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POPPET VALVES OF INTERNAL COMBUSTION ENGINES

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Fig-1

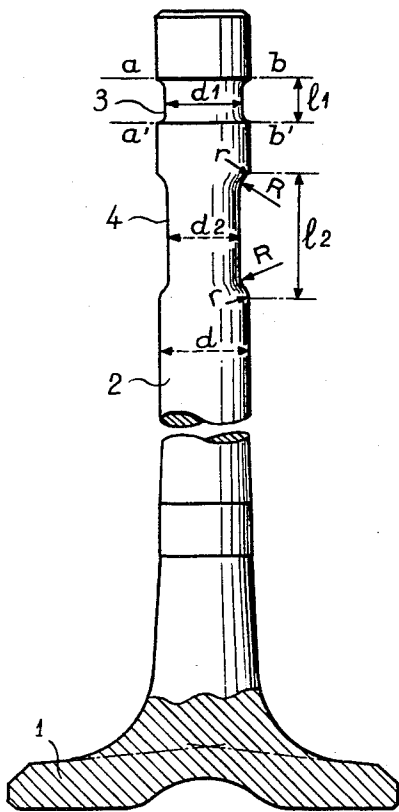
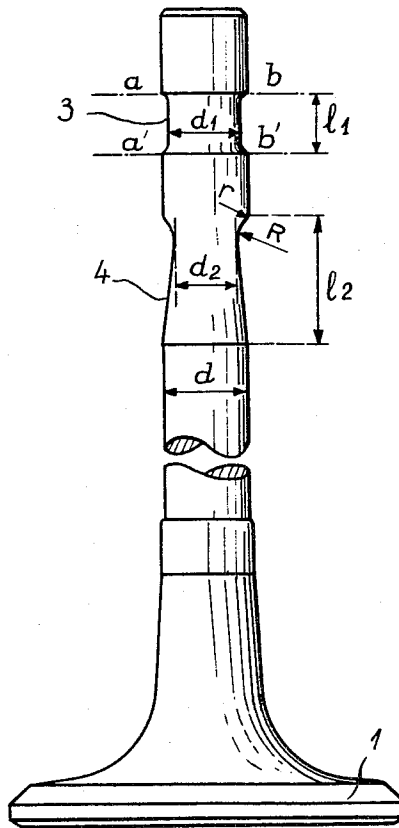


Fig-2



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3,185,142

**POPPET VALVES OF INTERNAL COMBUSTION ENGINES**

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Claims priority, application France, Jan. 30, 1963, 923,192, Patent 1,354,983; Oct. 28, 1963, 952,004, Patent 84,593

3 Claims. (Cl. 123—188)

This invention relates to poppet valves of internal combustion engines and has specific reference to improvements in the design of these valves with a view to increase their mechanical strength and prevent their breakage.

Engine valves comprise as a rule a groove positioned near the end of the valve stem and adapted to receive the pair of tapered half rings (also called valve cotters) retaining the valve collar of substantially frusto-conical configuration on which the valve spring is caused to abut.

The groove formed in the valve stem reduces the strength of the valve and may become a source of incipient fracture, notably in the case of high-speed engines.

The improvements constituting the subject matter of this invention consist in reducing the diameter of the valve stem slightly beneath said groove, when the valve is observed with its head down, that is, between the cotter groove and the valve head, the length of said portion of reduced diameter being substantially greater than that of said groove; thus, an elasticity is imparted to the valve stem which is sufficient to prevent the valve breakage across said groove.

Referring to the attached drawing,

FIGURE 1 shows a poppet valve incorporating the improvements constituting the subject-matter of this invention, and

FIGURE 2 shows a modified embodiment of the valve of this invention.

In the drawing, the valve illustrated comprises a head 1 and a stem 2 formed with a groove 3 for engagement by the valve cotters. The normal diameter of the stem 2 is  $d$ .

To prevent the stem from breaking in the region  $a-b$ ,  $a'-b'$ , the diameter  $d$  is reduced in the portion 4 to a value  $d_2$  slightly inferior or equal to the diameter  $d_1$  of the bottom of groove 3, this reduced portion 4 extending along an axial length  $l_2$  as long as permitted by the valve gear diagram in the valve stem guiding zone.

The portion with diameter  $d_2$  of stem 2 merges at its two ends into the portion of diameter  $d$  of stem 2 by means of a large-radius fillet  $R$  followed by a small-radius rounded edge  $r$ . It is essential that this reduction in diameter be obtained without leaving any trace of machine tool.

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FIGURE 2 illustrates a modified form of embodiment wherein the stem diameter is still reduced in portion 4 along the length  $l_2$ , but in this case this reduction in diameter, instead of being obtained by providing a cylindrical portion of reduced thickness along the valve stem as in the preceding case, is obtained by giving a tapered configuration to this portion. Under these circumstances the stem clearance is of frustoconical configuration with its minor base adjacent to the groove 3 having a diameter  $d_2$ , the major base of this stem clearance having the same diameter as the valve stem, as shown at  $d$ . The minor base diameter  $d_2$  should be slightly inferior or equal to the diameter  $d_1$  measured in the bottom of groove 3, and the length  $l_2$  of the frustoconical portion should be as long as consistent with the valve gear diagram in the guided zone of the valve stem.

The clearance cone merges into the valve stem at its smaller end by means of a fillet having a relatively large radius  $R$ , followed by a rounded edge having a smaller radius  $r$ .

Of course, it would not constitute a departure from the present invention to bring minor changes in the practical embodiment thereof, provided that the basic principles of the invention which are set forth in the appended claims are adhered to.

I claim:

1. In a poppet valve comprising an elongated valve stem and a valve head at the lower end thereof, said stem having an annular groove located near the upper end of said stem and adapted to receive a valve cotter, a longitudinal portion of said stem between said groove and said head being reduced in diameter over a length greater than the height of said groove, said longitudinal portion of reduced diameter being of a frusto conical shape with the minor diameter being located at the upper part of said stem adjacent said groove and with the major diameter located at the lower part of said stem adjacent said head, the peripheral junction between said portion of reduced diameter and the normal diameter of the stem being defined by a fillet and a rounded portion, said fillet having a larger diameter than said rounded portion.

2. The poppet valve of claim 1 wherein the said minor diameter is less than the diameter of said groove.

3. The poppet valve of claim 1 wherein the said minor diameter is equal to the diameter of said groove.

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