J. M. HENDRON.

AUTOMATIC INJECTOR.

APPLICATION FILED MAY 26, 1919.

1,347,035. **Patented July 20, 1920.**

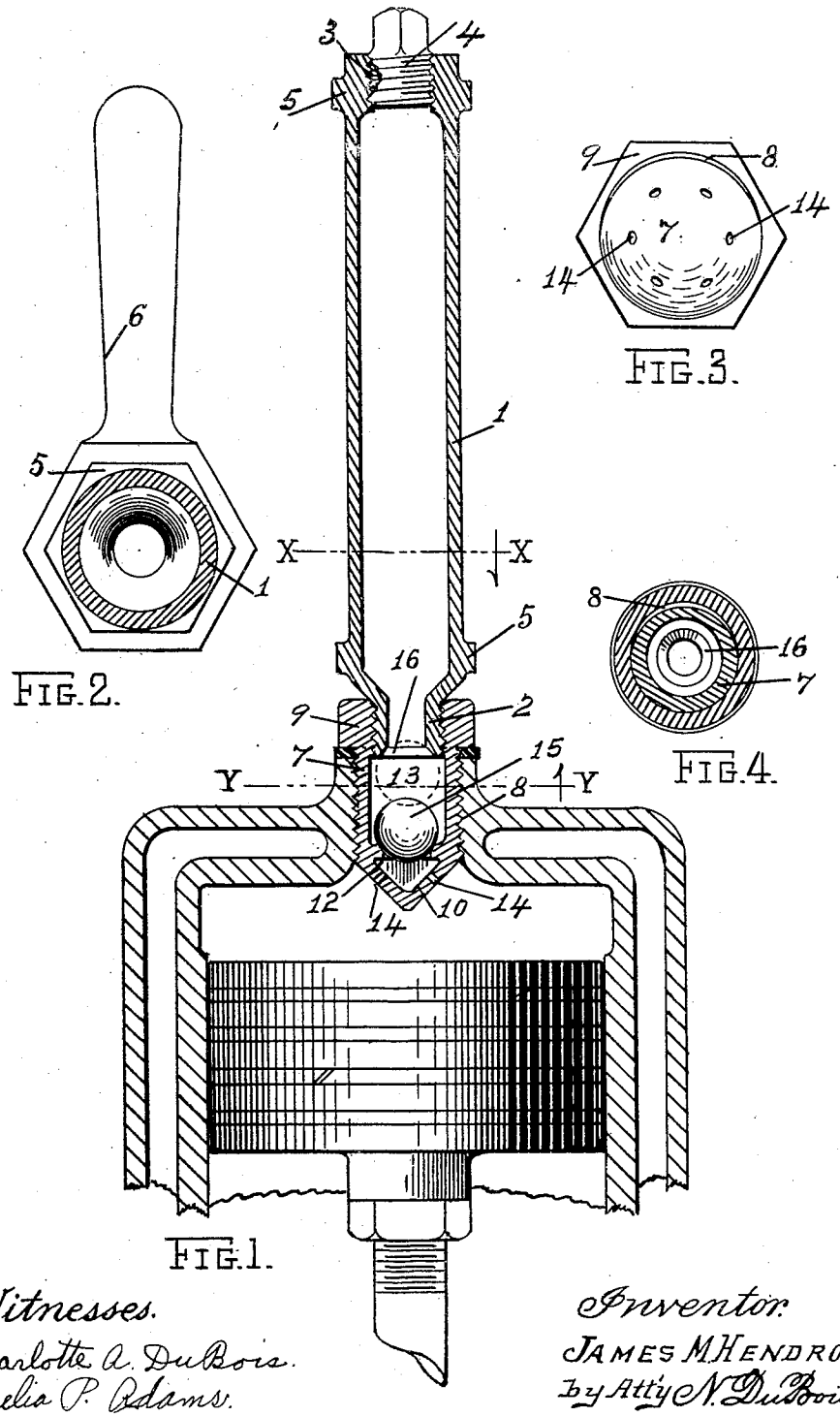


FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

Witnesses.
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UNITED STATES PATENT OFFICE.

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AUTOMATIC INJECTOR.

1,347,035. Specification of Letters Patent. Patented July 20, 1920.

Application filed May 26, 1919. Serial No. 299,727.

To all whom it may concern:

Be it known that I, JAMES M. HENDRON, a citizen of the United States, residing at Springfield, in the county of Sangamon and State of Illinois, have invented a new and useful Automatic Injector, of which the following is a specification.

The invention relates primarily to automatic injectors usable for successively injecting into the several operating cylinders of internal combustion engines a solvent fluid to loosen the carbon accumulated on the inner walls of the cylinders so that it may be expelled through the exhaust while the engine is running.

The purposes of the invention are to provide an injector adapted to inject into the engine cylinder to which the injector is connected, and with which it coöperates, successive measured charges of carbon resolvent; to provide in the injector means for measuring the successive charges of liquid; to provide a valve operative synchronously with the reciprocating piston operating in the engine cylinder to which the injector is applied; and to provide other new and useful features of construction.

The invention is illustrated in the annexed drawing, to which reference is hereby made, and will now be described, and the novel features thereof will be recited in the claim.

Figure 1 is a vertical section taken on the longitudinal axis of the injector, and including part of the coöperating engine cylinder to which the injector is applied.

Fig. 2 is an enlarged horizontal section through the container on the line X. X. of Fig. 1;

Fig. 3 is an enlarged plan of the detached and inverted valve plug; and

Fig. 4 is a horizontal transverse section through part of the engine cylinder and through the valve plug on the line Y. Y. of Fig. 1.

The same reference numerals designate the same parts in all the views.

The injector proper, which may be made of any suitable material, comprises a tubular liquid-container 1, having at one terminal a tubular screw 2 provided with a flared seat 16, and having at the other terminal an internally screw-threaded opening 3; a screw closure 4 engaging the screw threads of the opening 3; polygonal members 5 adapted to be engaged by a suitable wrench 6 for rotating the container; and a valve-plug 7 having external screw threads 8, a polygonal member 9 adapted to be engaged by the same wrench, tapered terminal walls 10; an internal ledge 12, a central chamber 13, and a series of outlet openings 14 in the walls 10. The outlet openings 14 are so arranged as to cause the fluid to be directed laterally at angles to the inner wall of the cylinder, to insure its reaching the piston rings, thereby insuring that the fluid will enter around the rings, to thoroughly cleanse the same during the movements of the piston. The capacity of the openings 14 relative to the measured charge of fluid in the chamber 13 is such that the fluid will flow gradually through the openings, responsive to the suction in the engine cylinder. A ball valve 15 of somewhat less diameter that the chamber 13, is free to move in the length of the chamber and is adapted to engage on the flared seat 16 of the screw 2, to limit outward movement of the valve; and to seat on the ledge 12 to stop the flow of liquid from the chamber 13 through the outlet openings 14.

The container is designed to be attached in operative relation to the cylinder of a one-cylinder internal combustion engine; or to be attached in operative relation to any cylinder of a multi-cylinder internal combustion engine; in such manner that the compression stroke of the piston will compress air and gases in the cylinder and the compressed air and gases will enter the chamber 13 through the openings 14 and will move the valve 15 until it stops against the seat 16 and shuts off the flow of liquid from the container into the measuring chamber, so long as the pressure continues. The return stroke of the piston will produce a partial vacuum in the cylinder which will withdraw air and liquid from the chamber 13 through the openings 14 and thereby facilitate the seating of the valve 15 on the ledge 12. If the appliance be used on an ordinary one-cylinder engine the spark-plug will be removed and the valve plug 8 will be screwed into the spark-plug-opening and the fly wheel will be rotated by hand to reciprocate the piston, to admit of alternate compression and expansion of the gases in the cylinder. If the appliance be used on a motor-cycle engine, the pedals may be operated, without ignition, to reciprocate the piston to admit of alternate

compression and partial vacuum in the cylinder. Under this mode of operation carbon resolvent liquid from the container will flow into and fill the chamber 13 during the compression movements of the piston, and the measured quantities of liquid will be successively discharged from the chamber into the cylinder during the suction or reverse movements of the piston.

By the use of the appliance shown and described, any person may readily clean the cylinders of his own engine with very little cost and without throwing the engine entirely out of operation during the cleansing process.

The automatic injector is adapted to be temporarily fitted in the spark-plug-opening of internal combustion engines of standard manufacture, to supply a fluid carbon-removing liquid in the respective engine cylinders and is designed to be applied in succession to the cylinders of a multi-cylinder engine so that one cylinder at a time will be treated after removing the spark-plug and while the piston is operating without an explosion.

To the best of my knowledge and belief, I am the first to devise and use a liquid-injector in coöperation with the reciprocating piston of one cylinder of an operating multi-cylinder internal-combustion-engine said injector comprising a container for a supply of liquid; a chamber for measuring the liquid; and a valve in the chamber, operating synchronously with the reciprocating engine piston to cause successive measured discharges of liquid from the injector into the cylinder.

I have shown and described a preferred embodiment of my invention, but it is obvious that minor structural details may be varied without departure from my invention.

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

In an appliance of the class described, the combination of a tubular screw plug having a polygonal head, an internally screw threaded opening through the head, a cylindrical body externally screw threaded, a tapered terminal part, a valve seat in said terminal part, a chamber in said terminal part below the valve seat, and a series of dispersive openings through the wall of said terminal part; a ball supported on said valve seat; and a container screwing into the head of the plug and having a flared terminal on which the ball engages upon outward movement of the ball.

In witness whereof I have hereunto signed my name.

JAMES M. HENDRON.

Witnesses:

CHARLES W. HENDRON,

W. R. GIBSON.