Jan. 17, 1939. F. GLASSFORD 2,144,147

METHOD OF MAKING VALVE TAPPETS

Filed July 20, 1936

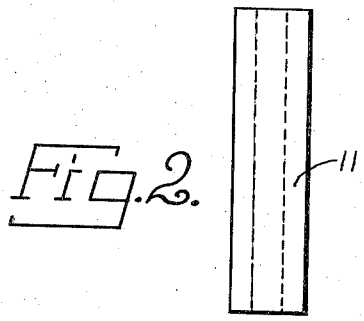


Fig. 2.

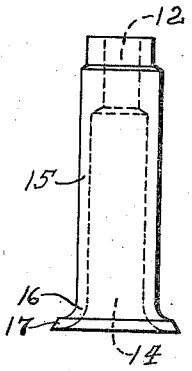


Fig. 3.

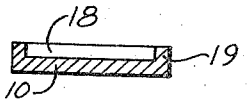


Fig. 1.

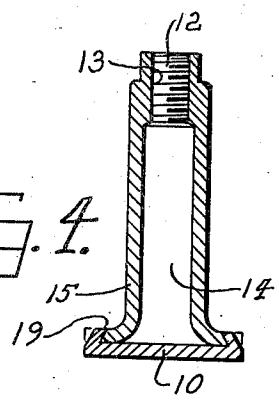


Fig. 4.

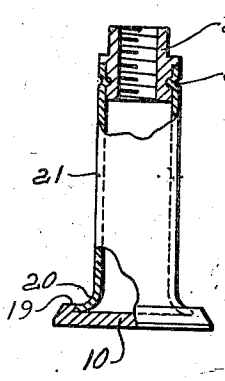


Fig. 5.

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Patented Jan. 17, 1939 2,144,147

UNITED STATES PATENT OFFICE

2,144,147

METHOD OF MAKING VALVE TAPPETS

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Application July 20, 1936, Serial No. 91,537

1 Claim. (Cl. 29—156.7)

This invention relates to method of forming valve tappets, for use in internal combustion engines, gas-compressors, and analogous mechanisms.

My invention has among its objects the provision of an improved fabricated valve tappet.

Another object of my invention resides in the provision of a novel, inexpensive, and efficient method of forming my valve tappet.

Further objects of my invention reside in the provision of an improved valve tappet of low cost of manufacture and light durable structure, and in the novel combination and arrangement of parts thereof more particularly hereinafter described and shown in several detailed embodiments in order to illustrate the principles of my invention, reference being had to the accompanying drawing, in which:

Fig. 1 is a sectional elevational view of the tappet head before it is attached to the tappet stem.

Fig. 2 is an elevation of the blank from which the tappet stem is formed.

Fig. 3 is a tappet stem formed from the blank.

Fig. 4 is an enlarged sectional view illustrating the method of attaching the stem to the head.

Fig. 5 is a sectional view showing a modified stem construction.

The head 10 of my improved tappet is preferably made of a high-carbon steel or certain other metals capable of being heat treated to a high degree of hardness and wear resistance.

The stem may be formed in various ways, but as shown in Fig. 2 the blank 11 is a suitable length of metal tubing. Thereafter, the blank 11 is bored to form apertures of different diameters at the opposite ends, the smaller aperture 12 being threaded to receive the usual adjustment screw at 13. The larger bore 14 is of the diameter necessary to reduce the walls 15 to the required thickness. The end of the tube is then flared, as shown at 16, by pressing in suitable dies, or by other means, such as spinning, so as to form an oblique flange 17. The head 10 is formed having a base portion 18 and a peripheral flange portion 19 extending substantially perpendicular to the base portion 18 to provide a recess for the reception of the flared end 17 of the stem. The inner diameter of the flange portion 19 may be the same diameter as the outer diameter of the flared flange 17 or may be slightly smaller when the parts are at ordinary room temperature.

The head and the stem may be united by heating the head 10 for the heat-treating process and then inserting the flared end 16 of the stem which is maintained at ordinary room temperature. The raised portion 19 of the head 10 is then pressed or spun while hot against the oblique flange 17. The head end of the tappet assembly is then quenched or cooled in the heat-treating process.

The cooling operation causes the head 10 to contract in size, thereby forming an even tight fit of the raised portion 19 of the head against the flared end 16 of the stem. If it is desirable because of the head and stem interlocking design to secure more clearance between the raised portion 19 of the head and the flared end 16 of the stem at the beginning of the assembling operation, this can be accomplished by materially lowering the temperature of the stem as by freezing, etc.

The structure thus formed will be rigid and strong, and there will be no tendency for the head to separate from the stem as these parts are firmly interlocked and maintained permanently under stress. This result is effected by the raised portion 19 tending to contract and the flared end 16 tending to expand simultaneously.

The stem, as well as the head, may be formed in various ways. For example, by any of the usual methods of drawing a tube from a sheet metal blank. During this drawing operation the flared flange 20 at the end of the blank is easily formed so as to be ready for engagement with a head in the aforementioned manner. Where, however, the blank is made from sheet metal, the walls 21 are of a substantially uniform thickness and it may be necessary to provide a bushing 22 for the threaded end. This bushing 22 may be formed with a peripheral groove 23 into which the tube is pressed by rolling or other suitable means.

It will be understood that by forming a tappet in this manner the stem portion may be made of inexpensive material and the head portion produced from a high carbon steel capable of being hardened when heated and quenched. Furthermore, the stem and head portions are thereby permanently united and under stress for assembly. A material saving of time and money is effected by using the heat-treating operation of the head for a two-fold purpose: i. e., as a hardener and as a means for shrinking the head on the flange of the stem to produce permanent interlocking.

If desired the outer edge of the flared flange 17 may be slightly tapered so that the flange 19 may be pressed inwardly from its normal position at right angles to the base 10 forming an acute angle between the flange 19 and the base 10.

This forms an interlock between the head and stem.

My method of joining the head and the stem is such that the flange of the head is snug against the flange of the stem, and after bringing the head and the stem to the same temperature they are maintained permanently locked under stress by the contraction of the head and the expansion of the stem.

This is a great improvement over the conventional fabricated tappet wherein the members are pressed together in various ways, as in the latter there is a tendency for these members to recede from their respective positions when the pressure is withdrawn.

What I claim is:

The method of forming a tappet which comprises, forming a radially extending flange portion on one end of a stem member, forming a separate head member having body and flange portions, said head member being formed of metal capable of being case-hardened by heat treatment, securing said head member to said stem member by forcing said flange portion of said head member over the flange portion of said stem member while maintaining a difference in temperature between said head and stem members by heating said head member and cooling said stem member, and immediately quenching to harden said head member and thereby simultaneously shrinking said flange portion of said head member and expanding said flange portion of said stem member into interlocking engagement.

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