

R. B. BENJAMIN.
GAS-ENGINE SPEED CONTROLLER.
APPLICATION FILED FEB. 17, 1912.

1,238,481.

Patented Aug. 28, 1917.

2 SHEETS—SHEET 1.

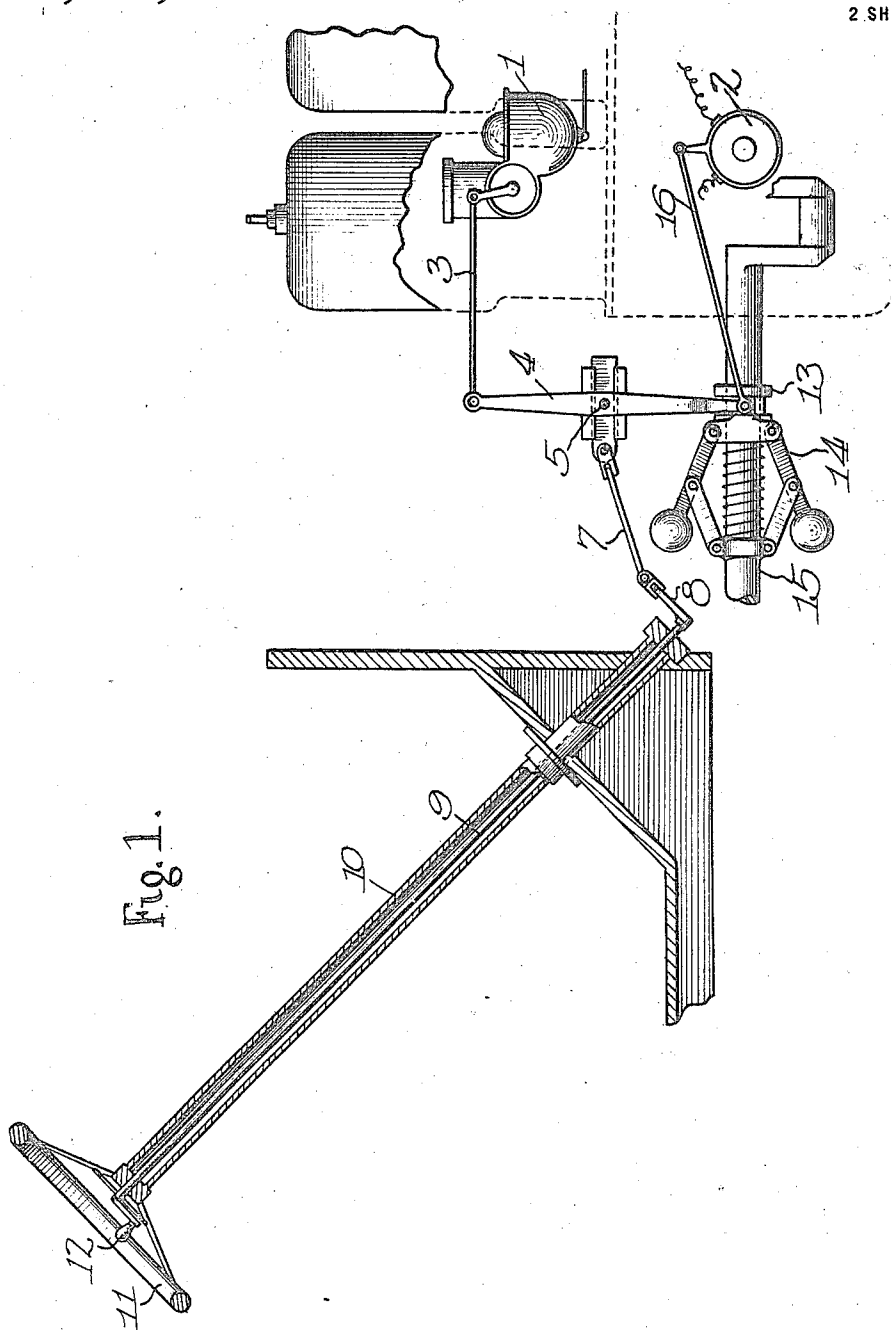


Fig. 1.

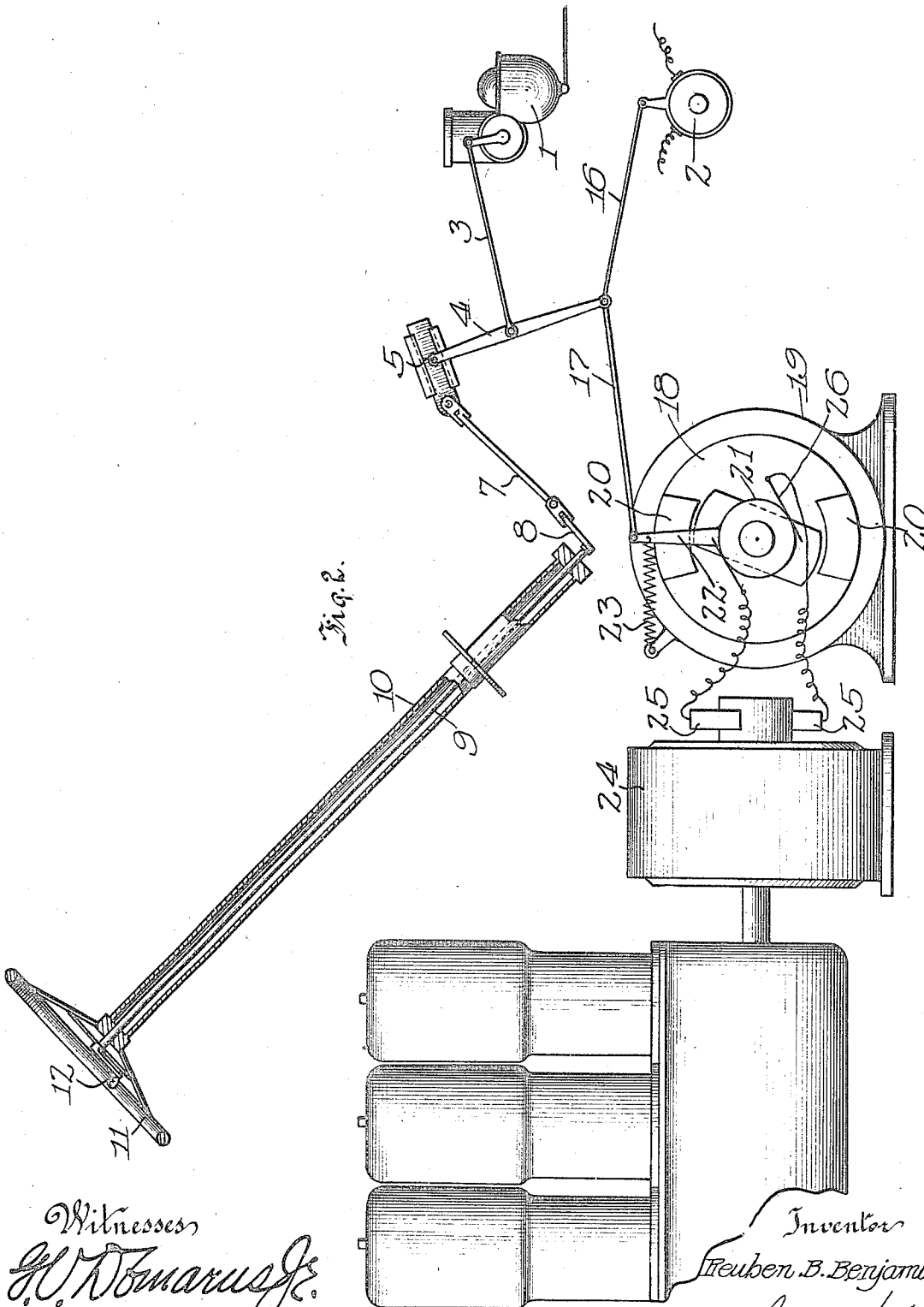
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UNITED STATES PATENT OFFICE.

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GAS-ENGINE-SPEED CONTROLLER.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, REUBEN B. BENJAMIN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Gas-Engine-Speed Controllers, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to improvements in means for governing and controlling the speed of power supplying devices and particularly explosive engines.

One of the objects of my invention is to provide means for maintaining the speed of an explosive engine constant and at the same time permitting the speed at which the engine is intended to be run to be predetermined or varied. In other words, one of the objects of my invention is to provide means whereby the speed at which the engine is intended to be run may be changed and means whereby the speed may be maintained constant at the speed to which it has been changed to run, the maintaining of the predetermined speed constant being brought about automatically, while the predetermining of the speed is under the will of the operator.

Another object of my invention is to provide means whereby ignition may be automatically varied in accordance with the speed of the engine; that is, when the engine is running at a low speed the ignition will be automatically retarded and as the speed of the engine increases the ignition will be automatically advanced.

I have illustrated diagrammatically in the accompanying drawings two embodiments of my invention. These embodiments are shown more or less diagrammatically, especially those parts of the automobile the construction of which is well known and well understood. In the drawings—

Figure 1 illustrates one embodiment of my invention wherein the automatic control is mechanical, while in

Fig. 2 I have illustrated the automatic control as being electrical.

Referring first to the embodiment illustrated in Fig. 1, I have illustrated at 1 a carbureter which may be of any well known construction, and an ignition controller 2

which also may be of any well known construction. The fuel supply valve of the carbureter is connected by a link or rod 3 with one end of a lever 4 which is pivoted at 5 to a sliding pivot member 6. This sliding pivot member is connected by a link 7 with a crank 8 formed on the end of a rod 9 extending up through the hollow handle 10 of the steering mechanism, and provided at its upper end within the steering wheel 11 with an operating handle 12. The opposite end of the lever 4 is bifurcated and these bifurcated ends fit over and are pivotally connected to a sliding collar 13 of a ball governor 14. This ball governor is connected to a shaft 15, which may be the driving shaft or which may be any other shaft receiving its power from the engine. The movable member of the ignition controller is connected by a link 16 with the end 13 of the lever 4.

In operation, when the engine is at rest the fuel supply valve of the carbureter is closed and the ignition controller is in a starting position. To start the engine the handle 12 is moved to open the fuel supply valve to the desired starting speed and the engine started in the ordinary manner. As the speed of the engine picks up the ignition will be advanced by the operation of the ball governor and the fuel supply valve will be left open at the point to maintain the desired speed as long as this speed remains constant. If, however, the load conditions vary, then the fuel supply valve will be opened or closed, in accordance with the tendency of the engine to run faster or slower than the desired speed, so that the fuel supply to the engine will be increased or diminished to maintain the speed substantially constant.

Due to the fact that the pivotal point 5 of the lever 4 is movable, the lever may be manipulated to set the fuel supply valve at a point to deliver any required supply of fuel to the engine, whereby the speed may be adjusted to a predetermined point. After the speed has thus been adjusted to the predetermined point, the governor 14 will always tend to maintain the fuel supply valve in a position to maintain the speed constant; that is, if the speed increases above the predetermined speed then the fuel supply valve will be operated to shut off the fuel supply, causing the engine to slow

down; if the speed decreases below the predetermined point, then the fuel supply valve will be opened more widely to give an additional amount of fuel to the engine, thereby increasing its speed. It will thus be seen that the predetermined speed will be maintained constant, and this speed will be maintained constant irrespective of the load imposed upon the engine. If the load of the engine becomes lighter, then the engine will tend to race and the governor will immediately shut off or cut down the fuel supply. If the load on the engine be increased, the speed of the engine will tend to drop and the governor will act to increase the fuel supply, thereby maintaining the speed of the engine constant irrespective of its load.

In Fig. 2 I have illustrated electromagnetic means for governing the engine. In this figure the carbureter 1 and the ignition controller 2 are illustrated diagrammatically, as in Fig. 1. The fuel supply valve of the carbureter 1 is connected by a link or rod 3 with the central portion of the lever 4, and the ignition controller 2 is connected by the link or rod 16 with the lower end of the rod 4. The upper end of the rod 4 is pivotally connected with the sliding member 6 which is operated in the same manner as described with respect to Fig. 1. The lower end of the lever 4 is connected by a link 17 with the movable member 18 of what I have termed a balanced electromagnet 19. This magnet comprises a pair of stationary fields 20 and a movable armature 21; the armature, however, being not intended to make a complete rotation. The armature is provided with an extension 22 by which it is connected with the link 17, and opposing the movement of the armature is a coiled spring 23 which tends to maintain the armature and the link 17 in normal position. Driven from the engine is a dynamo 24, the brushes 25 of which are connected with the brushes 26 of the armature 21. In operation, it will be seen that the potential delivered by the dynamo 24 depends directly upon the speed at which it is driven and therefore upon the speed of the engine. As the speed of the engine increases the potential of the dynamo 24 will increase, whereby the armature 21 of the balanced electromagnet will be caused to have a rotative tendency, which will move the lever 4 to advance the spark and at the same time cause this lever to close the fuel supply valve, reducing the fuel supply. The rest of the operation of this embodiment is substantially the same as that described with respect to Fig. 1.

While I have shown and described certain embodiments of my invention, it will be understood that my invention is capable of being embodied in various other forms without departing from the spirit thereof as set forth in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a device of the character described, the combination with an explosive engine, of a fuel controller, means for setting said controller at different points for causing the engine to run at different predetermined speeds, of an electromagnetic means for automatically changing said controller to maintain the speed of the engine constant and means operating from the engine for supplying said electromagnetic means with electrical energy.

2. In a device of the character described, the combination with a manually variable controller for predetermining the speed of an explosive engine, of an electromagnet for automatically operating said controller for maintaining constant the predetermined speed, a dynamo for supplying said electromagnet with electrical energy arranged to be driven at a speed corresponding to the speed of the engine.

3. In a device of the character described, the combination with a manually variable controller for predetermining the speed of an explosive engine, of an electromagnet the operation of which depends upon a variable potential, for automatically operating said controller for maintaining constant the predetermined speed, and an automatic electric machine operated from the engine for supplying the variable potential.

4. In a device of the character described, the combination with a fuel supply controller of an explosive engine, of an ignition timer, means within the control of the operator for operating said controller to supply the engine with a predetermined fuel supply, and electromagnetic means for operating said fuel supply controller to vary the fuel supply in accordance with the load conditions of the engine to maintain the speed constant and for operating said ignition timer to vary the time of ignition in accordance with the speed of the engine.

5. In a device of the character described, the combination with a fuel supply controller for gas engines, of a charge ignition timer, means within the control of the operator for operating said fuel controller to feed a predetermined charge to the engine, a balanced electromagnet for automatically operating said fuel controller to vary the fuel supply in accordance with variations in load conditions to maintain the speed constant and for operating the ignition timer to vary the time of the ignition in accordance with the speed of the engine.

6. In a device of the character described, the combination with a fuel supply controller, of an ignition timer, means within the control of the operator for operating said controller to feed to the engine a pre-

determined fuel supply, an electromagnet for automatically operating said controller and ignition timer, and a dynamo for supplying current to said electromagnet.

5 7. In a device of the character described, an explosive engine, means for regulating the fuel supplied thereto, means for varying the time of ignition, electromagnetic means controlled by the engine and responsive to variations of speed thereof for controlling said regulating means and said varying means, and manually controlled means for controlling said regulating means in conjunction with said automatic controlling means.

10 8. In a device of the character described, an explosive engine, means for regulating the fuel supplied thereto, means for varying the time of ignition, and electromagnetic governing means for said regulating means and said varying means, whereby an increase in speed of the engine causes an advance in the time of ignition and a reduction of the fuel supply.

20 9. In a device of the character described, an explosive engine, means for regulating the fuel supplied thereto, means for varying the time of ignition, and electromagnetic governing means common to said regulating means and said varying means, whereby an increase in speed of the engine causes an advance in the time of ignition and a reduction of the fuel supply.

30 10. In a device of the character described, an explosive engine, means for regulating the fuel supplied thereto, means for varying

the time of ignition, electromagnetic governing means for said regulating means and said varying means, whereby an increase in speed of the engine causes an advance in the time of ignition and a reduction of the fuel supply, and manually controlled means for controlling said regulating means in conjunction with said governing means.

11. In a device of the character described, 45 an explosive engine, means for regulating the fuel supplied thereto, means for varying the time of ignition, governing means comprising a movable member controlled by the engine and responsive in its movement to variations of speed thereof, connections between said member and said regulating means for actuating said regulating means, and link connections between said member and said varying means. 55

12. In a device of the character described, an explosive engine, means for regulating the fuel supplied thereto, means for varying the time of ignition, governing means comprising a lever controlled by the engine 60 and responsive in its movement to variations of speed thereof, connections between said lever and said regulating means for actuating said regulating means, and connections between said lever and said varying means. 65

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

REUBEN B. BENJAMIN.

Witnesses:

W. PERRY HAHN,
MABEL REYNOLDS.