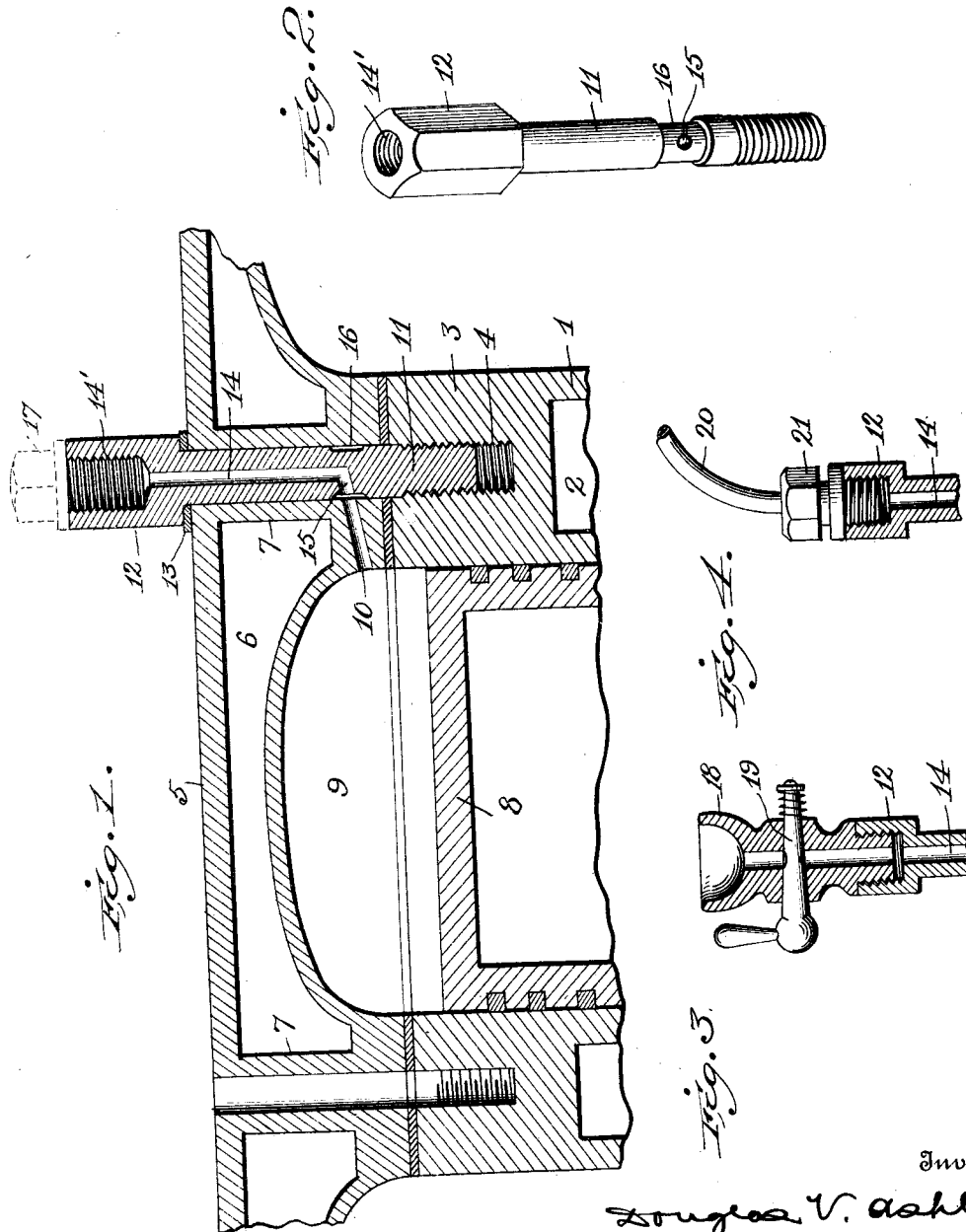


D. V. ASHLEY.
BOLT FOR INTERNAL COMBUSTION ENGINES.
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UNITED STATES PATENT OFFICE.

DOUGLAS V. ASHLEY, OF BINGHAMTON, NEW YORK.

BOLT FOR INTERNAL-COMBUSTION ENGINES.

1,059,103.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, DOUGLAS V. ASHLEY, a citizen of the United States, residing at Binghamton, in the county of Broome and State of New York, have invented new and useful Improvements in Bolts for Internal-Combustion Engines, of which the following is a specification.

This invention relates to internal combustion engines, and its object is to provide a convenient device for communicating with the combustion space of the cylinder of such an engine. It has been a matter of considerable study and experiment to obtain some way of admitting gas or fluid into the cylinder without drilling the water jacket. The increasing use of self starters makes such a device of especial advantage, where a charge of gasoline or of acetylene gas from a generator or compressed air from a reservoir is the medium relied upon to give the initial impetus to the piston. Some engines are provided with pet cocks which afford entrance into the cylinder, but even in such cases it is desirable to have some other means for providing an additional opening into the cylinder, for the purpose of relieving compression, testing the regularity of the firing, introducing substances for cleaning the cylinder walls, taking off a portion of the exploded gases to operate a pump or to be stored up for future use in starting, or for introducing into the compression space any gas, liquid or other substance to start or assist in starting the engine.

To this end my invention provides a special form of bolt which is to be used in place of one of the regular bolts by which the head of the cylinder is fastened in place. These bolts usually pass through a sleeve which is cast as a part of the head and extends across the water space, the threaded portion of the bolt engaging with a tapped hole in the wall of the cylinder. The special bolt which I provide has a passage extending longitudinally for a portion of its length and emerging at one side of the bolt at a depth sufficient to permit it to communicate with a duct drilled in the cylinder head below the water jacket and intersecting the bolt hole. The outer end or head of the bolt is preferably countersunk and screw threaded to enable a pipe or other appliance to be connected to it.

In the accompanying drawing, Figure 1

is a section of a portion of the upper end of an engine cylinder and its water-jacketed head, showing one of my improved bolts applied thereto. Fig. 2 is a perspective view of the bolt. Fig. 3 shows a priming cup screwed into the outer end of the bolt, and Fig. 4 shows a pipe coupled thereto.

The wall of the cylinder 1 is thick enough to provide for a water jacket 2, and at its upper end it has a solid portion 3 in which are drilled the tapped holes 4 for the reception of the bolts which fasten the cylinder head 5 in place. This head has a water space 6 which is crossed by the sleeves 7 through which the fastening bolts pass to engage with the holes 4. When the piston 8 is at the upper end of its stroke a combustion chamber 9 is formed at the top of the cylinder above such piston.

In applying my invention to such a structure, I drill a hole or duct 10 from the combustion chamber to intersect the bolt hole. This duct is preferably drilled in the head 5, as shown. The ordinary fastening bolt is removed and my special bolt is substituted therefor. This bolt has the usual threaded shank 11 to engage with the tapped hole 4, and a head 12 to clamp the cylinder head. Packing 13 may be placed under the bolt head if so desired. A passage 14 is drilled longitudinally from the bolt head down into the bolt to or a little beyond the level of the duct 10, and a lateral hole 15 is drilled into the bolt at this point to intersect the passage 14. The location of the hole 15 is such that it will register with the duct 10 when the bolt is screwed home. In order to avoid the necessity for the rather nice fitting which would be necessary if the hole 15 is to be made to register exactly with the duct, the bolt is preferably provided with a circumferential groove 16 into which the hole 15 will enter, said groove being of such dimensions as to insure its registering with the duct 10 irrespective of the angular position of the hole 15. In the drawing the hole and the duct are shown as exactly in line, but it will be readily understood that if the bolt should be given a half turn, so as to carry the hole 15 to the other side, it would still be in communication with the duct through the groove.

The upper end of the passage 14 is provided with a screw threaded countersink 14' and may be kept closed by a screw plug 17

if desired; or it may be permanently provided with a priming cup 18 having a stop cock 19, whereby a charge of gasoline may be introduced into the engine cylinder for priming purposes. If a self starter is used in which compressed air or gas or combustible liquid is to be introduced into the cylinder, a pipe 20 may be permanently connected with the bolt by a union 21.

It is apparent that my improved bolt enables communication to be established with the combustion chamber of the engine without the necessity of drilling into the water jacket to insert some special pipe for that purpose. This is a great advantage, as it is difficult to make and to keep tight the joints which such special pipe would entail.

In accordance with the provisions of the patent statutes, I have shown and described what I regard as the best embodiment of my invention; but I would have it understood that this showing is merely illustrative, and that the invention can be carried out in other ways without departing from the spirit and scope thereof. It is evident, for instance, that the bolt shown and described is not limited in its use to engines having a water jacket, although it is of especial advantage in such cases, as set forth.

Having thus described my invention, what I claim is:—

1. As a new article of manufacture, a bolt for securing together the head and the cylinder of an internal combustion engine, said bolt having a head to engage the outer surface of the cylinder head, a cylindrical shank of a length sufficient to pass through the cylinder head and enter a tapped hole in the cylinder, screw threads upon that portion of said shank which is to enter said tapped hole, a passage extending lengthwise of said bolt head and shank and a hole entering said passage from one side of said shank.

2. As a new article of manufacture, a bolt for fastening together the head and the cylinder of an internal combustion engine, said bolt having a head to engage the outer surface of the cylinder head, a cylindrical shank of a length sufficient to pass through the cylinder head and enter a tapped hole in the cylinder, screw threads upon that portion of said shank which is to enter said tapped hole, a passage extending from its head for a portion of its length and a hole entering said passage from one side of said shank.

3. As a new article of manufacture, a bolt for fastening together the head and the cylinder of an internal combustion engine, said bolt having a head to engage the outer surface of the cylinder head, a cylindrical shank of a length sufficient to pass through the cylinder head and enter a tapped hole in the cylinder, screw threads upon that por-

tion of said shank which is to enter said tapped hole, a passage extending from said head and countersunk therein, and a hole entering said passage from the side of the shank.

4. As a new article of manufacture, a bolt for fastening together the head and the cylinder of an internal combustion engine, said bolt having a head to engage the outer surface of the cylinder head, a cylindrical shank of a length sufficient to pass through the cylinder head and enter a tapped hole in the cylinder, screw threads upon that portion of said shank which is to enter said tapped hole, a passage extending longitudinally from said head and countersunk therein, said countersink being screw-threaded, and a hole entering said passage from the side of said shank.

5. As a new article of manufacture, a bolt for fastening together the head and the cylinder of an internal combustion engine, said bolt having a head to engage the outer surface of the cylinder head, a cylindrical shank of a length sufficient to pass through the cylinder head and enter a tapped hole in the cylinder, screw threads upon that portion of said shank which is to enter said tapped hole, a passage extending lengthwise of said bolt, a circumferential groove around the shank of said bolt, and a hole entering said passage from said groove.

6. As a new article of manufacture, a bolt for fastening together the head and the cylinder of an internal combustion engine, said bolt having a head to engage the outer surface of the cylinder head, a cylindrical shank of a length sufficient to pass through the cylinder head and enter a tapped hole in the cylinder, screw threads upon that portion of said shank which is to enter said tapped hole, a passage extending longitudinally from said head with a screw-threaded countersink in said head, a circumferential groove surrounding said shank, and a hole extending from said groove into said passage.

7. In an internal combustion engine, the combination with a cylinder and its separable head provided with the usual holes for the fastening bolts, and said cylinder head being provided with a duct connecting the combustion chamber with one of said holes, of a fastening bolt provided with a longitudinal passage emerging at one side of said bolt and connecting with said duct.

8. In an internal combustion engine, the combination with a cylinder and its separable head provided with the usual holes for the fastening bolts and said cylinder head being provided with a duct connecting the combustion chamber with one of said holes, of a fastening bolt provided with a longitudinal passage emerging at one side of said bolt and connecting with said duct, and

means connected to said bolt for conveying fluid substances into said combustion chamber.

5 9. In an internal combustion engine, the combination with a cylinder and a separate head therefor having a water jacket, of a fastening bolt for said head provided with a longitudinal passage in communication with the combustion chamber, whereby an

entrance to said chamber is afforded without drilling said water jacket.

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

DOUGLAS V. ASHLEY.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."