March 3, 1936. E. C. BIEWEND ET AL 2,032,906

VALVE TAPPET

Filed Dec. 10, 1931

Fig. 1

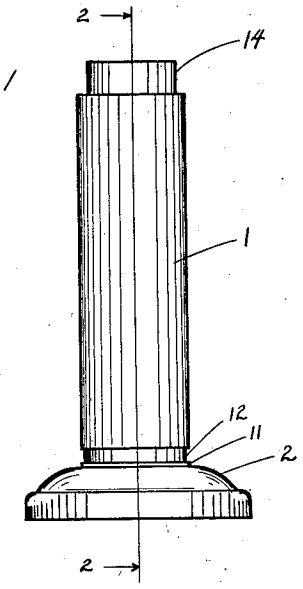


Fig. 2

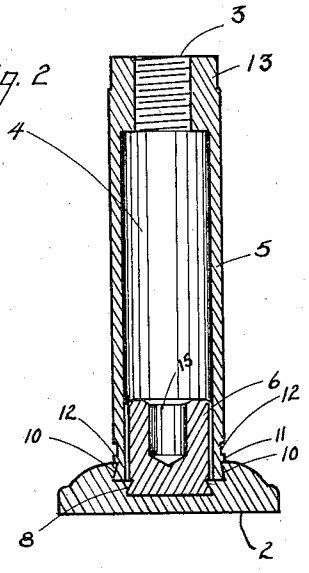


Fig. 3

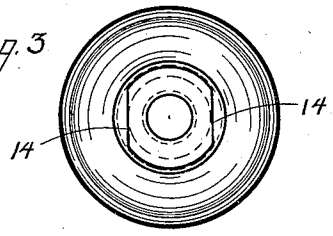


Fig. 6

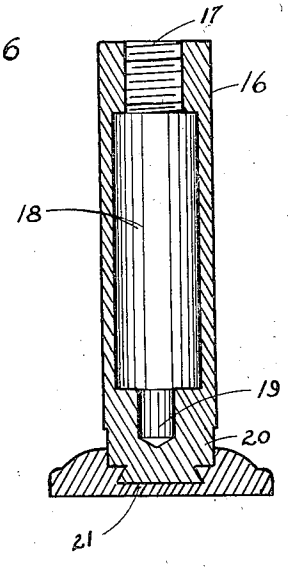


Fig. 4

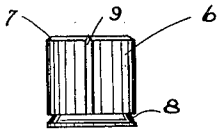
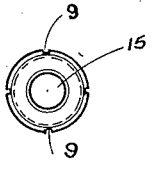


Fig. 5



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VALVE TAPPET

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6 Claims. (Cl. 123—90)

This invention in its broadest aspect has application in any field in which the casting or molding of one material to a like material or a different material is desired and has particular application to the casting of a chilled cast iron head to a steel stem in the manufacture of valve tappets.

One of the objects of this invention is to produce a machine element which in its application is subject to several different types of wear and stress and thus must be constructed of different wear and stress resisting materials to fulfill its purpose.

Another object of this invention is to produce a machine element in which the unit is constructed by a simple and inexpensive casting of one material upon a preformed foundation of the same or different material.

Still another object of this invention is to cast a chilled cast iron head upon a steel stem or shank to produce a valve tappet presenting a wearing resisting surface which will withstand the wiping action of the tappet cam in the present day high speed automotive engine.

A further object of this invention is to produce a light tappet valve by securing a chilled cast iron head to a hollow, thin walled stem or shank by press fitting into the stem or shank an insert or plug having an angle or radius turned therein and then casting the iron head around the stem and the insert or plug to secure the head to the stem by the dove-tail joint formed between the insert or plug and the casted head.

With these and other objects which will become apparent as the description proceeds, this invention resides in the combination and arrangement of parts hereinafter described and set forth in the claims.

In the accompanying drawing wherein two convenient embodiments of my invention are set forth.

Fig. 1 is an elevation of one preferred embodiment of this invention.

Fig. 2 is a vertical sectional view upon section line 2—2 of Fig. 1.

Fig. 3 is a top view of Fig. 1.

Fig. 4 is an elevation of the insert or plug shown in section in Fig. 2.

Fig. 5 is a top view of Fig. 4.

Fig. 6 is a vertical sectional view taken similar to Fig. 2 of a modified embodiment of this invention.

In Fig. 1 reference character 1 designates the stem or shank, preferably of steel but which can be constructed of other satisfactory material, of a valve tappet having secured thereto a cast or molded head 2, preferably of chilled cast iron but which could be of any other material capable of being casted or molded including a phenol condensation product, which would present a surface sufficient to resist the wiping action of the tappet cam.

As shown in Figs. 2 and 3 the stem 1 has a threaded aperture 3 adapted to receive the threaded adjusting screw inserted between the tappet 1 and the valve stem. Reference character 4 designates an aperture drilled or otherwise provided in the stem 1 resulting in thin walls 5 for the sake of lightness of structure. The aperture 4 is reamed out at the lower end of the stem 1 to produce a close fit for the press fitted plug 6 shown removed from the assembly in Figs. 3 and 4.

The plug 6, which is preferably of steel but which may be constructed of any other material of sufficient strength and capable of being press fitted or otherwise secured in the stem 1, is provided with a beveled upper end 7 to facilitate its insertion into the stem and in its lower end has an angle or radius 8 produced by a necking operation giving that portion of the plug the appearance of a frustum and into which the material of the head 2 is cast or molded to provide a dove-tail like joint between the plug 6 and the head 2 in the assembly. To eliminate the formation of blow holes when the head 2 is of cast material, machined vents or channels 9 are provided in the plug. The vents or channels 9 should be of sufficient dimension as to avoid the complete closing thereof during the press fitting operation. The plug 6 is provided with a drilled aperture 15 to lighten the assembly. Another important feature of the plug 6 is that it reenforces the thin walls 5 of the stem 1 at the point having the greatest tendency to chip or crack.

To provide an additional anchoring means for the head 2, the stem 1 is constructed with a turned angle or radius 10 similar to 8 of the plug 6, about which the chilled iron head 2 shrinks during the cooling. In practice it has been found that the anchoring effect of the plug alone is sufficient and that the iron will shrink about a cylindrical surface of the stem 1 with sufficient bindage and anchorage to produce a satisfactory tappet, so it is obvious that the invention is not limited to any particular type of stem structure.

A retaining ring 11, adjacent the grinding undercut 12, is provided to prevent the molten iron

from filling up the undercut 12 during the casting operation.

At the upper end of the stem 1, a grinding undercut 13 is provided similar to the undercut 12. As it is necessary to hold the tappet against rotation when the adjustment screw, which is threadedly engaged in the threaded aperture 3, is manipulated, the upper end of the stem 1 is machined to present two parallel surfaces 14.

The method employed to cast the chilled cast iron head 2 to the plug 6 and stem 1 is well understood by those skilled in the art. One convenient method, for example, consists in suspending the stem 1 with plug 6 press fitted thereto in a cast iron mold of the shape of the desired head 2 and casting the iron around the plug 6 and the stem 1; the cast iron mold chilling the cast head to produce the required amount of hardness.

From the foregoing description it will be apparent to those skilled in the art, that this invention provides an inexpensive and efficient method of producing a light tappet which will meet all the necessary requirements.

In Fig. 6 is shown a modified embodiment of this invention which eliminates the necessity of a steel plug 6 but which increases the complexity of the drilling operation. In the modified form of the invention, the stem or shank 16 is a solid steel member provided with a threaded aperture 17 and drilled apertures 18 and 19. The aperture 18 is of greater diameter than 17 in order to reduce the weight of the stem while the diameter of the aperture 19 is substantially less than the aperture 18 to provide additional strength at the lower end of the stem or shank. The lower end of the stem 16 which is embedded in the cast iron head is substantially of the same vertical cross sectional outline as the stem 1 and the plug 6 shown in Fig. 2, and is anchored in the head 21 in a similar manner.

Altho the securing of the plug 6 in aperture 4 by press fitting is preferred, it is within the scope of this invention to secure the plug 6 therein by any other well known means, such as for example, by spot-welding.

Having thus described our invention it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and we do not wish to be limited to the details herein disclosed, but what we claim is:

1. A valve tappet comprising a stem having one end thereof hollow, a plug partially inserted in said hollow portion and reinforcing the same and a head surrounding and frictionally engaging said stem adjacent said plug and secured to said plug.

2. A valve tappet comprising a stem having one end thereof hollow, a plug partially inserted in said hollow end and frictionally engaging the same, having an annular recess in the portion without said stem, and a head interlocking with said recess, and extending axially along said stem a predetermined distance for connecting engagement therewith.

3. A valve tappet comprising a hollow stem, a reinforcing and anchoring plug partially inserted and secured in one end of said stem, having an annular recess in a portion thereof without said stem, and a head interlocking with said recess, surrounding and engagingly secured to the exterior portion of said stem adjacent said plug.

4. A valve tappet comprising a hollow stem, the walls thereof being of insufficient thickness for the strength required, a reinforcing and anchoring plug partially inserted and frictionally engaged in one end of said stem, and having an annular recess in the portion without said stem, and a head portion surrounding and frictionally engaging the lower portion of said stem and interlockingly engaged with the recess of said plug.

5. A valve tappet comprising a hollow stem, a plug at one end thereof having an annular recess, and a head secured to said plug and stem engaging said recess.

6. A valve tappet comprising a stem having one end thereof hollow and of substantially uniform diameter, a reinforcing plug partially inserted in said hollow end and frictionally engaging the same, having a recess in the portion without said stem, and a head interlocking with said recess in said plug and tightly surrounding the portion of said stem adjacent said plug.

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