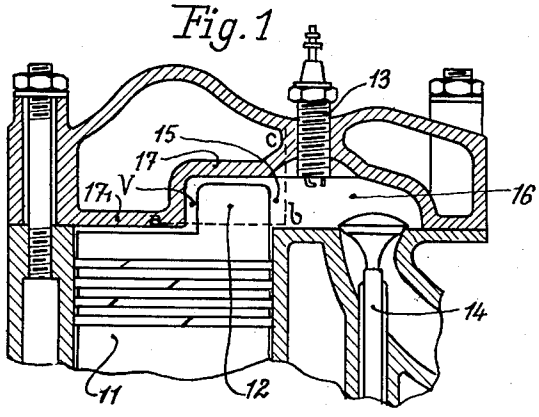
Dec. 2, 1930. A. A. A. DARCHE 1,783,603

ANTIEXPLOSIVE MEANS WITH GREAT TURBULENCE FOR EXPLOSION MOTORS

Filed April 13, 1928

Fig. 1



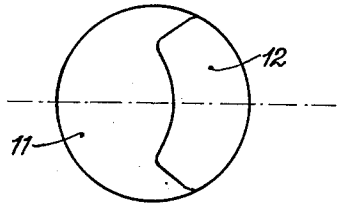


Fig. 2

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UNITED STATES PATENT OFFICE

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ANTIEXPLOSIVE MEANS WITH GREAT TURBULENCE FOR EXPLOSION MOTORS

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One knows that from the double point of view of power and output in explosion motors the shape and arrangement which the combustion chamber has is of a capital importance.

A predominant value has for a long time been given to the relation between the gaseous mass contained in the chamber and the surface contact with the walls thereof, experiments on "turbulence" and the explosion wave having precised the question and introduced new elements of consideration.

The explosion chamber must permit of a rapid combustion by means of a quick turbulence but without there being, in order to produce this, an exaggeration of the speed of passage through the inlet valve which would affect the coefficient of filling and the power developed.

Without engendering explosive waves, in order to improve the output a degree of compression, as high as possible, must be obtained. The limit admissible in each case can be clearly put back by a judicious realization of the combustion chamber.

It appears particularly interesting to be able to obtain the double result previously referred to by the use of lateral covers viz. the valve-chambers without having recourse to mechanical complications of overhead valves with rockers.

The present invention, which proposes to aim at this result, is based firstly on the consideration that from the point of view of the combustion the molecular turbulence presents its full utility only at the end of the compression stroke and particularly onward from the ignition when the flame must be spread rapidly in the mass.

In accordance with the present invention, the piston is provided at its inner end on the side opposed to the valve and ignition chamber of the cylinder head with a vertical upwardly extending boss or projection of such size as to nearly fill that portion of said valve and ignition chamber which is entered by said projection at the end of the instroke of the piston, and the said portion of the said chamber corresponds in profile with the said projection, so that at the end of the instroke of the piston only a narrow space exists between the cylinder head and the piston, establishing communication between said chamber and the cylinder, that portion of the said chamber which is immediately above the corresponding side of the cylinder being obturated by the projection to such an extent as to cause a pronounced increase of the speed of the gases flowing from the cylinder over the projection into the ignition chamber, and so that the turbulence of the gases produced in the said chamber is greatly increased at the very instant of ignition.

The space left between the bottom of the cylinder and the piston at its dead point will be as much reduced as mechanical constructive needs permit. Consequently, practically limited to the lateral cover viz. the valve-chamber, the explosion chamber can have a suitable shape reducing the distance of the ignition point to the extreme parts, and likewise reducing the risk of explosion. The same result will be aimed at by the turbulence produced, which disseminating the flame rapidly in all directions, will still diminish its possible length of travel through the fresh gases.

At the return of the gas piston the inverse passage at high speed, of the gases from the chamber of explosion to the cylinder through a limited section will maintain the turbulence, will complete, if need be, the combustion and will permit, on the other hand, the instantaneous ignition of the gaseous film remaining between the bottom of the cylinder and the piston.

The circulation of the inflamed jet at high speed takes place across and approximately parallel to the inner end piston and hence avoids for the latter the blow pipe effects which a perpendicular projection might produce. Also the carbon deposits will be burnt, in proportion as they appear.

For a compression of usual value and in the case of a normal mixture, such a rapid combustion could be provided that it would be sufficient for the ignition to have a very reduced advance for large variations of the speed of rotation.

In the accompanying drawings

Figure 1 is a vertical transverse sectional

view of the cylinder head and piston of an internal combustion motor constructed in accordance with this invention.

Figure 2 is a detail plan of the piston showing the obturating projection on the upper end thereof.

According to the present invention, the piston 11 carries on a part of its summit a projection or bossage 12 of suitable shape and size. The ignition and valve chamber 16 has its major portion out of line with and extending laterally from one side of the cylinder and has an extension or arm 15 which extends part way across and is in communication with the cylinder. The piston projection 12 is of such size as to nearly fill said chamber extension at the instroke of the piston, but is somewhat less in height and width than said chamber extension, so that when the piston is at the inner end of its stroke a narrow tortuous passage *v* is formed between the piston with its projection 12 and the cylinder head and inner face of the wall of the chamber 15. Hence the speed of the gases flowing along and across the projection 12 and from the inner end of the cylinder is greatly increased and the gases are forced into the chamber 16 in a state of turbulent agitation, which extends throughout the entire volume of the gases and at the instant of ignition. At the beginning of the outstroke of the piston the expansion begins, and inflamed gases are forced at great speed, under pressure, into the lateral extension 15 of the chamber, hence prolonging the speed of turbulence. The combustion of unburned gases will now be rapidly caused, with beneficial effect on the power and output of the engine.

Toward the end of the movement of the piston this prolongation 12 engages the transverse section *a—b* establishing the communication in jackets ricardo between the cylinder and the space forming the chamber of combustion.

The result is a partial obturation of this section, producing the first acceleration of the speed of the gases along the vertical border V of the prolongation 12.

On the other hand, the progressive obturation of the section *b—c* establishing the communication between the chamber of combustion 16 (which volume is reduced to the one of the cupola) and the cylinder increases still the speed of the gases and hence the turbulence produced in the chamber itself of combustion, toward the moment of ignition.

The combustion of the mixture is effected very rapidly in the chamber 16 but the explosion pressure will be established only progressively above the prolongation 12 at first and then above the whole upper surface of the piston, whereby the explosion shock upon different moving elements will be reduced.

13 is a spark plug.

14 is the admission or exhaust valve.

On the whole, the invention proposes in the most general way a device assuring a great turbulence and antiexplosion for motors with the lateral cover or cupola, whether the usual one or in the kind of ricardo or in a derived form. The antiexplosion condition will be the better fulfilled the smaller is the volume of the cupola. In order to avoid too a great increase of the ratio of compression, it is possible to introduce, during the suction period one cylinder volume only at a final diminished pressure, producing, overmore, a prolonged expansion. This method could be combined usefully with the other arrangements provided by the invention.

The figures representing only schematical views, their relative dimensions are given only in the way of simple indication.

The invention permits, within the scope of the main inventional idea, different modifications.

What I claim, is:—

In an internal combustion engine, a cylinder having a head provided with an ignition and valve chamber, the major portion of which is out of line with and extends laterally from one side of the cylinder and which chamber has an extension part way across and in communication with the cylinder, and a piston in the cylinder having at one side, at its inner end, a projection adapted to enter and nearly fill said extension of said chamber and hence force combustion gases from said extension into the major portion of said chamber at the end of the instroke of the piston, the length and width of said projection being slightly less than the corresponding dimensions of said chamber extension and the opposing localized surfaces of said projection and the said chamber extension being substantially parallel, so that at complete instroke position of the piston a narrow tortuous passage is formed between the cylinder and the chamber to cause turbulent agitation of the gases at the instant of ignition.

In witness whereof I affix my signature.

ALBERT ALEXANDRE AUGUSTIN DARCHE.