G. R. RICH.

PUPPET VALVE FOR INTERNAL COMBUSTION ENGINES.

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1,218,317. **Patented Mar. 6, 1917.**

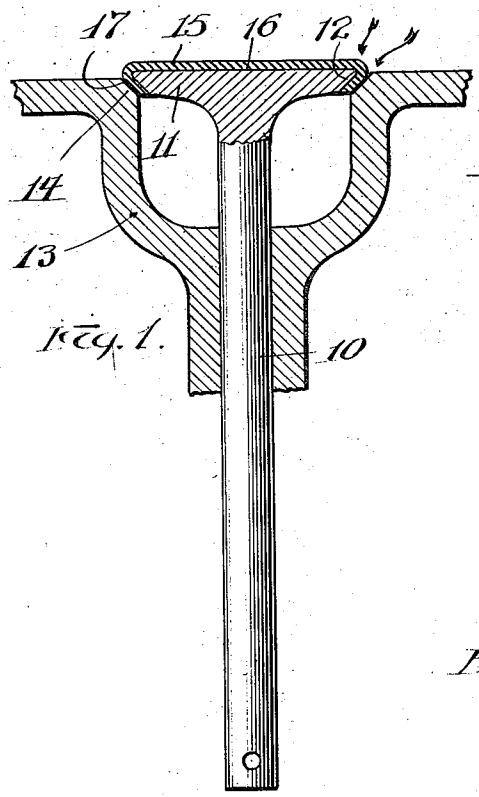

Fig. 1.

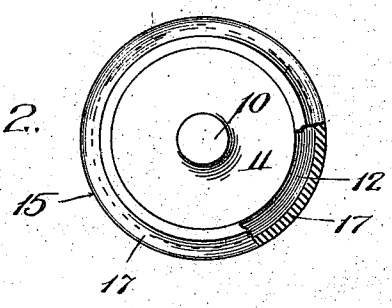

Fig. 2.

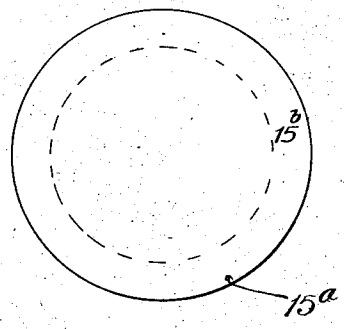

Fig. 3.

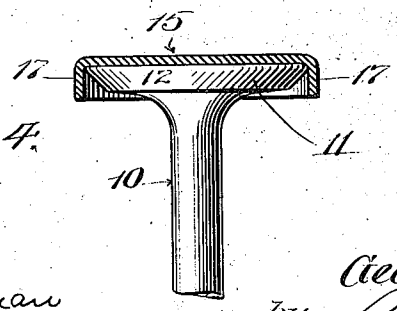

Fig. 4.

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UNITED STATES PATENT OFFICE.

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PUPPET-VALVE FOR INTERNAL-COMBUSTION ENGINES.

1,218,317. Specification of Letters Patent. Patented Mar. 6, 1917.

Application filed November 17, 1913. Serial No. 801,392.

To all whom it may concern:

Be it known that I, GEORGE R. RICH, a citizen of the United States, and a resident of Oak Park, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Puppet-Valves for Internal-Combustion Engines, of which the following is declared to be a full, clear, and exact description.

This invention relates to puppet valves for internal combustion engines and its object is to provide a cheap, simple and efficient puppet valve of improved construction and capable of successfully withstanding the effects of the high temperatured gases incident to internal combustion engines. The use of "tungsten" steel in the production of puppet valves of this character has become recognized almost universally since my discovery of its use in this respect, and as disclosed in my prior Patent No. 1,051,845, dated January 28, 1913, and this invention designs to provide a puppet valve which can be constructed practically as cheap as the ordinary steel valve but having the characteristic of resisting the effects of the high temperatures developed in internal combustion engines.

The invention consists in a puppet valve, having a sheet metal hood formed of "tungsten" steel, or steel containing a suitable percentage of "tungsten", and covering the vulnerable parts of the valve—that is, the head or disk—and particularly the face thereof which seats upon the valve seat, the hood being arranged thereon in such a manner that the gaseous charge may not leak out from the cylinder between the valve head and its hood.

The invention further consists in the several novel features hereinafter set forth and claimed.

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

Figure 1, is a view, partly in elevation and partly in central longitudinal section, of a puppet valve embodying one form of the present invention, and showing it in position on a valve seat; Fig. 2, is an end view of the valve; Fig. 3, is a plan of a blank from which the hood is constructed, and Fig. 4, is a central longitudinal section of the blank, stamped up into cup shape, and placed on the valve head prior to the operation of securing it thereon.

Referring to said drawing, 10, designates the stem and 11, the head of a puppet valve, constructed of steel, its peripheral edge or face 12, being of tapered formation, as is common in puppet valves of this class, and the stem and head being preferably made integral with each other, as shown; 13, designates the wall of a cylinder having a tapered valve seat 14, for the valve.

Those familiar with the art, to which this invention belongs, know that part of the compressive and explosive force in internal combustion engines is expended toward the end of the valve head and that the exhaust gases pass between the seat 14, and the face or edge 12, of the valve head, in discharging from the cylinder. Carbon deposits on the face or edge of the ordinary valve head and usually at one side of the head, and collects thereon to such an extent that the valve head cannot seat properly after a short period of usage, thereby decreasing the efficiency of the engine, because of the leakage of gas, and frequently causing the stem to warp at a point close to the head. These defects I have overcome in a cheap puppet valve by making the valve head of less size than its seat and combining with the body of the head a thin sheet metal imperforate hood 15, comprised of "tungsten" steel or steel containing a percentage of "tungsten", said hood conforming to the end 16, and face 12, of the head. To guard against leakage between the head portion 11, and hood 15, the latter is arranged to extend across the end face 16, with its edge portion bent around the tapered face of the head 11, as at 17, and forced tightly against the same. The pressure of the gaseous charge and its discharge being in the direction of the arrows in Fig. 1, there is no possibility of leakage between the head portion and hood.

In constructing the hood, I first form blanks 15^a, of disk like formation (see Fig. 3.) by punching them from sheets of metal containing a suitable percentage of "tungsten"; the disks being of about one sixteenth of an inch in thickness and of larger diameter than the head portion of the valve, so as to provide a marginal edge 15^b, at least as wide as the peripheral edge or face 12.

Thereafter the blank is stamped up into a cup shape (see Fig. 4.); the inner diameter of which is practically the same as the largest diameter of the head portion of the

valve. This cup shape member is then placed upon the head portion with its flange surrounding the peripheral face thereof, and while hot said flange is crowded down upon the face, by suitable dies, after which the surface of the flange 17, is faced off and the terminal edge trimmed off to form the finished valve.

The "tungsten" steel hood costs but a trifle, but when applied to a puppet valve body, made of other steels, it provides a valve having many of the characteristics of a high priced valve made of "tungsten" steel. The danger of carbon depositing on the face of the hood, is reduced to a minimum with the use of a "tungsten" steel hood, whereby the valve is free to seat perfectly at all times and the danger of its stem warping is therefore practically eliminated. If the hood wears loose on the head portion, it will still seat perfectly, because of the engagement of the tapered face of the head portion with the tapered inner side of the flange 17.

It is obvious that other metals having the characteristics of "tungsten" steel may be employed in the hood and I desire to be understood therefore, as intending in the following claim to include such substitutions for "tungsten" steel as are equivalents thereof.

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

A puppet valve of the character described, formed with a head portion having a tapered face, and having a thin, flanged, imperforate disk of "tungsten steel" covering its end and tapered face, and permanently secured thereto in close contact therewith.

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Witnesses:
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