H. L. SEWARD AND R. E. HALE.

FUEL CUT-OUT AND COMPRESSION RELEASE FOR GAS ENGINES.

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1,393,838. **Patented Oct. 18, 1921.**

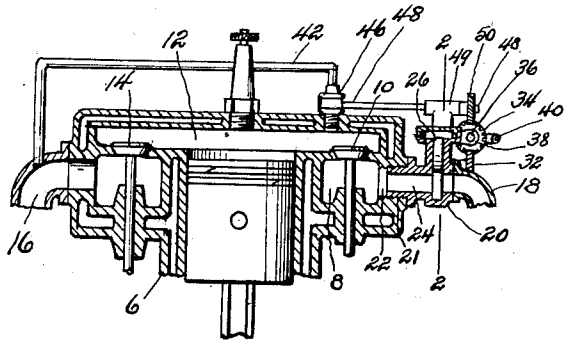


Fig. 1.

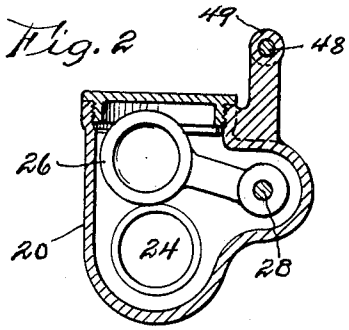


Fig. 2.

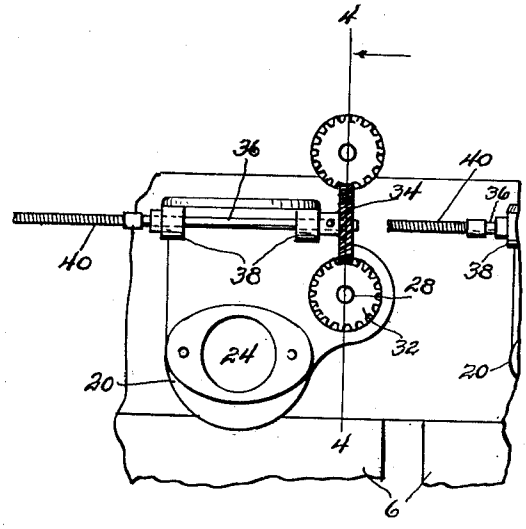


Fig. 3.

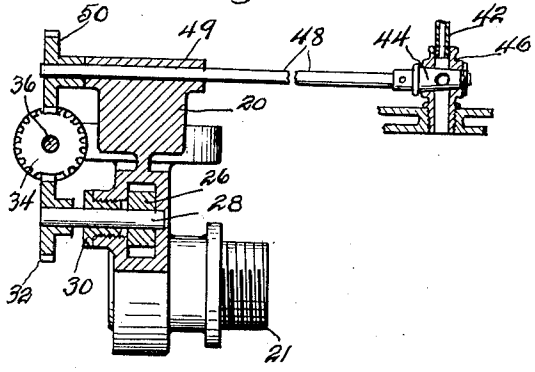


Fig. 4.

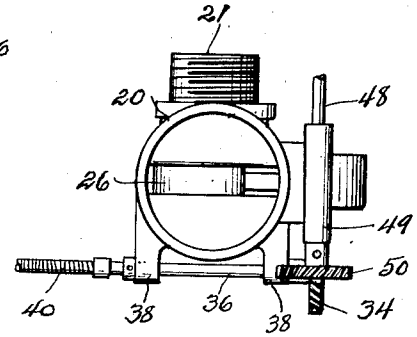


Fig. 5.

Witness:

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UNITED STATES PATENT OFFICE.

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FUEL CUT-OUT AND COMPRESSION-RELEASE FOR GAS-ENGINES.

1,393,838. Specification of Letters Patent. Patented Oct. 18, 1921.

Application filed April 18, 1919. Serial No. 291,040.

To all whom it may concern:

Be it known that we, HYRAM L. SEWARD and RUSSELL E. HALE, citizens of the United States, residing at Kansas City, in the county of Jackson, State of Missouri, have invented certain new and useful Improvements in Fuel Cut-Outs and Compression-Releases for Gas-Engines, of which the following is a complete specification.

The present invention relates to improvements in internal combustion engines, and aims to provide an auxiliary control means for multiple cylinder engines adapted under certain conditions, as where one or more of the cylinders become inoperative or are not working satisfactorily, to enable the operator to cut off the fuel supply thereto and also to relieve the compression therein.

Accordingly one of the objects of the invention is to devise a control means of this character which comprises an auxiliary cut-off valve adapted, at the will of the operator, to cut off the fuel supply to the inlet valve chamber of any cylinder of the engine.

It is also an object of the invention to provide a conveniently controlled auxiliary valve by which the operator may, at will, relieve the compression within the combustion chamber of any one of the engine cylinders.

It is also sought to devise a means of the character described adapted to be conveniently applied in the form of an attachment associated with the inlet valve chamber of each cylinder and including an operative connection from the attachment to the compression release valve of that cylinder.

It is further sought to provide a simple and efficient, as well as inexpensive construction for accomplishing the purposes stated.

With these general objects in view, the invention will now be described with reference to the accompanying drawing illustrating one form of construction which has been devised for embodying the proposed improvements, after which the novel features therein will be set forth and particularly defined in the appended claims.

In the drawing—

Figure 1 is a vertical sectional view showing a portion of an engine cylinder provided with a control means constructed in accordance with the present invention;

Fig. 2 is an enlarged detail sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary side view showing portions of two cylinders with said control means applied thereto;

Fig. 4 is a sectional view, taken on the line 4—4 of Fig. 3; and

Fig. 5 is a plan view of one of the attachments forming the cut-off valve, with the cap portion thereof removed.

Referring to the said drawing in detail, this illustrates the improvements in connection with an internal combustion engine cylinder 6 having the usual inlet valve chamber 8 provided with a valve 10 controlling communication with the combustion chamber 12 which exhausts past an exhaust valve 14 to the exhaust passage 16 in the usual well-known manner.

Adapted to be interposed between each inlet valve chamber 8 and its fuel intake connection 18 is an attachment 20 having a threaded portion 21 adapted to be fitted into the intake passage 22 of said valve chamber, said intake connection 18 being suitably retained against the outer end of the attachment with its passage in register with the passage 24 through the attachment, as illustrated in Fig. 1. An auxiliary fuel cut-off valve 26 is mounted to swing across the passage 24, being carried by a pin 28 journaled in a bearing screw 30 carried by said attachment 20, the outer end of said pin 28 being provided with a spiral gear 32 meshing with a similar gear 34 which is carried by a short shaft 36 supported in bearings 38 and operated by a flexible shaft 40 from the driver's position.

The combustion chamber 12 of each of the cylinders 6 is provided with a by-pass connection 42 forming an auxiliary or secondary outlet passage from the combustion chamber to a point exterior to the exhaust valve 14 where it communicates with the exhaust passage 16. The entrance to this connection is controlled by a valve 44 mounted in a bearing nipple 46 fitted in the cylinder head, said valve 44 being connected to one end of a shaft 48 journaled in a bearing 49 formed on the attachment 20; the other end of said shaft 48 carries a spiral gear 50 meshing with the gear 34. By this means the shaft 40 for each cylinder operates simultaneously both valves 26 and 44 of that cylinder, each of the shafts 40 being extended back to a point for convenient operation from the driver's position.

It is thus apparent that a simple and efficient control means is provided for carry-

ing out the desired objects of the invention. The valve 26 is normally open to permit passage of the fuel to the valve chamber 8 and the valve 44 is normally closed to permit the usual compression and combustion which take place within the chamber 12. It often happens in the case of multiple cylinder engines that one of the cylinders goes "dead" or becomes inoperative or operates unsatisfactorily due to defective ignition or valve action or other trouble, and such difficulty is the more apt to be experienced with the increase in the number of cylinders to the engine. When this occurs, the power is of course decreased while at the same time the load is increased due to the work of compression being done in the inactive cylinders, besides which the fuel drawn into those cylinders is simply wasted. By the provision of the improved control means, when one or more of the engine cylinders exhibit signs of trouble of this character, the operator can by manipulation of the proper connections 40 cut off the supply of fuel to those cylinders and at the same time relieve the compression therein, by the simultaneous closing of the valve 26 and opening of the valve 44 of each cylinder so affected. This at once relieves the engine of the abnormal load imposed by the dead cylinder or cylinders and permits the engine to continue its operation until the trouble can be remedied. The cylinders which are affected can usually be readily ascertained by testing, through manipulation of the control connections. The improvements are of especial advantage in the case of air-plane engines, in which troubles of the character described usually oblige the pilot to immediately hunt a landing place, whereas with the improved control for cutting off the fuel supply and relieving compression in the dead cylinders he is enabled for a time to continue his flight. Such a control feature is also especially advantageous and desirable in the hauling of heavy dead loads, such as characterizes tractor operations.

While we have illustrated and described what we now regard as the preferred form of embodiment of the improvements, we desire to reserve the right to make all such formal changes or modifications as may fairly fall within the scope of the appended claims.

Having described the invention, what we claim is:

1. In an internal combustion engine, the combination with the combustion chamber provided with an exhaust passage having an exhaust valve and also with an inlet valve chamber having a fuel intake connection, of a self-contained attachment adapted to be interposed between said intake connection and valve chamber and including an auxiliary cut-off valve adapted to shut off the intake of fuel to said combustion chamber, means providing a secondary outlet passage from the combustion chamber to said exhaust passage at the exterior of the exhaust valve, a valve adapted to normally close said secondary outlet passage, and a single control connection operative for simultaneously actuating said last-named valve and said cut-off valve.

2. In an internal combustion engine comprising a plurality of cylinders, each provided with an exhaust passage having an exhaust valve and also with an inlet valve chamber having a fuel intake connection, a self-contained attachment adapted to be interposed between the intake connection and valve chamber of each of said cylinders and including an auxiliary cut-off valve adapted to close the passage through the attachment, means providing a secondary outlet passage from the combustion chamber of each cylinder to its exhaust passage at the exterior of the exhaust valve, a second auxiliary valve adapted to normally close the secondary outlet passage of each cylinder, and separate and independently operable means for actuating the said auxiliary valves of any one of said cylinders.

3. In an internal combustion engine, the combination with the combustion chamber provided with an exhaust passage having an exhaust valve and also with an inlet valve chamber having a fuel intake connection, of a self-contained attachment adapted to be interposed between said intake connection and valve chamber and including an auxiliary cut-off valve adapted to shut off the intake of fuel to said combustion chamber, means providing a secondary outlet passage from the combustion chamber to said exhaust passage at the exterior of the exhaust valve, a valve adapted to normally close said secondary outlet passage, said last-named valve and cut-off valve each being provided with a gear operably connected therewith, and a controlling connection provided with a gear in mesh with both of said valve gears and operative to simultaneously actuate the valves connected therewith.

In witness whereof we hereto affix our signatures.

HYRAM LEE SEWARD.
RUSSELL E. HALE.