

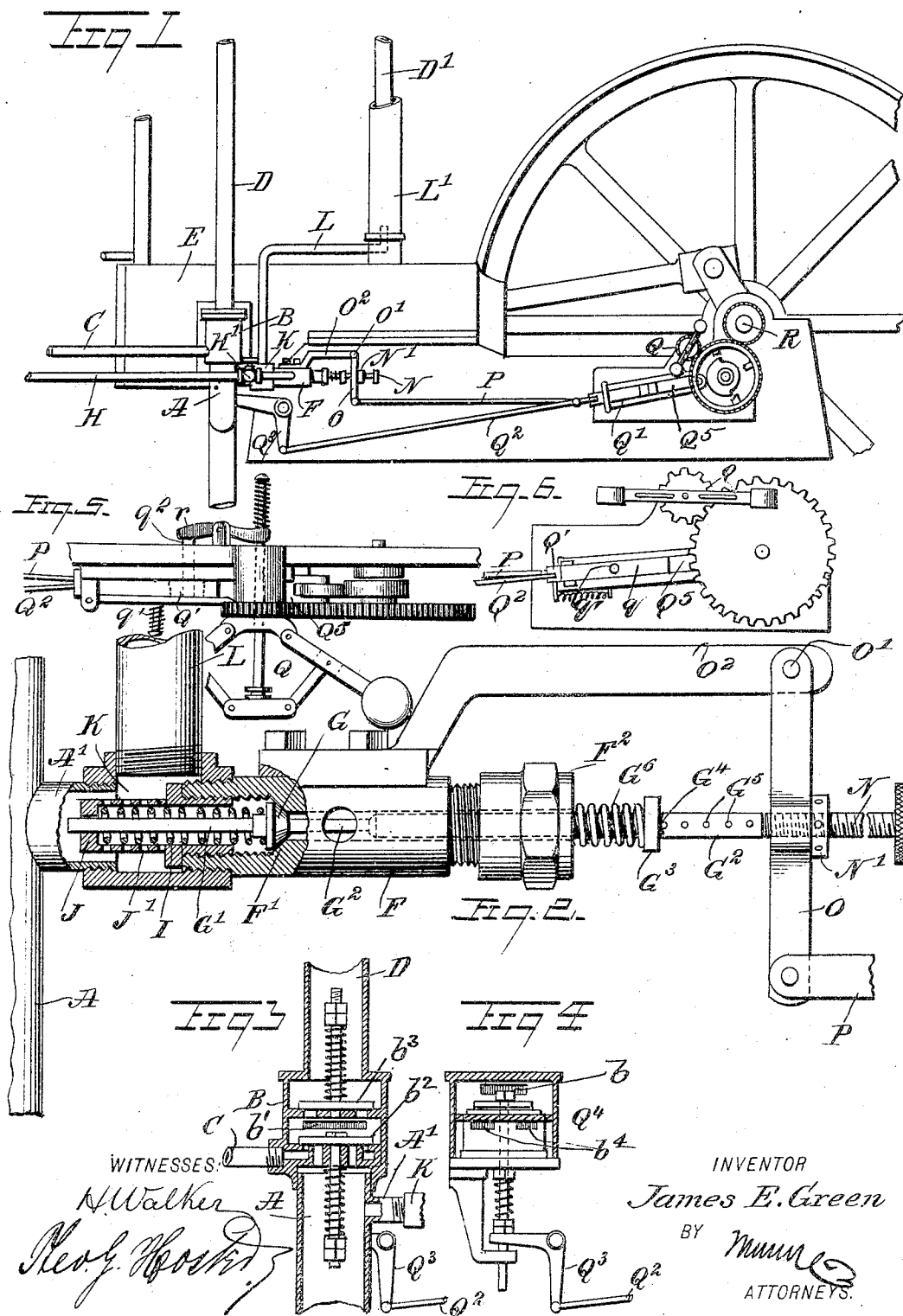
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J. E. GREEN.

OIL OR GASOLENE ATTACHMENT FOR GAS ENGINES.

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UNITED STATES PATENT OFFICE.

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OIL OR GASOLENE ATTACHMENT FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 792,894, dated June 20, 1905.

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To all whom it may concern:

Be it known that I, JAMES EDWIN GREEN, a citizen of the United States, and a resident of Belmont, in the county of Pleasants and State of West Virginia, have invented a new and Improved Oil or Gasolene Attachment for Gas-Engines, of which the following is a full, clear, and exact description.

The invention relates to gas-engines such as are used in oil districts; and its object is to provide a new and improved oil or gasolene attachment for a gas-engine to allow of running the engine with gas from an oil-well or with gasolene in case the gas-supply gives out, or in case the supply is low and not sufficient to run the engine then oil or gasolene-vapor is supplied through the attachment in any desired degree to form an explosive mixture with the gas, the arrangement being such that the necessary changes can be made while the engine is running.

A further object of the invention is to vaporize oil or gasolene previous to its entrance into the mixing-chamber to insure complete combustion and to prevent the attachment from frosting or freezing.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement as applied to a gas-engine of the two-cycle type. Fig. 2 is an enlarged side elevation of the improvement, parts being in section. Fig. 3 is an enlarged sectional side elevation of the mixing-chamber and adjacent parts. Fig. 4 is a like view of the governor-controlled regulating-valve. Fig. 5 is a detail plan view illustrating the governor connections, and Fig. 6 is a front view of the same.

The improved oil or gasolene attachment is secured to the gas-engine at the air-supply pipe A for the mixing-chamber B, into which opens the air-supply pipe and into which also

opens the gas-supply pipe C, so that a mixture of air and gas is formed in the said chamber B. D is an auxiliary exhaust-pipe opening into the chamber B, as indicated in Fig. 3. The mixture passes from the mixing-chamber B into the cylinder E, to be ignited therein in the usual manner to give the desired impulses to the engine.

The attachment, as shown in detail in Fig. 2, is provided with a valve-casing F, having a valve-seat F', normally closed by a valve G, and the said valve-casing is connected in front of the valve G with an oil or gasolene supply pipe H, leading from an overhead oil or gasolene tank, so that the oil or gasolene flows by its own gravity from the said tank into the valve-casing F. The valve G is normally held in its seat F' by a spring I, coiled on the extension G' of a valve-stem G² and guided in a bearing arranged in the rear end of a tube J, screwing in the rear end of the casing F and containing perforations J', opening into an auxiliary mixing-chamber K, attached to a nipple A' on the air-supply pipe A, as plainly shown in Fig. 2.

A hot-air-supply pipe L is attached to the chamber K and leads from a tube L', through which extends the main exhaust-pipe D', so that air passing into the said tube L' is heated and sucked in this condition by way of the pipe L into the auxiliary mixing-chamber K to mix with the vaporized oil or gasolene issuing through the perforations J' in the tube J. Now the hot air passing into this mixing-chamber K heats the tube J, and consequently the oil or gasolene periodically discharged through the valve-seat F' into the tube J is vaporized, and the vaporized oil or gasolene mixes with the hot air, and the mixture is drawn through the air-supply pipe A into the mixing-chamber B to mix with the gas passing into the same to form a highly-explosive mixture, sucked into the cylinder E in the usual manner, to be finally ignited therein.

The engine to which the attachment is shown applied only explodes the charge at every other revolution, one revolution being employed to clean the cylinder and draw in a fresh charge, the charge then being compressed and exploded.

It is to be understood that the suction produced on the forward stroke of the engine opens the lower auxiliary valve b^2 and draws in the charge, which passes from pipe A up under the open valve b^2 and thence through the port b' , which communicates through ports b^4 with the casing of the main valve Q^4 . The main valve Q^4 is open at this time, and the charge passes up under the valve and through the port b into the explosion-chamber. When the engine is at the extreme end of stroke, the main valve closes and confines the charge in the cylinder or explosion-chamber. After the explosion takes place the regular exhaust passes out through the main exhaust-pipe D' . As soon as the explosion takes place the main valve Q^4 is raised. The engine-piston on the return stroke drives out the hot air or burned gases remaining in the main cylinder or explosion-chamber, the gases passing out through the port b , thence down under the main valve, and out through ports b^4 . The ports b^4 connect, as previously described, with port b' of the chamber B and the burned gases pass through the port b' , lifting the upper auxiliary valve b^3 , and thence pass into the auxiliary exhaust-pipe D, which conducts the fumes outside the building.

The forward end of the valve-stem G^2 extends through a stuffing-box F^2 , held on the forward end of the valve-casing F, and on the outer end of the valve-stem G^2 is held an adjustable collar G^3 , abutting against a pin G^4 , inserted in one of a series of apertures G^5 , formed on the valve-stem G^2 . A spring G^6 presses with one end against the said collar G^3 to assist the spring I in holding the valve G normally in a closed position on its valve-seat F' . The terminal of the outer end of the valve-stem G^2 is adapted to be engaged by a screw-rod N, screwing in a lever O, fulcrumed at O' on a bracket O^2 , attached to the valve-casing F, and the said screw-rod N after being adjusted is securely locked in place on the lever O by a locking-nut N' .

The free end of the lever O is pivotally connected by a link P with a slide Q' , forming a movable part of a governor Q, driven from the main shaft R of the engine. A second slide Q^5 is located at the front end of Q' and is provided with a wheel at its end. A spring (not shown) presses on the slide Q^5 and holds the wheel in engagement with an eccentric driven from the engine, so that when the engine is in motion the movable part Q' and link P impart a swinging motion to the lever O, so that the screw-rod N imparts a sliding motion to the valve-stem G^2 to move the valve G off its seat to allow the oil or gasoline to pass to the open valve-seat F' into the vaporizing-tube J. On the return stroke of the movable part Q' the springs I and G^6 immediately return the valve G to its seat F' to disconnect the oil or gasoline supply from the vaporizing-tube J. The movable part Q'

of the governor Q is connected by a link Q^2 with a bell-crank lever Q^3 , controlling the admission-valve Q^4 of the engine, (see Fig. 4,) so as to regulate the amount of the explosive mixture passing into the cylinder E to run the engine at a uniform speed.

The body portions of the slides Q' Q^5 are spaced apart at their adjacent ends; but the slide Q' has a hinged front portion q projecting beyond the end of the body and adapted when in normal position to be engaged by the slide Q^5 when the latter is moved by the eccentric. The hinged or movable part q of the slide Q' is normally held in position to be engaged by the slide Q^5 by a spring q' . A pin q^2 extends through a slot formed in the body portion of the slide Q' and engages the hinged part q , the slot in the slide being elongated to permit of the forward and backward movement of the slide. A pivoted lever r bears at one end against the outer end of the pin q^2 , the other end of the lever being arranged to be moved by the governor. When the speed of the engine increases beyond the normal, the upper end of the lever r is moved outward, and the pin q^2 , engaged by the other end of the lever, is moved inward, forcing the hinged part q of the slide out of normal position, so that the slide Q' is not acted on by the slide Q^5 , driven from the eccentric. When the speed of the engine again reaches the normal, the lever r is returned to normal position by the spring on the governor and the spring q' returns the hinged part q to operative position.

The main or admission valve Q^4 is situated between the auxiliary valve b^3 and the engine-cylinder and is directly back of the chamber B, containing the said auxiliary valve. This valve Q^4 serves to separate the explosion-chamber from the auxiliary valve b^3 and to retain the charge in the cylinder. When the slide Q' and link Q^2 are out of operative position, the valve Q^4 is closed by its spring, and the suction produced by the stroke of the engine cannot then open the valve b^3 .

The slide Q' being connected with the admission-valve Q^4 , the movement of said valve is controlled by the governor to regulate the amount of explosive mixture passing to the cylinder to run the engine at a uniform speed when the gas-supply only is employed, as well as when the oil or gasoline attachment is in use.

Now from the foregoing it will be seen that the engine can be run in the usual manner with gas as the motive agent; but in case the gas is not in sufficient quantity to properly run the engine then use is made of the oil or gasoline attachment—that is, the valve H' in the oil or gasoline supply pipe H is opened to allow oil or gasoline to flow to the valve-casing F. Now as the valve G is periodically opened a desired amount of oil or gasoline is allowed to flow into the vaporizing-tube J for

the oil or gasolene to be vaporized and mixed with the hot air drawn in through the pipe L, the mixture then passing into the mixing-chamber B to mix with the gas passing through the pipe C into the said chamber. Now by the operator adjusting the screw-rod N in the lever O the valve G may be opened more or less, so that a larger or lesser amount of oil or gasolene is allowed to flow into the vaporizing-tube J, according to the amount required for running the engine properly—that is, if the gas-supply is very low then the valve G is moved open more fully, and when the gas-supply increases the valve G is opened but an instant to admit less oil or gasolene to the tube J. Now in case the gas-supply gives out entirely then the screw-rod N is adjusted correspondingly to admit a large quantity of oil or gasolene to the engine, so as to run the latter by oil or gasolene only.

It is to be understood from the above description that when the attachment is in use and the engine is running at normal speed the valve G is opened by the forward movement of the slide Q' to allow the oil to flow into the vaporizing-tube and is closed by the action of the springs I and G⁶ on the return movement of the slide Q'. When the speed of the engine under the action of the attachment increases beyond the normal, the slide Q' is then not acted upon to open the valve G, said valve remaining closed until the speed of the engine again reaches the normal.

The valve G of the attachment when the latter is in use and the admission-valve being actuated from the slide Q' are opened and closed at the same time, and consequently when the hinged part q of the slide Q' is thrown out of operative position by the governor the admission-valve Q¹ and the valve G of the attachment are held closed by the action of their springs and the supply of the explosive mixture to the engine is shut off.

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

1. An attachment for an engine normally using gas as a fuel, the said attachment comprising a valve-controlled oil or gasolene supply opening into the mixing-chamber of the engine, whereby additional fuel may be supplied to the engine when the gas-supply becomes deficient, and means governed by the speed of the engine for intermittently opening the said valve, as set forth.

2. An attachment for gas-engines normally using gas as a fuel, the said attachment comprising a valve-controlled oil or gasolene supply, opening into the mixing-chamber of the engine, whereby additional fuel may be supplied to the engine, when the gas-supply becomes deficient, means governed by the speed of the engine for intermittently opening the said valve, and a hot-air supply connected with the said oil or gasolene supply, to vapor-

ize the oil or gasolene and form a mixture with the same, as set forth.

3. An attachment for gas-engines normally using gas as a fuel, the said attachment comprising a valve-controlled oil or gasolene supply, opening into the mixing-chamber of the engine, means governed by the speed of the engine for intermittently opening the said valve, and manually-controlled means for regulating the throw of the said valve to admit more or less oil or gasolene according to the amount of gas-supply, as set forth.

4. An attachment for gas-engines normally using gas as a fuel, the said attachment comprising an auxiliary mixing-chamber connected with the main mixing-chamber of the engine, an oil or gasolene supply opening into the said auxiliary mixing-chamber, a hot-air pipe connected with the said auxiliary mixing-chamber to vaporize the oil or gasolene and form an additional fuel for the engine when the gas-supply becomes deficient, a valve controlling said oil or gasolene supply, and means governed by the speed of the engine for intermittently opening said valve, as set forth.

5. An attachment for a gas-engine normally using gas as a fuel, the said attachment comprising an auxiliary mixing-chamber, provided with a valve-seat, an oil or gasolene supply pipe opening into the said valve-casing, a valve normally seated on the said valve-seat, means for periodically opening the said valve and governed by the speed of the engine and a perforated vaporizing-tube extending into the said auxiliary mixing-chamber and connected with the said valve-casing, the said auxiliary mixing-chamber being connected with the engine whereby additional fuel may be supplied to the engine when the gas-supply becomes deficient, as set forth.

6. An attachment for a gas-engine normally using gas as a fuel, the said attachment comprising an auxiliary mixing-chamber, provided with a valve-seat, an oil or gasolene supply pipe, opening into the said valve-casing, a valve normally seated on the said valve-seat and adapted to be periodically opened, a perforated vaporizing-tube extending into the said mixing-chamber and connected with the valve-casing, a lever mounted to swing means actuated from the engine, for moving said lever periodically, the said means being governed by the speed of the engine, and a screw-rod held in the said lever and adapted to engage the valve-stem of the said valve to move the latter into an open position to allow the oil or gasolene to flow into the said vaporizing-tube, the said auxiliary mixing-chamber being connected with the engine whereby additional fuel may be supplied to the engine when the gas-supply becomes deficient, the said screw-rod being adjustable in the said lever to regulate the throw of the said valve to

admit more or less oil or gasolene according to the amount of gas-supply, as set forth.

7. The combination with the air - supply pipe for the mixing-chamber of a gas-engine normally using gas as a fuel, of an oil or gasolene attachment for supplying additional fuel to the engine when the gas-supply becomes deficient, the said attachment comprising an auxiliary mixing-chamber connected with said air-supply pipe, a valve-casing connected with said auxiliary chamber and provided with a valve-seat, an oil or gasolene supply pipe connected with the valve-casing, a perforated vaporizing-tube connected with the valve-casing and extending into the auxiliary mixing-chamber, a valve normally seated on the valve-seat and periodically opened to permit the oil or gasolene to flow into the vaporizing-tube, a hot-air pipe connected with the auxiliary mixing-chamber, means for normally holding the valve to its seat, means actuated from the engine for periodically opening said valve, the said means being governed by the speed of the engine, and means for regulating the throw of said valve to admit more or less oil or gasolene according to the amount of gas-supply, as set forth.

8. The combination with a gas-engine normally using gas as a fuel and having a mixing-chamber into which opens the gas-supply pipe

and the air-supply pipe, of an attachment for supplying additional fuel to the engine when the gas-supply becomes deficient, the said attachment comprising an auxiliary mixing-chamber connected with the air-supply pipe leading to the mixing-chamber of the engine, a valve-controlled oil or gasolene supply, leading to the auxiliary mixing-chamber, a hot-air supply opening into the auxiliary mixing-chamber to vaporize the oil or gasolene and form a mixture with the same, the mixture being drawn into the mixing-chamber of the engine to mix with the gas passing into the same, means for intermittently opening the said valve to admit the oil to said auxiliary mixing-chamber, the said means being actuated from the engine during the normal running of the same, a governor, and a connection between the governor and said means, whereby the latter is moved out of operative position when the speed of the engine increases beyond the normal as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES EDWIN GREEN.

Witnesses:

T. N. Boss,
GEO. W. Boss.