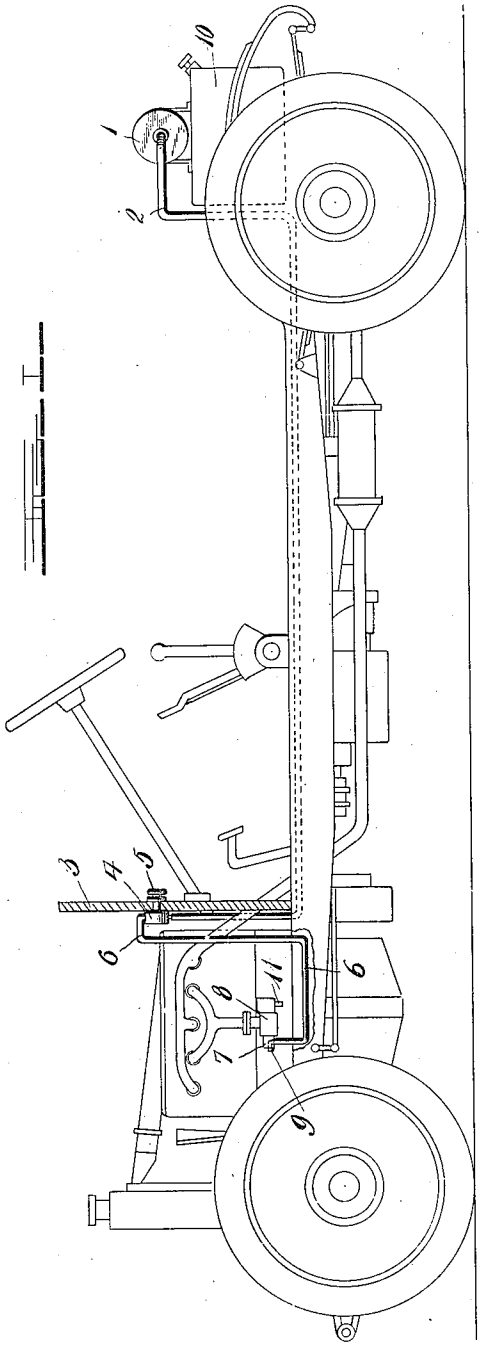
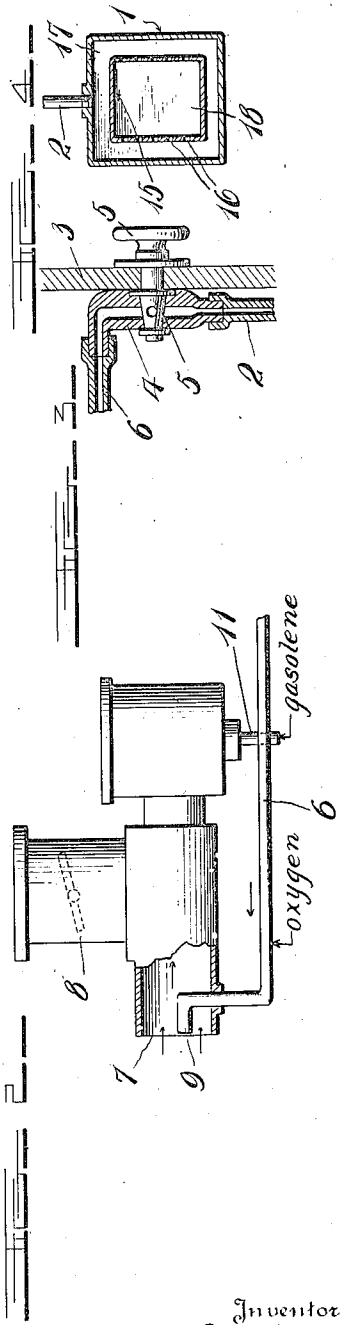
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E. M. SHINKLE

METHOD OF AND APPARATUS FOR BURNING GASEOUS OXYGEN IN INTERNAL COMBUSTION ENGINES

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METHOD OF AND APPARATUS FOR BURNING GASEOUS OXYGEN IN INTERNAL-COMBUSTION ENGINES.

Application filed April 5, 1922. Serial No. 549,910.

To all whom it may concern:

Be it known that I, EDWARD M. SHINKLE, a lieutenant colonel in the United States Army, and a citizen of the United States, at present stationed at Washington, in the District of Columbia, have invented certain new and useful Improvements in Methods of and Apparatus for Burning Gaseous Oxygen in Internal-Combustion Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a method of and apparatus for burning gaseous oxygen in internal combustion engines, and has for its object to improve the processes heretofore proposed.

With this and other objects in view, the invention consists in the novel steps and combinations of steps constituting the process, and in the novel parts and combinations of parts constituting the apparatus, all as will more fully be hereinafter disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification, in which like numerals designate like parts in all the views:

Figure 1 is a diagrammatic view of an automobile with this invention applied thereto;

Figure 2 is a side elevational view, partially broken away, of a carburetor illustrating the application of oxygen thereto;

Figure 3 is a sectional detail view of a portion of the dashboard of the automobile and a control apparatus for the oxygen; and

Figure 4 is a sectional diagrammatic view of an oxygen containing tank illustrating how dangers from the explosions of said tank may be lessened.

1 indicates any suitable container for gaseous exygen, provided with any suitable outlet 2 leading to the dashboard 3 of an automobile and provided with a connection 4 controlled by any suitable means such as the valve 5. Joined to said connection, is the pipe 6 leading to the air intake 7 of the carburetor 8, and having its extreme end 9 pointing away from said carburetor rather than into it, as shown. 10 indicates a fuel hydrocarbon tank, connected to the carburetor by a pipe 11, only a portion of which is shown in Figure 2.

The operation of this invention is as follows:

The container 1 is located at any suitable and convenient point on the machine, and the connections with the engine being substantially as shown, the operator, on opening the valve 5, will permit gaseous oxygen to pass into the carburetor only when a suction is created. That is to say, as soon as the air is drawn into the carburetor through the suction of the engine, the gaseous oxygen will be reversed in its normal direction of flow and drawn into said carburetor along with the air.

The extreme end 9 of the oxygen pipe 6 is pointed away from the carburetor 8 in order that the oxygen will not reach the intake manifold except when a suction exists therein. In other words, with the end 9 pointing in an opposite direction, oxygen would be liable to leak into the carburetor, and thus find its way into the intake manifold when the car is left standing over more or less long periods of time, with the result that when the engine is started its cylinders would be at first filled with relatively pure oxygen, and therefore, the initial explosions might be so violent as to wreck the engine. By pointing the end 9 of the pipe 6, however, away from the carburetor 8, as shown, any leaks of oxygen that may occur will not do any damage, because the oxygen will be diffused away into the air, and thus will only a normal mixture of oxygen or less than a normal mixture of oxygen, be found in the initial explosive charges when starting the engine. Further, as it is desired to carry the gaseous oxygen at as high a pressure as possible, with safety, I may, in some cases, adopt the form of oxygen containing tank 1 that is illustrated in Figure 4. That is, I may place inside said tank 1 a similar tank 15, provided with numerous small perforations 16.

The operation of such a relation of parts, upon an explosion taking place, is as follows: When the outer wall or tank 1 is ruptured only the gas which is under pressure in the space 17 is available as a propelling agent. In other words, this gas being relatively small in volume, its pressure is very quickly relieved, and therefore its propelling capacity is relatively small. By far the greater volume of gas may be contained in the space 18 and this can only escape through the relatively small perforations 16, so that its explosive pressure is likewise relatively small. The result is upon explosion the propelling capacity of the main body of gas is likewise very small. The net result of the construction therefore is that when a tank under very high pressure explodes, the rupturing effects on the apparatus surrounding the same are reduced to a minimum.

By actual tests I have found that gaseous oxygen introduced into the cylinders of an internal combustion engine in accordance with the above disclosure possesses a great many advantages of great commercial importance. That is to say, with a six-cylinder engine, the bore of which was 4¼ inches and the stroke of which was 7 inches, and which engine was mounted on a block and connected to a dynamometer, it was found that when no oxygen was admitted to the cylinders, the pull was 62 pounds, at a speed of 700 revolutions per minute. When oxygen was admitted to the cylinders, the pull was 78 pounds and the speed was 840 revolutions per minute. In other words, the admission of oxygen in accordance with the disclosure above, gave an increase of power of approximately 51%. Another series of tests was then run in which the speed was held constant at 700 revolutions per minute. The pull without oxygen was 72 pounds, while with oxygen the pull was 114 pounds, thus giving a gain in power of slightly more than 58%. Other tests for power were run with the results that an average gain of about 54% was observed.

In addition to the above tests, efforts were made to determine the rate of use of oxygen that would give a maximum increase of power. That is, a test for a period of ten minutes was had and the consumption of oxygen was found to be at the rate 118.8 cubic feet per hour, when the revolutions per minute were found to be 700. From the disclosures at this speed, one may readily compute the consumption of oxygen of any engine at any speed, but he should allow for a possible error of, say, from 3 to 5% in the results.

The advantages of this process of using gaseous oxygen may be found in the following:

(*a*) Ecomony of fuel to a degree several times the value of the oxygen used;

(*b*) A saving in the expense of having the engine cleaned of carbon, and also a saving in the loss of time involved in the cleaning of the engine.

(*c*) The starting and the operation of the engine is efficient from the start.

(*d*) Much of the present wear and tear on the engine due to carbon knocks is avoided.

(*e*) The use of oxygen renders available to operators 50% additional power when required, thus enabling engineers to modify their present practice with respect to the engine horsepower per ton of weight.

(*f*) The present low grade of fuel is rendered quite satisfactory, and it is possible to use still lower grades of fuel than those that are now used.

Of course, it is obvious that pressure reducers and other suitable apparatus not shown or described, which will be found desirable, in the use of gaseous oxygen under pressure, may be employed in connection with this invention. These various devices being of a well known construction, it is not deemed necessary to further refer to them here.

What is claimed is:

1. The method of rendering safe the starting of an internal combustion engine with the aid of free gaseous oxygen which consists in leading said oxygen to the air intake of the carburetor of said engine and causing said oxygen to flow in a direction opposite to that of the entering air; reversing the direction of flow of said oxygen by sucking it along with the air into said carburetor to form a mixture of air, oxygen, and hydrocarbon; and exploding said mixture in the engine.

2. The method of operating a vehicle propelled by an internal combustion engine with the aid of gaseous oxygen, which consists in carrying said oxygen under pressure on said vehicle, leading said oxygen to the air intake of the carburetor of said engine and causing it to flow into the air in a direction opposite that of the suction of said engine; sucking said oxygen along with the outside air into and through said carburetor to form an explosive mixture; and exploding said mixture in said engine.

3. In an apparatus for utilizing free gaseous oxygen in an internal combustion engine, the combination of a container for said oxygen; a carburetor having an air intake; and a connection between said tank and said intake delivering oxygen in a direction opposite that of the incoming air.

4. In an apparatus for utilizing free gaseous oxygen in an internal combustion engine, the combination of a container for said oxygen provided with an inner perforated casing to lessen the force of any explosion that might occur; a carburetor having an air intake; and a connection between said tank

and said intake delivering oxygen in a direction opposite that of the incoming air.

5. The method of rendering safe the starting of an internal combustion engine with the aid of free gaseous oxygen, which consists in leading said oxygen to such a point in proximity to the carburetor of said engine as will normally prevent said oxygen from entering, in substantial quantities, the engine, when the latter is not running, and will enable said oxygen under suction to enter said engine when the latter is running.

In testimony whereof I affix my signature.

EDWARD M. SHINKLE.