March 31, 1925. 1,531,298

K. R. MANVILLE

CYLINDER HEAD FOR INTERNAL COMBUSTION ENGINES AND METHOD OF MACHINING THE SAME

Filed May 10, 1923

Fig. 1.

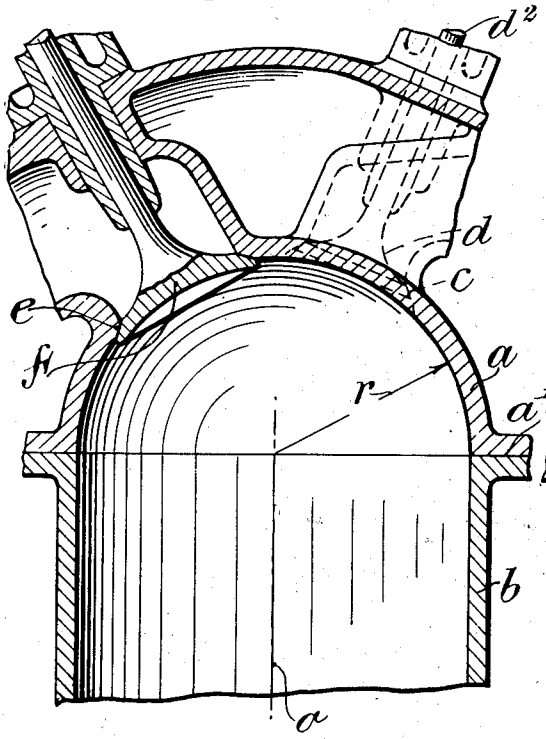


Fig. 2.

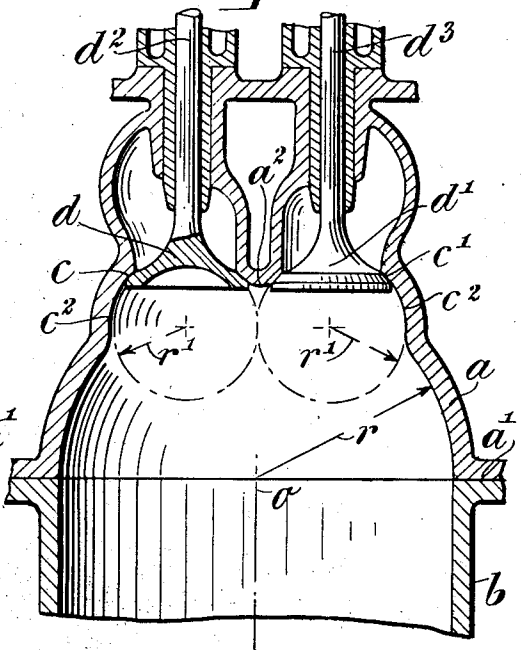


Fig. 3.

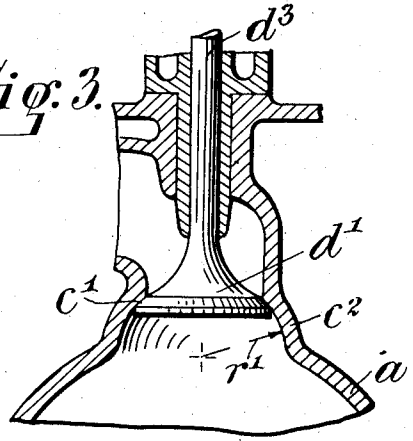
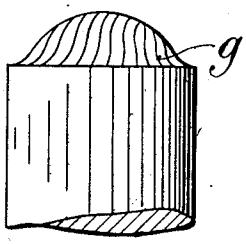


Fig. 4.



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UNITED STATES PATENT OFFICE.

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CYLINDER HEAD FOR INTERNAL-COMBUSTION ENGINES AND METHOD OF MACHINING THE SAME.

Application filed May 10, 1923. Serial No. 637,945.

To all whom it may concern:

Be it known that I, KEITH R. MANVILLE, a citizen of the United States, residing in the borough of Brooklyn, of the city of New York, in the State of New York, have invented certain new and useful Improvements in Cylinder Heads for Internal-Combustion Engines and Methods of Machining the Same, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to an improved cylinder head for internal combustion engines and is designed primarily with reference to a head with which is associated valves operated by overhead cams. Cylinder heads of this type should satisfy certain outstanding requirements from the manufacturing standpoint and from the standpoint of thermal and mechanical efficiency, such as, first, that the head should afford a combustion space of generally spherical form for volumetric capacity with minimum radiating area, second, that the wall of the combustion chamber should be wholly machined within to reduce carbonization and insure the same cubical capacity in different cylinders of the same engine; and third, that where twin exhaust ports are provided, their valve stems should be parallel for operation by a single cam.

From a manufacturing standpoint the greatest difficulty in providing a generally spherical combustion chamber whose walls are wholly machined and whose exhaust ports are controlled by valves having parallel stems operated from a single cam, arises from the practical difficulty of introducing finishing tools which will machine the valve pockets and finish off the edges between these pockets and the spherical wall of the combustion chamber proper.

It is the principal object of the present invention to provide a head of the type described in which the machining operations may be carried on in a practical and economical manner and the entire interior of the combustion space be wholly machined by operations which are thoroughly commercial. This condition is secured, nevertheless, in a head which insures thermal and mechanical efficiency and satisfies the best engineering practice. Its volumetric capacity is a maximum consistent with minimum radiating area.

The invention will be described with reference to the accompanying drawings in which:

Figure 1 is a view in vertical section showing so much of a gas engine and manifolding as is necessary for an understanding of the construction of the improved head and the disposition of the ports therein.

Figure 2 is a view similar to Figure 1 but taken on a plane at right angles thereto and indicating particularly the twin exhaust ports.

Figure 3 is a detail view in section of one of the exhaust ports shown in Figure 2.

Figure 4 is a conventional view showing a suitable form of cutter for the valve pockets.

The improved head *a* may be bolted to the cylinder wall *b* in accordance with the usual practice the parting line being indicated at *a'*. It is proposed to provide in the improved head, twin exhaust ports *c*, *c'*, controlled, respectively, by valves *d*, *d'*, whose stems d^2, d^3, respectively, extend upwardly in parallelism and may be operated by a single cam on an overhead shaft as will be understood. A single inlet port *e* controlled by a valve *f* will, however, be sufficient. Since the valve stems d^2, d^3, of the twin exhaust valves *d*, *d'*, are in parallelism it is necessary that the ports *c*, *c'*, shall be disposed in proximity at one side of the head and, accordingly, that the inlet port *e* be formed at the other side of the head. It is understood, of course, that a cylinder head of generally spherical form affords the greatest volumetric capacity and, at the same time, the greatest thermal efficiency since its radiating area is the least for a given capacity. Further, it is important that the entire wall of the head be machined to prevent carbonization and insure efficiency in operation of the motor. However, it is practically impossible to form a head of true spherical outline and meet all of the conditions suggested. Accordingly, while the improved head *a* is of what might be called generally spherical form it is not truly spherical since the valve pockets *c*, *c'*, are themselves formed in smaller spheres which conform generally to the contour of

the spherical surface of the heat but are cut on a smaller radius. For instance, the head a proper may be considered as having a radius r and its interior surface in so far as it is formed on this radius r may be readily machined in the conventional manner. The tool employed enters along the axis o of the cylinder as will be understood. When this machining operation has been completed a separate tool such as that indicated in Figure 4 at g is employed to machine the valve pockets c, c', which are to be disposed in proximity to one another and whose walls c^2 should merge with a machined edge into the machined wall of the combustion chamber proper. The radius of the valve pockets c, c', which are of generally spherical form is indicated at r', this radius, of course, being substantially smaller than the radius r of the head. The cutting tool g is preferably moved into the pockets from the center of the sphere a to the respective centers of the smaller spheres to be generated on the radius r'. In this cutting operation the portion a^2 of the wall of the head between the pockets c, c', is machined off uniformly and the walls c^2 of the pockets are so machined as to merge gently into the wall a of the head. When these operations are completed no further machining operations are required nor need any hand finish be employed. The valve pockets thus machined afford seats for the two exhaust valves illustrated, the stems of these valves extending in parallelism and being operable by a single overhead cam. The head shown has maximum volumetric capacity with minimum radiating area and the wall of the combustion chamber is machined throughout within thereby reducing carbonization as compared with an unfinished wall and insuring the production of a space of known cubical capacity, thereby enabling the chambers in the heads of different cylinders to be formed of the same cubical capacity.

The method suggested herein may be modified by one skilled in the art and employed to accomplish similar results but any obvious variations are to be deemed within the scope of this invention.

What I claim is:

1. A cylinder head of generally spherical form having twin ports formed in pockets of generally spherical form but on a smaller radius than the head.

2. A cylinder head of generally spherical form having twin exhaust ports formed in its wall in proximity to each other and in twined spherical pockets cut on a radius less than the radius of the head.

3. A cylinder head of generally spherical form having an inlet port and twin exhaust ports disposed in pockets of generally spherical form but cut on a lesser radius than the head, and valves controlling said exhaust ports and having their stems disposed in parallelism.

This specification signed this 8th day of May, A. D. 1923.

KEITH R. MANVILLE.