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1,496,489

A. L. POWELL

MECHANICAL IGNITER

Filed Feb. 2, 1921

Fig. 1.

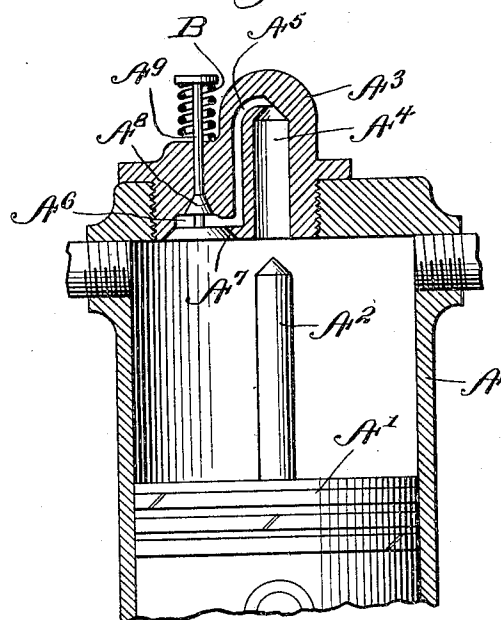


Fig. 2.

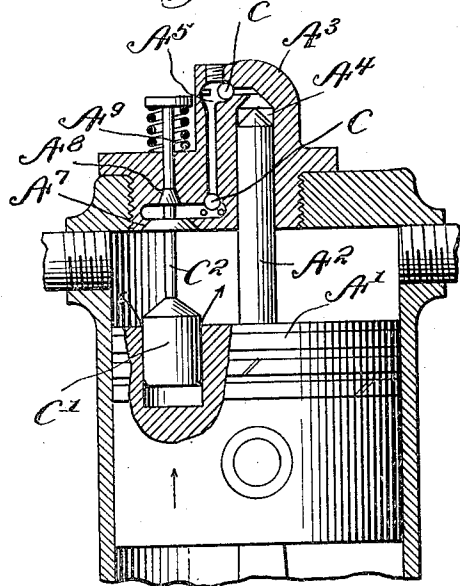
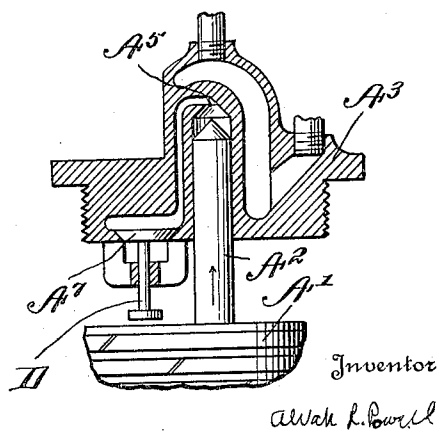


Fig. 3.



Inventor

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UNITED STATES PATENT OFFICE.

ALVAH L. POWELL, OF MILES CITY, MONTANA, ASSIGNOR TO THE A. L. POWELL POWER CO., INC., OF MILES CITY, MONTANA, A BODY CORPORATE.

MECHANICAL IGNITER.

Application filed February 2, 1921. Serial No. 441,978.

To all whom it may concern:

Be it known that I, ALVAH L. POWELL, a citizen of the United States, residing at Miles City, in the county of Custer and State of Montana, have invented certain new and useful Improvements in Mechanical Igniters, of which the following is a specification.

My invention relates to improvements in mechanical igniters for internal combustion engines in which I fire the explosive charge by means of a gas brought to an ignition temperature by compression. In the accompanying drawings I show my improvement as attached to an engine, in which—

Fig. 1 is a sectional elevation.

Fig. 2 is a sectional elevation of a modification of my improvement.

Fig. 3 is a sectional elevation of a further modification.

In Fig. 1 a cylinder A contains a piston A¹, slidable therein. On piston A¹ there is a minor piston A² vertically disposed. In the cylinder head of A there is a plug, A³, preferably threaded in said head and counter-bored, at A⁴, to fit the diameter of minor piston A². From A⁴ a cored passage, A⁵, leads to an annular valve space A⁶. In A⁶ there is located a poppet valve A⁹ having two seating areas that engage valve seats at A⁷, A⁸. The valve A⁹ has a stem, as shown in the figure, on which is a spring, B, that supports it. This spring is assumed to be strong enough to hold the valve tight until the minor combustion charge has been fired in the cored passage A⁵.

The igniter works as follows:

On compression stroke of piston A¹ the minor piston A² traps part of the compressed fuel charge in A⁴. Piston A² continues to compress the charge until A¹ is at end of stroke. The charge in A⁵ has now reached combustion temperature, and fires. The sudden increase of pressure overcomes the force of the spring B and valve A⁹ is unseated, at A⁷. The flame from the small charge reaches the main cylinder charge, igniting it.

In Fig. 2 I use ball check valves, C, C, in the passage A⁵ to minimize the danger of back firing. The valve A⁹ has added to it a piston, C¹, connected to the main valve by a stem, C². This piston is in line with a hole in piston A¹, Fig. 2. The parts operate as follows: On compression stroke A² traps

the fuel charge in A⁴, compressing it into A⁵. The spring B holds valve A⁹ to its seat, but with a force that is not great enough to resist the force of an explosion in passage A⁵. But as piston A¹ advances, the hole in piston head coincides with the valve-piston C¹ and the gas compressed between C¹ and the bottom of hole in A¹ adds an increased pressure to valve A⁹. C¹ fits loosely in the hole to which it fits and the compression under it gradually leaks out as A¹ advances. (Note arrows, Fig. 2). The added compression holds A⁹ to its seat until piston A¹ has started on outstroke; A⁹ is released as the pressure from piston C¹ becomes neutral and the hot fired charge from A⁵ exhausts into main combustion chamber, igniting the fuel charge therein.

In Fig. 3 I show a further modification. A heating means is added to the plug A³ through which pass either exhaust gases, or water from water jacket. This gives a heating effect that adds to the sensitiveness of the gas in A⁵. Such a charge can be fired with low compression. To ignite main charge piston A¹ lifts valve by contact with stem at D, the hot exhaust from A⁵ firing the compressed power fuel charge.

What I believe is new and ask to have protected by Letters Patent, is—

1. In an internal combustion engine, a cylinder, a head in said cylinder, said head having a bored passage and a duct leading from the passage to the cylinder, a valve controlling the said duct, major and minor seating surfaces on said valve, said major and minor surfaces being separated so as to provide a space therebetween adapted to register with the cylinder end of the duct, a stem for the valve, a spring surrounding the stem and urging the valve to closed position, a piston, a minor piston, said minor piston being adapted to enter the bored passage in the head and trap and compress therein part of the cylinder charge, and means for removing said head from said cylinder, substantially as described.

2. In an internal combustion engine, a cylinder, a head in said cylinder, said head having a bored passage and a duct leading from the passage to the cylinder, a valve controlling the said duct, major and minor seating surfaces on said valve, said major and minor surfaces being separated so as to provide a space therebetween adapted to

register with the cylinder end of the duct, a stem for the valve, a spring surrounding the stem and urging the valve to closed position, a piston, a minor piston, said minor piston
5 being adapted to enter the bored passage in the head and trap and compress therein part of the cylinder charge.

3. In an internal combustion engine, a cylinder, a head in said cylinder, said head
10 having a bored passage and a duct leading from the passage to the cylinder, a valve controlling the said duct, major and minor seating surfaces on said valve, said major and minor surfaces being separated so as to
15 provide a space therebetween adapted to register with the cylinder end of the duct, a stem for the valve, means urging the valve to closed position, a piston, a minor piston, said
20 minor piston being adapted to enter the bored passage in the head and trap and compress therein part of the cylinder charge.

4. In an internal combustion engine, a cylinder, a head in said cylinder, said head
25 having a passage extending in the same direction as the axis of the cylinder and a duct leading from the passage to the cylinder, a valve controlling the said duct, major and minor seating surfaces on said valve, said
30 major and minor surfaces being separated so as to provide a space therebetween adapted to register with the cylinder end of the duct, a stem for the valve, a spring surrounding the stem and urging the valve to
35 closed position, a piston, a minor piston, said minor piston being adapted to enter the passages in the head and trap and compress therein part of the cylinder charge.

5. In an internal combustion engine, a cylinder, a head in said cylinder, said head
40 having a passage extending in the same direction as the axis of the cylinder and a duct leading from the passage to the cylinder, a

valve controlling the said duct, major and minor seating surfaces on said valve, said
45 major and minor surfaces being separated so as to provide a space therebetween adapted to register with the cylinder end of the duct, a stem for the valve, a spring surrounding the stem and urging the valve to
50 closed position, a piston, a minor piston, said minor piston being adapted to enter the passages in the head and trap and compress therein part of the cylinder charge, and means carried by the stem adapted to be actuated by the piston whereby the valves may
55 be controlled and back firing may be prevented.

6. In an internal combustion engine, a cylinder, a head in said cylinder, said head
60 having a passage extending in the same direction as the axis of the cylinder and a duct leading from the passage to the cylinder, a valve controlling the said duct, major and minor seating surfaces on said valve, said
65 major and minor surfaces being separated so as to provide a space therebetween adapted to register with the cylinder end of the duct, a stem for the valve, a spring surrounding the stem and urging the valve to closed position, a piston, a minor piston, said minor
70 piston being adapted to enter the passages in the head and trap and compress therein part of the cylinder charge, and means carried by the stem adapted to be actuated by the piston whereby the valves may be
75 controlled and back firing may be prevented, said means including a piston carried by the valve stem and adapted to coact with a hole in the first mentioned piston whereby the
80 air in the hole is compressed against the bottom of the stem carried by the piston.

In testimony whereof I affix my signature.

ALVAH L. POWELL.