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COMBUSTION CHAMBER FOR INTERNAL COMBUSTION ENGINES

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Fig. 1.

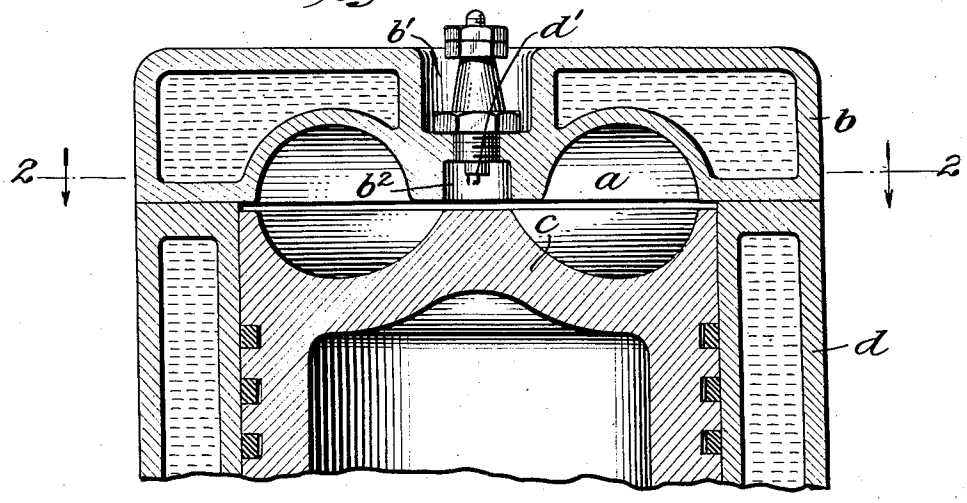
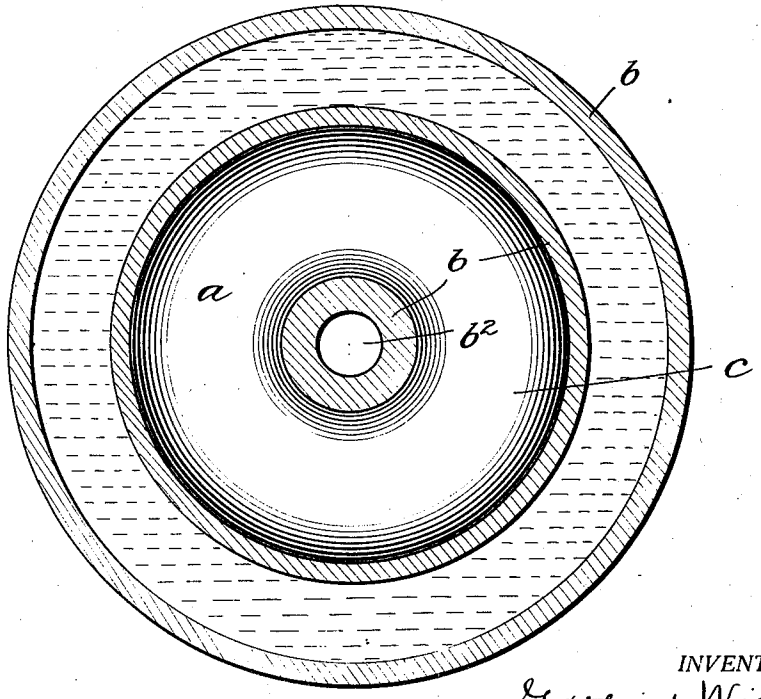


Fig. 2.



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COMBUSTION CHAMBER FOR INTERNAL-COMBUSTION ENGINES.

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Flame propagation in internal combustion engines while popularly termed an explosion is in reality a burning, the rate of which determines to an appreciable extent the efficiency of the engine. Accordingly, it is important that the ignition device be so disposed with respect to the body of gas to be ignited that the entire body of gas shall be ignited as rapidly as possible. Theoretically, the ideal position for the ignition means is immediately in the geometric center of the body of gas but this condition cannot be obtained in any combustion space. A further consideration in efficient gas engine practice is the provision of the greatest possible volumetric capacity with the minimum radiating surface. The ideal construction to satisfy this condition would be a truly spherical combustion space. This is not feasible, however, in a practical engine. The principal object of the present invention, however, is to meet the two conditions outlined to the greatest degree possible in a construction which will give the greatest possible volumetric capacity obtainable with the most advantageous location of the ignition means with respect to the body of gas in the combustion space. It is also true in practice that the heat of the spark from any available igniting devices cannot be sufficient to cause what may be termed approximately spontaneous ignition and a much more intense igniting flame would be desirable for securing rapid ignition of the main charge. A further object of the present invention is, therefore, to incorporate in a firing chamber what may be termed a supplemental detonating space within which is confined a charge which, upon ignition, projects itself into the main body of gas uniformly and with relative intense heat explodes it spontaneously. In meeting these joint conditions it is proposed, in the preferred embodiment, to form the combustion space of annular form and suitable cross section and to dispose the ignition device centrally of the annulus but communicating freely within a supplemental detonating charge with the main charge so that the igniting flame may move outwardly along a radial path and reach every portion of the gas in the annular chamber at the same instant so that the conditions approaching a true explosion are satisfied so far as is practical.

The invention will be described with further reference to the accompanying drawings, wherein:

Figure 1 is a view in vertical section through a fragment of a cylinder of an internal combustion engine having a head and combustion space constructed in accordance with the invention.

Figure 2 is a view in horizontal section taken on the plane indicated by the line 2—2 of Figure 1 and looking in the direction of the arrows.

The drawings are intended to illustrate the principle of the invention in rather conventional form and it is to be understood that no limitations as to size, dimensions and arrangement of parts are to be imposed by reason of the precise embodiment illustrated. However, the advantages of the invention are realized in an efficient form, as will be readily understood, with reference to the illustrated embodiment. The desirable thermal condition surrounding the use of a generally spherical combustion space are satisfied in the illustrated embodiment by forming the combustion space *a* of generally circular or other capacious form in cross section as, for instance, by co-operating complementary curved channels in the engine head *b* and in the head of the piston *c*. The curved grooves thus formed are annular in each instance so that when the piston is at the top of its stroke an annular combustion space of generally circular form in cross section results. With this condition satisfied the present invention takes advantage of the relation of parts to bring the ignition means illustrated as a conventional spark plug *d'*, centrally of the body of gas to be ignited by disposing the spark plug centrally of the head *b*, that is, centrally of the annular combustion space *a*. Of course, the ignition points will communicate at the time of firing with the combustion space, which is to say, flame propagation will take place radially from the points into the annular body of gas and uniformly and centrally thereof. The result will be that generally uniform ignition will occur in the shortest possible space of time across the body of gas and the quickest rate of flame propagation will be insured, approximating a true explosion.

Having described the principle on which

the invention rests and the two important conditions which it satisfies, some of the details of the illustrated embodiment will be described for the sake of completeness. The engine cylinder *d* may be water-jacketed and communicate with the jacketed engine head *b*. Centrally of the head is formed a recess *b'* into which the body of the spark plug *d'* may be introduced. The points of the spark plug may themselves rest within a comparatively shallow firing chamber b^2 which may entrap a small volume of charge and yet communicate freely with the annular combustion space *a* when the piston *c* is in firing position.

The charge confined within the shallow firing chamber b^2 may be thought of as a detonating charge which upon ignition on the up-stroke of the piston is caused to propagate flame of intense heat radially and uniformly into the main charge confined within the outer channels. This insures a quick combustion approaching a spontaneous explosion as is desirable.

It is to be understood that the annular chamber *a* might be formed of semi-circular outline only and wholly in the head *b* or wholly in the piston *c* without departing from the spirit of the invention and some of the advantages thereof retained but it is believed that the fullest results will be secured by making the chamber *a* of substantially circular cross sectional form.

As indicated hereinbefore other embodiments of different designs but retaining the principle described may be made by one skilled in the art without departing from the spirit of the invention.

What I claim is:

1. In an internal combustion engine an annular combustion chamber of substantially circular cross sectional form the upper half of which is formed in the cylinder head and the lower half of which is formed in the piston head.

2. In an internal combustion engine an annular combustion chamber of substantially circular cross sectional form the upper half of which is formed in the cylinder head and the lower half of which is formed in the piston head and having ignition devices disposed centrally thereof and communicating therewith.

3. In an internal combustion engine an annular combustion chamber of generally circular cross sectional form the upper half of which is formed in the cylinder head and the lower half of which is formed in the piston head.

4. In an internal combustion engine an annular combustion chamber of substantially circular cross sectional form, a spark plug disposed centrally of the annular chamber, the engine being provided with a separate combustion space in proximity to the spark plug communicating with the annular combustion chamber.

5. In an internal combustion engine in combination with the cylinder walls, the piston and a cylinder head, an annular channel semi-circular in cross section formed in the cylinder head and a complementary channel semi-circular in cross section formed in the piston head, said channels co-operating to form an annular combustion chamber of substantially circular cross sectional form.

6. In an internal combustion engine an annular combustion chamber, a supplemental firing chamber disposed centrally of the said combustion chamber and communicating therewith and ignition devices disposed within the firing chamber.

This specification signed this 14 day of March A. D. 1923.

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