. 1 and 2 represent embodiments of the invention. Fig. 1 is a partly diagrammatic view of the assembly; Fig. 2 is a fragmentary diagrammatic view of the moving mechanism; and Fig. 3 is a diagrammatic illustration of the control device applied to a hot air engine.

In Fig. 1 the reference numeral 1 denotes a vessel which is provided with three orifices 2, 3 and 4 at the top. The orifices 2 and 3 are closed on the outside by spring-loaded valves 5 and 6, the orifice 4 communicating, for instance as shown diagrammatically in Figure 3, with the cylinder of the engine required to be controlled. One of the walls of the vessel consists of a plate-shaped member 7 which is connected, through an elastic body 8, to the bottom of the vessel 1. The elastic body 8 is connected in a gas-tight manner both to the plate 7 and to the bottom of the vessel 1 so that the vessel 1, upon closure of the valves 5 and 6, communicates only with the engine to be controlled. To the movable plate 7 is secured a bar 9 which passes to the outside through a wide aperture 10 provided in the wall of the vessel. A spring 11 is provided between the plate 7 and the bottom of the vessel 1. At the upper side of the plate 7 is secured an inclined control member 12 which is just engaged by the valve bars on closed valves 5 and 6.

A rod 13 which has a fixed pivotal point at 14, is swingably mounted to the rod 9 at 13a. The rod 9 is provided at its end with a fork (not represented) exhibiting a slit-shaped aperture 15. Furthermore a bar 16 is provided of which the end 17 is connected to the regulating mechanism of the engine to be controlled, the rod 16 being supported in two fixed bearings 18. The bar 16 extends through the fork at the end of the rod 9 and comprises a pin 19 fitting in the slit-shaped aperture 15.

In Fig. 2 corresponding parts bear the same reference numerals.

The operation of the device described is as follows, it being assumed that the engine to be controlled is a hot-gas engine in which the average pressure of the working medium, the quantity of fuel to be supplied and the quantity of com-

bustion air to be supplied are required to be controlled.

As soon as the speed of the engine decreases, for instance due to an increase in load, the regulator forming part of the engine will undergo a change of state. Such a regulator may take the form of a conventional centrifugal governor device as diagrammatically indicated in Figure 3 operated by the shaft of the engine to be governed as shown, for example, in the U. S. Pat. No. 2,414,170 to F. Salzmann, for a Method For the Regulation of the Output of Thermal Power Plants, and in the U. S. Pat. No. 270,036 to G. O. and W. Eimecke, for a Double Acting Hot Air Engine. The change in the regulator may then be transmitted in a manner similar to that indicated in the patents, to the bar 16 with the result that the latter will slightly shift to the right. Owing to this the pin 19 and the end of the bar 9 are likewise slightly shifted to the right, the junction point 13a between the bar 9 and the bar 13 functioning as a fixed pivotal point of the bar 9. The bar 9 is able to turn slightly due to the elastic connection between the plate 7 and the vessel 1. Due to the rotation of the bar 9 the member 12 occupies another position as indicated in dotted lines in Fig. 2. Owing to this valve 5 is urged from its seat and the aperture 2 is left free. The aperture 3 communicates, for instance, with the open air as indicated in Figure 3, and the aperture 2 communicates with a vessel filled with gas at a high pressure, the aperture 4 communicating, for instance, with the cylinder of the hot-gas engine to be controlled such as indicated at E in Figure 3. Owing to the connection established between the cylinder of the hot-gas engine to be controlled and the pressure vessel, working medium will flow from the vessel to the cylinder. However, this working medium of higher pressure will at the same time increase the pressure in the vessel 1, as a result of which the movable wall portion 7 is urged away against the action of the spring 11. The member 12 which is rigidly secured to the movable plate 7 again releases the valve 5 so that the latter closes. The position now occupied by the various members is indicated in dot-and-dash lines. Simultaneously with this downward movement of the plate 7 the bar 9 is lowered according to its longitudinal axis which is possible with respect to the bar 16 owing to the slot 15. This movement is followed by the bar 13 which turns about the point 14. To the end 20 of the bar 13 are secured members by which the supply of fuel and combustion air to the engine is controlled in any conventional manner, for example, by actuation of conventional valves as indicated in Figure 3.

If the speed of the engine increases, for instance owing to a decrease in load, the bar 16 moves to the left, with the result that the valve 6 opens and communication is established between the engine cylinder and a pressure vessel of low pressure or the open air. Due to this the pressure in the vessel 1 will also decrease and the plate 7 will rise so that the valve 6 closes again and the end 20 of the bar 13 is lowered, thus reducing the supply of fuel and combustion air.

The control as described is simple and reliable. If the various component parts, notably the member 12 and the spring 11, are suitably proportioned, there is no tendency to so-called over-control.

What I claim is:

1. In combination, an engine in which a pres-

sure fluid medium is employed and a control device for said engine, said control device comprising first means for admitting pressure fluid medium to said engine, second means for allowing pressure fluid medium to escape from said engine, third means responsive to the pressure to the pressure fluid medium in said engine and comprising an element movable to positions for rendering either of said first or second means operative, and fourth means responsive to the load imposed upon said engine for effecting the positioning of said element.

2. In combination, an engine in which a pressure fluid medium is employed, means for heating the pressure fluid medium, a control device for said engine, said control device comprising first means for admitting pressure fluid medium to said engine, second means for allowing pressure fluid medium to escape from said engine, third means responsive to the pressure of the pressure fluid medium in said engine and comprising an element movable to positions for rendering either of said first or second means operative, fourth means responsive to the load imposed upon said engine for effecting the positioning of said element, and other means responsive to movement of said movable element for controlling said pressure fluid medium heating means.

3. In combination, an engine in which a pressure fluid medium is employed, means for heating the pressure fluid medium, a control device for said engine, said control device comprising first means for admitting pressure fluid medium to said engine, second means for allowing pressure fluid medium to escape from said engine, third means comprising a movable wall responsive to the pressure of the pressure fluid medium in said engine and an element longitudinally movable by said wall to position for rendering either of said first or second means operative, pivoted means connected to said element and responsive to the longitudinal movement thereof for controlling said pressure fluid medium heating means while causing a rotative component to be included in the movement of said element, and fourth means responsive to the load imposed upon said engine for effecting the rotary positioning of said element.

4. In combination, an engine in which a pressure fluid medium is employed, means for heating the pressure fluid medium, a control device for said engine, said control device comprising first means for admitting pressure fluid medium to said engine, second means for allowing pressure fluid medium to escape from said engine, third means comprising a movable wall responsive to the pressure of the pressure fluid medium in said engine and an element longitudinally movable by said wall to positions for rendering either of said first or second means operative, pivoted means connected to said element and responsive to the longitudinal movement thereof for controlling said pressure fluid medium heating means while causing a rotative component to be included in the movement of said element, and fourth means responsive to the load imposed upon said engine for effecting the rotary positioning of said element, said pivoted means being pivoted about a point which is stationary with respect to the longitudinal axis of said element.

5. In combination, an engine in which a pressure fluid medium is employed, means for heating the pressure fluid medium, a control device for said engine, said control device comprising first valve means for admitting pressure fluid

5

medium to said engine, second valve means for allowing pressure fluid medium to escape from said engine, collapsible means responsive to the pressure of the pressure fluid medium in said engine and comprising a movable wall, rod means, said movable wall being connected to said rod means which rod means are longitudinally movable with said wall to positions for rendering either of said first or second valve means operative, a pivot point fixed with respect to longitudinal movement of said rod means, bar means pivoted on said pivot point, said bar means having one end thereof pivotally connected to said rod means at a point between the ends thereof and the other end thereof connected to means for controlling said pressure fluid heating means, and regulating means responsive to the load imposed upon said engine and movable laterally

6

with respect to said rod means, said regulating means being connected to the other end of said rod means for effecting the positioning of said rod means about said pivot point between the ends thereof.

ALEXANDRE HOROWITZ.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
334,153	Babcock -----	Jan. 12, 1886
2,172,910	Keller -----	Sept. 12, 1939
2,414,170	Salzmann -----	Jan. 14, 1947
2,446,108	Salzmann -----	July 27, 1948