June 2, 1936. J. O. SNYDER 2,042,969

MEANS FOR CONTROLLING COMPRESSION IN ENGINES

Filed Sept. 5, 1933

Fig. 1.

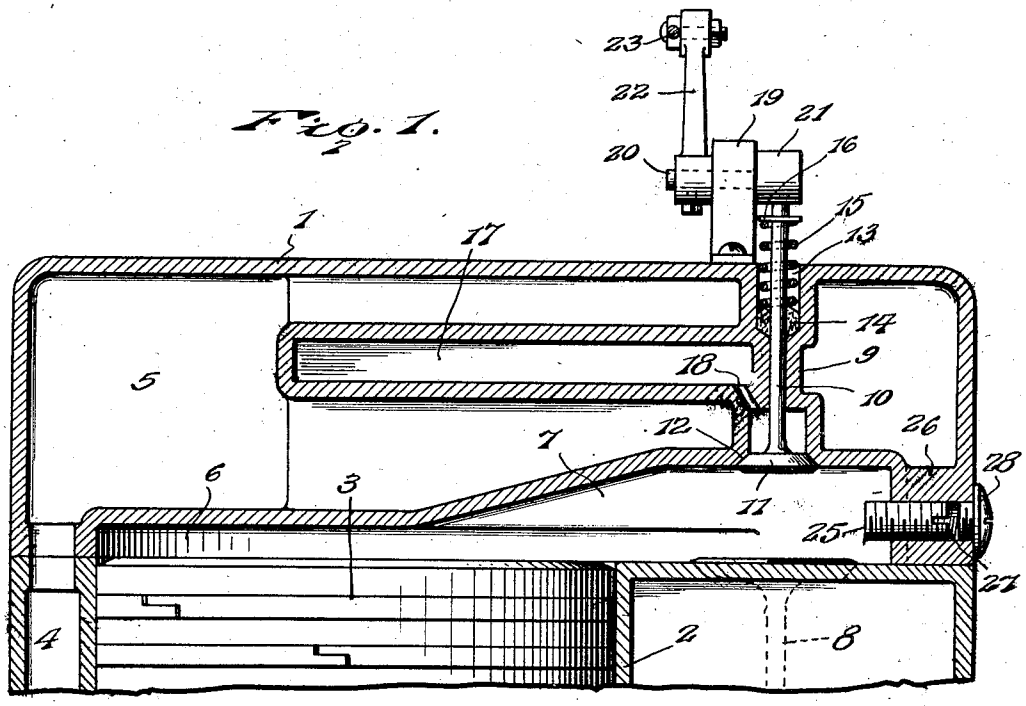


Fig. 2.

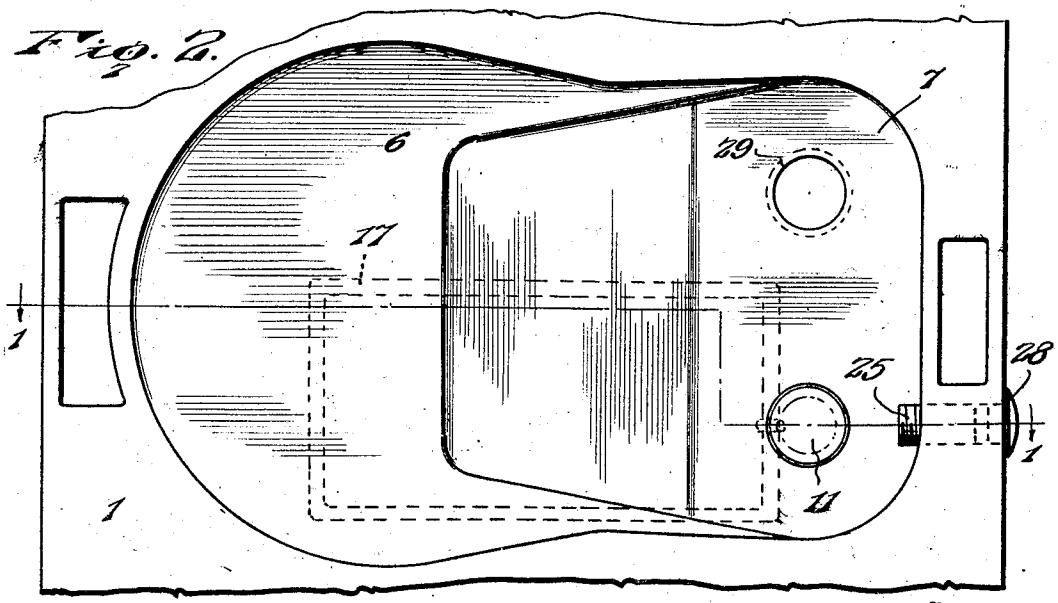
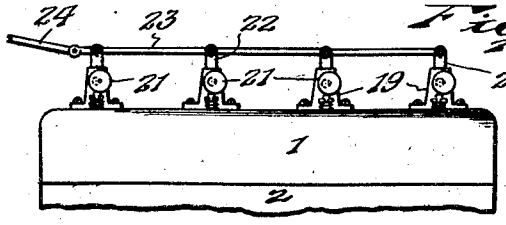


Fig. 3.



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Patented June 2, 1936 2,042,969

UNITED STATES PATENT OFFICE

2,042,969

MEANS FOR CONTROLLING COMPRESSION IN ENGINES

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Application September 5, 1933, Serial No. 688,231

1 Claim. (Cl. 123—48)

The object of this invention is to provide means whereby the compression in an internal combustion engine may be controlled so that, when starting, the engine will operate on low compression but can be adjusted to compress to successively higher degrees as the speed of the engine or the demands upon the same increase. The invention also has for its object the provision of a compression chamber which is of greater volume or cubic content than the compression chambers now ordinarily provided and includes means whereby the volume of the compression chamber may be reduced and the degree of compression accordingly raised as the necessities or desires of the operator may require or suggest. The stated objects and other objects, which will appear incidentally during the course of the following description, are attained in such a structure as is illustrated in the accompanying drawing, and the invention resides in certain novel features which will be particularly pointed out in the appended claim.

In the drawing,

Figure 1 is a diametrical section through a cylinder head and the upper end of a cylinder of an internal combustion engine having my present invention applied thereto.

Figure 2 is a bottom plan view of the cylinder head, the line 1—1 in this figure indicating the plane of the section shown in Figure 1.

Figure 3 is a detail elevation showing a plurality of cylinders having the invention applied thereto for simultaneous adjustment.

In the drawing, the reference numeral 1 indicates a cylinder head, the numeral 2 indicates the upper end of a cylinder and the numeral 3 indicates the upper end of a piston working in the cylinder, the cylinder having a surrounding water space, indicated at 4, and the cylinder head being of a hollow construction so as to provide a water jacket 5. In the underside of the cylinder head there is formed a recess or chamber 6 which constitutes a compression and combustion chamber, said chamber having a substantially circular portion arranged directly over the cylinder and adapted to accommodate the end of the piston when the latter is at the upper end of its stroke. The compression chamber is also formed with a lateral extension, shown at 7, which extends over the inlet and outlet valves of the engine, one of said valves being shown in dotted lines at 8, and said valves operating in the usual manner in order that the fuel and spent gases may follow the proper courses. The lateral extension or enlargement 7 is of greater depth than the circular portion 6 so as to increase the capacity of the compression and combustion chamber, and the upper wall or ceiling of the extension is inclined downwardly so as to gradually merge into the upper wall or ceiling of the circular portion 6. It will also be noted, upon reference to the drawing, that the width of the lateral extension gradually decreases toward the center of the circular portion 6. Within the water space of the cylinder head, there is formed a web 9 which is preferably of circular cross section and has a central opening or passage therethrough in which is slidably received the stem 10 of a disk valve 11 adapted to engage the valve seat 12 formed in the upper wall or ceiling of the extension chamber 7. The valve seat 12 is defined at the lower end of a pocket or tubular portion of the web, which pocket is preferably alined with the usual inlet valve, and the upper extremity of said web is also constructed to define a pocket 13 receiving packing 14, to prevent leakage of gases around the valve stem, and an expansion spring 15 which rests upon the packing and bears against the underside of an abutment 16 on the valve stem near the upper end of the latter. Integral with the web 9 and extending laterally therefrom within the water space of the cylinder head there is a chamber or reservoir 17 which communicates with the extension chamber 7 and the lower tubular end of the web 9 through a port 18, as clearly shown in Figure 1.

It will now be understood that if the valve 11 be unseated when fuel mixture is passing into the combustion and compression chamber, the charge will not be confined below the valve seat but will pass upwardly and escape through the port 18 into the reservoir 17 and, as a result, the compression of the charge will be low. If the valve be permitted to approach its seat, the flow of the fuel charge through the port 18 will be more or less restricted and retarded, and if the valve be seated none of the charge can pass to the reservoir 17 so that the entire charge will be confined within the chamber 6 and its lateral extension 7 and, consequently, the compression stroke of the piston will compress the charge to a high degree. The operator, by properly adjusting the valve, may, accordingly, regulate the compression in the engine, and experience has demonstrated that the speed of the engine can be very quickly accelerated by merely adjusting the valve for a higher degree of compression and the acceleration will be accomplished without any increased consumption of fuel and, conse-

quently, as compared with previous engines, the consumption of fuel is greatly economized.

The spring **15** acts constantly to hold the valve **11** on its seat and there is provided means whereby the valve may be adjusted so as to regulate the degree of compression, as required. To this end, a bracket or lug **19** is provided upon the top of the cylinder head and a rock shaft **20** is journaled in and extends through this lug. An eccentric **21** is secured on one end of this rock shaft and bears upon the end of the valve stem, as clearly shown in Figure 1, so that if the shaft be rocked to present the high part of the eccentric to the valve stem, the valve will be unseated, and if the low part of the eccentric be presented to the valve stem, the valve will be seated under the action of the spring **16**. A crank arm **22** is secured to the end of the rock shaft **20** remote from the eccentric and the crank arms of the several cylinders are connected by a link or connecting rod **23**, as clearly shown in Figure 3. A link **24** is pivoted to the rear end of the connecting rod and extends to the instrument board in the vehicle so that it may be easily manipulated by the chauffeur or other operator.

It should be understood that the valves may be linked to and operated by a speed governor so as to automatically attain high compression as the speed of the engine increases.

In casting the cylinder heads, it frequently happens that some slight irregularities or differences occur in the dimensions of the compression chambers. To compensate for this condition and to attain uniformity in all the cylinders of any one engine, a plug **25** is mounted in a web **26** which is formed in each cylinder head at the lower side of the same and contains a threaded opening **27** to receive the plug. A cap screw **28** is fitted in the outer end of the opening so as to cover the plug **25** and prevent the access of any dirt thereto and also to present difficulties to any unauthorized persons who may attempt to tamper with the engine. Obviously, if the plug be adjusted inwardly, the capacity of the compression chamber will be decreased. Outward adjustment of the plug will increase the capacity of the chamber. The spark plug opening is shown at **29** in Figure 2. The compression valve is disposed at one side of the spark plug, which may be mounted in the cylinder head in the usual manner, and project into the lateral extension **7** of the compression chamber or operate within a pocket provided therefor.

From the foregoing description, taken in connection with the accompanying drawing, it will be seen that I have provided an exceedingly simple device whereby the compression in an engine may be easily controlled, and an ordinary engine, at a slight cost, converted from a low compression engine into a high compression engine. While the compression and combustion chamber has been enlarged, the cylinder head has been kept to approximately its original normal size, and it has been found unnecessary to alter the external design of the cylinder head so that the invention may be applied to existing engines at a slight cost.

Having thus described the invention, I claim:

In an internal combustion engine, a cylinder head having a combustion chamber in its underside, a tubular web extending through the head and having a pocket in its lower end opening into the combustion chamber, a downwardly opening valve arranged to seat in said pocket, means for unseating the valve, and a reservoir formed in said web and extending laterally therefrom within the head and communicating with said pocket through a port in the web.

JAMES O. SNYDER.