Jan. 9, 1923. 1,441,450.

G. R. RICH.

POPPET VALVE FOR INTERNAL COMBUSTION ENGINES.

FILED OCT. 18, 1922.

Fig. 1.

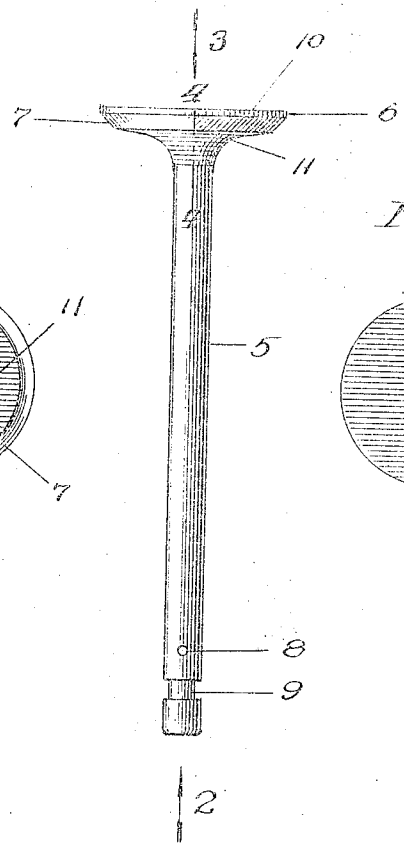


Fig. 2.

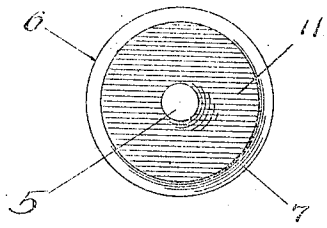


Fig. 3.

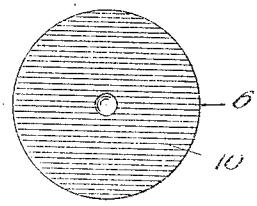
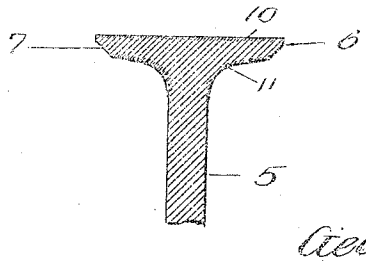


Fig. 4.



Inventor:
George R. Rich.
by Lowe & Hervey
his Attys

BEST AVAILABLE COPY

Patented Jan. 9, 1923. 1,441,450

UNITED STATES PATENT OFFICE.

GEORGE R. RICH, OF LOS ANGELES, CALIFORNIA.

POPPET VALVE FOR INTERNAL-COMBUSTION ENGINES.

Application filed October 18, 1922. Serial No. 595,289.

To all whom it may concern:

Be it known that I, GEORGE R. RICH, a citizen of the United States, and a resident of Los Angeles, Los Angeles County, and State of California, have invented certain new and useful Improvements in Poppet Valves for Internal-Combustion Engines, of which the following is declared to be a full, clear, and exact description.

This invention relates to poppet valves for internal combustion engines, and its principal object is to increase the efficiency of moderately low priced valves of this type. The ordinary forged or hammered steel or crome-nickel-steel valves, while comparatively inexpensive as compared with higher grades of valves, do not withstand the high temperatures developed in internal combustion engines, the hot gases wear away the tops and bottoms of the valve heads in a short space of time, and the heads warp, with the result that after the valves have been used for a short space of time, they do not seat properly, thereby allowing the combustible gases to leak past the valves, which results in poor compression and loss of power.

Many great efforts have been made to overcome this difficulty, but when the composition of the valve is improved, its cost is increased making its use prohibitive in the cheaper or lower priced automobile motors. One of the objects of this invention is to reduce the cost of manufacture of poppet valves and at the same time to lengthen their life of usefulness.

With these ends in view, this invention consists in a poppet valve for internal combustion engines, in which the top and bottom faces of hammered valve heads are left in their normal or natural condition, after being formed, instead of being machined away, thereby providing a hammered, non-porous protective casing or covering for the more porous underlying and interior portions of the head, and thereby protecting these internal portions against the destructive effects of the hot gases passing over them. The invention further consists in the several novel features hereinafter fully set forth and claimed.

The invention is clearly illustrated in the accompanying drawing, in which:

Fig. 1 is a side elevation of a poppet valve for internal combustion engines embodying a simple form of the present invention; Fig. 2 is an end view thereof looking in the direction of the arrow 2 in Fig. 1; Fig. 3 is an end view looking in the direction of the arrow 3 in Fig. 1; and Fig. 4 is a fragmental, central, longitudinal section taken on the line 4—4 of Fig. 1.

Referring to said drawing, the reference character 5 designates a valve stem, and 6 the head of a poppet valve embodying one form of the present invention. The stem and head are formed of a single piece of metal such as steel, for instance, crome-nickel-steel. The head is of the usual disk like form and its seating face 7 is beveled as usual, to seat upon the valve seat of the motor block. The lower end of the valve stem may be formed with an aperture 8 to receive a cotter pin, or it may be formed with an annular groove 9 to receive a washer, either being used for the purpose of retaining the usual valve spring, as is well understood.

In constructing a valve embodying the present invention, a steel rod of the proper length is heated to the proper temperature and one end thereof is upset to form an enlargement at that end and afterwards the rod is reheated and the enlarged end is placed in a power hammer containing suitable dies for forming the head, and the enlarged portion is then hammered out to form the disk like head 6 of the desired thickness for the finished valve.

The valve head is hammered until the temperature of the piece has fallen to a point where it no longer retains its plastic state whereby the top and bottom surface portions of the head becomes smooth and of greater density than the internal portion. Top and bottom smooth unbroken surfaces are thereby provided in which the pores of the metal are practically closed and no appreciable scale is formed.

The edge of the head, and the entire stem are thereafter machined to form the beveled bearing face 7 and the round stem. The top face 10 and the bottom face 11 of the head are not machined, but these parts are left in their natural or normal smooth, unbroken, non-porous condition which is imparted to them by the hammer. These surfaces are illustrated by the right line shading, in Figs. 1, 2 and 3 of the drawing.

The top and bottom faces of the valve head being left in their normal or natural smooth, unbroken, non-porous condition

after being subjected to the influence of the hammer, they effectively resist the action of the hot gases in internal combustion engines and act as a protective agency against the more porous portions of the interior of the head, which, if exposed to the direct influence of the hot gases, are soon eaten away, whereby the head becomes thinned out and warps, thereby seating imperfectly upon the valve seat and permitting the gases to leak by the valve.

In the ordinary practice of making valves, enough metal is provided to form a valve blank whose dimensions are somewhat greater than those of the finished valve, and all of the faces of the valve blank are machined to produce a valve of given dimensions. When the top and bottom faces of the valve head are machined, the denser portions are machined away and the more porous portions of the metal are exposed to the destructive influence of the hot gases and are liable to rapid deterioration. Moreover, there is a great deal of metal wasted in machining down the entire valve. In actual practice I have found that with valves made of substantially the size of the one shown in the drawing, seven valves can be made from the same amount of stock as six valves could formerly be made when they were machined all over. This means a great saving of material and consequently a great reduction in the cost of manufacture. Moreover, when the top and bottom faces of the valve head are protected against the destructive influence of the hot gases, the life of the valve is increased, materially, and when it does become worn out and a new one must be substituted for it, this may be done economically because of the low price for which valves containing the present invention may be had.

More or less variation of the exact details of construction is possible without departing from the spirit of this invention; I desire, therefore, not to limit myself to the exact form of the construction shown and described, but intend, in the following claim, to point out all of the invention disclosed herein.

I claim as new, and desire to secure by Letters Patent:

As a new article of manufacture, a poppet valve for internal combustion engines, comprising an unhammered steel stem and a disk-like head hammered from a single piece of material, the hammered disk-like head being of greater density than the stem, said head having hammered unmachined top and bottom surface portions which are relatively hard and non porous with respect to the internal portion, thereof, and smooth and unbroken, and which surfaces form protective coverings for the internal relatively porous portion during exposure of the valve to hot gases.

GEORGE R. RICH.