April 15, 1930. J. C. BARNABY 1,754,735

INTERNAL COMBUSTION ENGINE

Original Filed Dec. 30, 1927

Fig. 1.

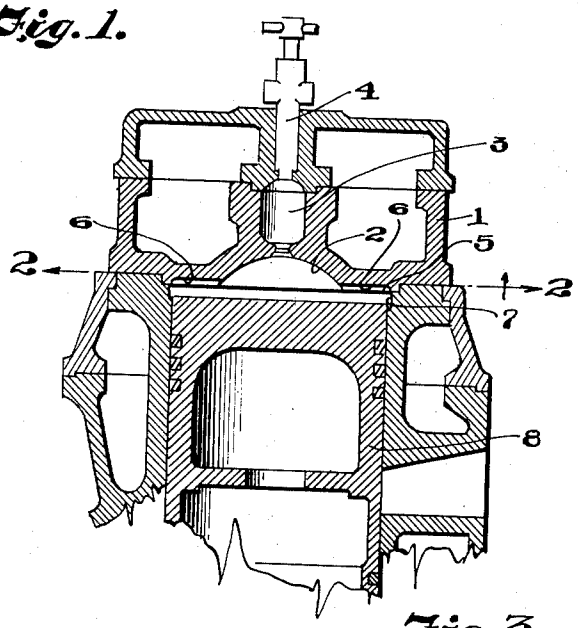


Fig. 2.

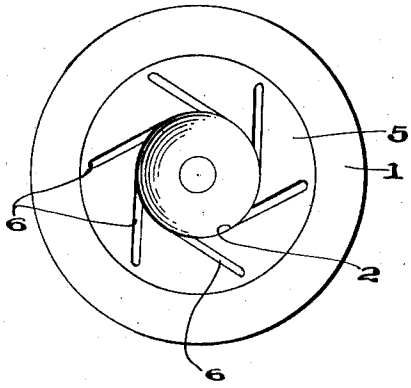
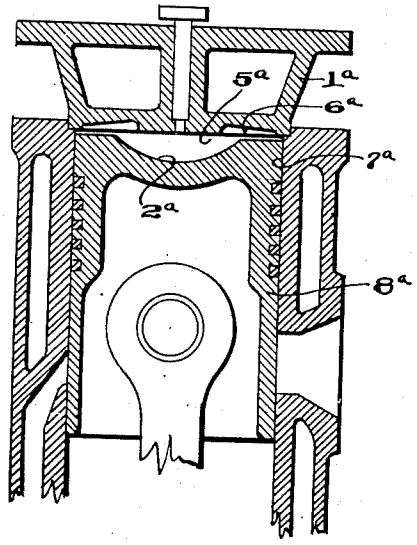


Fig. 3.



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UNITED STATES PATENT OFFICE

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INTERNAL-COMBUSTION ENGINE

Original application filed December 30, 1927, Serial No. 243,509. Divided and this application filed July 27, 1929. Serial No. 381,594.

This invention relates to internal combustion engines of the Diesel type and an object of the invention is to provide means preferably in the form of grooves or passageways which will impart a rotary motion to air or gas as it is forced inwardly into the combustion chamber from between the facing flat surfaces of the cylinder head and piston to produce turbulence in the compression space or chamber and result in a thorough mixing of the fuel.

The present invention is a division from my companion application, serial No. 243,509, filed December 30th, 1927.

With these and other objects in view, as may appear from the accompanying specification, the invention consists in various features of construction and combination of parts, which will be first described in connection with the accompanying drawings, showing an internal combustion engine of the preferred form embodying the invention, and the features forming the invention will be specfically pointed out in the claims.

In the drawings:

Fig. 1 is a fragmentary vertical section through an internal combustion engine constructed in accordance with the invention.

Fig. 2 is a horizontal section through the engine taken on the line 2—2 of Fig. 1 and showing a bottom view of the cylinder head, and

Fig. 3 of the drawings is a fragmentary section of a modified form of the invention.

Referring more particularly to the drawings, the improved internal combustion engine illustrated in the drawings, is what is known as a solid injection Diesel or oil engine of any approved form. The engine embodies the cylinder head 1, having the piston chamber 2 therein, into which atomized fuel oil is fed from the pre-combustion chamber 3 through the spray valve 4 of any suitable type. The flat surface 5 of the cylinder head 1 is provided with a plurality of grooves or passageways 6 cut therein, which extend angularly with respect to the radii of the cylinder head and extend inwardly from the outer perimeter or perimetric portion of the cylinder 7 of the engine to the combustion chamber or space 2, so that, as the piston 8 moves upwardly during the compression stroke and as it nears the completing of its compression stroke, a portion of the air or gas in the cylinder 7 will be squeezed or forced inwardly, through the grooves or passageways 6 into the combustion space 2 and will enter the combustion space substantially at a tangent to the circumference of the combustion space, causing a rotary motion and the setting up of turbulence in the compression space for thoroughly mixing the air or gas and the atomized fuel oil, which enters the compression space 2 from the spray valve 4.

While in Fig. 2 of the drawings the grooves 6 are shown as tangential to the circumference of the compression space 2, it is to be understood that they may be placed at any angle which will set up substantially a rotary motion of the air or gas forced through the grooves into the chamber 2 without departing from the spirit of this invention. It will also be noted that the grooves are open along one side for their entire length to the cylinder 7.

In Fig. 3 of the drawings, a modified form of the engine is shown, in which the cylinder head 1^a is provided with a plurality of grooves or passages 6^a in its flat surface 5^a, and these grooves extend from the perimetric portion of the cylinder 7^a inwardly towards the vertical axis of the cylinder head 1^a and open out into the compression space 2^a which is formed in the head of the piston 8^a, differing from the form shown in Fig. 1 of the drawings by locating the compression space in the piston head instead of in the cylinder head.

The grooves 6^a are shown as gradually increasing in cross sectional area from their outer ends to their inner ends and it is to be understood that they may be placed in any suitable angular relation to each other and to the radii of the cylinder head to provide the desired rotary motion and turbulence in the compression space 2^a, being arranged substantially as shown in Fig. 2 of the drawings. The action of the modified form of the invention shown in Fig. 3 is the same as the action of the form of engine shown in Figs. 1 and 2, that is, the air or gas compressed by the piston 8^a during its compression stroke is, at and near the terminus of the compression

stroke, forced inwardly from the perimetric portion of the cylinder 7^a through the grooves 69 into the compression space 2^a, entering the compression space in a rotary or whirling manner, resulting in the setting up of turbulence and a thorough mixing of the gas and fuel oil in the compression space.

It will be understood that the invention is not to be limited to the specific construction or arrangement of parts shown but that these may be modified widely within the invention defined by the claims.

What is claimed is:

1. An internal combustion engine including a cylinder, a cylinder head and a piston and having a combustion chamber therein of less diameter than the cylinder bore, said cylinder head provided with a plurality of angularly disposed grooves in its under surface opening out at their inner ends into the said combustion chamber, said piston and cylinder head co-operating towards the end of the compression stroke to force gas from the perimetric portion of the cylinder through said grooves into said combustion chamber.

2. An internal combustion engine including a cylinder, a cylinder head and a piston and having a combustion chamber therein of less diameter than the cylinder bore, said cylinder head provided with a plurality of grooves in its under surface extending inwardly from approximately the perimeter of the cylinder to said combustion chamber and extending substantially tangential to the perimeter of the combustion chamber, said piston and cylinder head co-operating towards the end of the compression stroke to force gas from the perimetric portion of the cylinder through said grooves into said combustion chamber.

3. An internal combustion engine including a cylinder, a cylinder head and a piston and having a combustion chamber therein of less diameter than the cylinder bore, said cylinder head provided with a plurality of grooves in its under surface, said grooves having their undersides opening throughout their entire length into said cylinder, said piston and cylinder head co-operating towards the end of the compression stroke to force gas from the perimetric portion of the cylinder through said grooves into said combustion chamber.

4. An internal combustion engine including a cylinder, a cylinder head and a piston and having a combustion chamber therein of less diameter than the cylinder bore, said cylinder head provided with a plurality of grooves in its under surface, said grooves having their undersides opening throughout their entire length into said cylinder, said piston and cylinder head co-operating towards the end of the compression stroke to force gas from the perimetric portion of the cylinder through said grooves into said combustion chamber, said grooves gradually increasing in cross sectional area from their outer ends to their inner ends.

5. An internal combustion engine including a cylinder, a cylinder head and a piston and having a combustion chamber therein of less diameter than the cylinder bore, said cylinder head provided with a plurality of grooves in its under surface extending inwardly from approximately the perimeter of the cylinder to said combustion chamber and extending substantially tangential to the perimeter of the combustion chamber, said piston and cylinder head co-operating towards the end of the compression stroke to force gas from the perimetric portion of the cylinder through said grooves into said combustion chamber, said grooves gradually increasing in cross sectional area from their outer ends to their inner ends.

In testimony whereof I affix my signature.

JAMES C. BARNABY.