April 30, 1929. G. R. RICH 1,710,997

PROCESS OF MAKING VALVE TAPPETS

Filed May 14, 1928

Fig. 1.

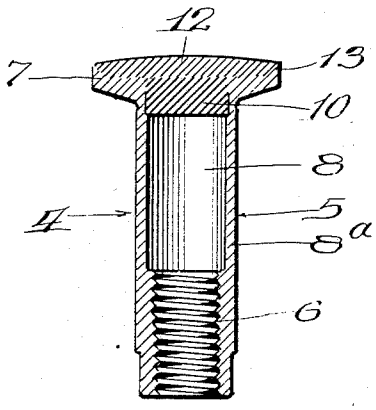


Fig. 2.

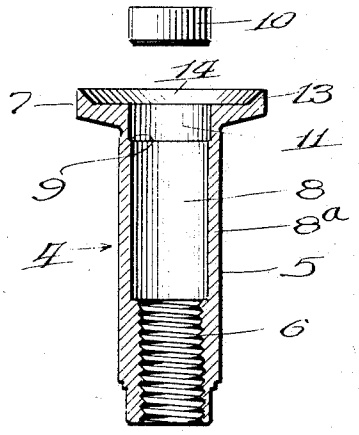
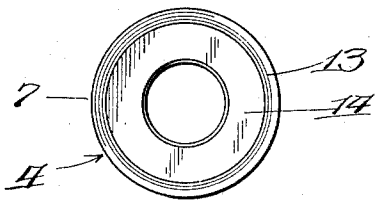


Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE R. RICH, OF BATTLE CREEK, MICHIGAN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WILCOX-RICH CORPORATION, A CORPORATION OF MICHIGAN.

PROCESS OF MAKING VALVE TAPPETS.

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The invention relates to a process of making valve tappets, and more particularly to hollow valve tappets of that type in which the body portion is formed of a piece of forged steel and the cam contacting surface portion is formed of cast iron or white iron fused to the head of the body portion. More particularly, the invention relates to hollow valve tappets in which the shank is formed with a relatively thin wall, whereby the weight of the tappet may be reduced considerably beyond that of the ordinary bored tappet. The thin wall is usually formed by boring out the forged piece from the head end of the body, and in order to fuse a cast metal cam contacting surface portion to the head, it is necessary to provide means for preventing the molten metal from flowing down into the hollow of the stem.

One object of the present invention is to provide a closure for the end of the bore at the head, whereby the molten metal will be kept from flowing into the cavity of the stem, The invention consists in the several novel features hereinafter fully set forth and claimed.

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

Figure 1 is a central longitudinal section taken through a valve tappet embodying a simple form of the present invention;

Fig. 2 is a central longitudinal section through the body portion and showing the plug or closure detached therefrom; and

Fig. 3 is a plan of the body portion shown in Fig. 2.

Referring to said drawing, which illustrates a simple embodiment of the present invention, the reference character 4 designates the body portion of the tappet, which is composed of steel, and said body portion comprises a hollow shank 5 internally threaded as at 6 and having a disk-like head 7 formed upon the end opposite the threaded end. The head is formed upon the shank 4 by heating a suitable length of rod to forging temperature and forging the head between suitable head forming dies, as is well understood. The head is formed with a marginal rim 13 which provides a shallow depression 14.

The stem contains a central bore 8 of greater diameter than the bore in which the threads 6 are made, thereby leaving a very thin wall 8^a between the threaded end and the head. At the extreme end of the bore 8 the diameter of the latter is increased somewhat as at 11, so as to leave a shoulder 9.

Tightly secured in the enlarged portion 11 of the bore 8 is a plug 10 preferably formed of mild steel, and integrally united with the head 7 and plug 10 is a cast iron or white iron cam contacting surface portion 12. The tappet consists essentially, therefore, in a body portion comprising the hollow thin walled shank 5 and head 7, the plug 10, and the iron cam contacting facing 12 all united into an integral structure.

In the manufacture of the valve tappet above described, the shank 5 is bored out from the head end to form the bore 8, thereby leaving the thin wall 8^a, and also bored from the other end and tapped to provide the internally threaded part 6 below the thin wall. The bore 8 is enlarged at the upper end to provide the shoulder 9. The plug 10 is then forced into the enlarged part of the bore, thereby closing the upper open end thereof, after which cast iron from a stick, or other piece of cast iron, is fused upon the upper end of the head and plug with the use of an electric arc welding tool, or other tool, which is capable of supplying sufficient heat to fuse the cast iron to the head and plug. The tappet is then hardened and machined in the usual manner.

By forming a thin walled shank in this manner, the weight of the tappet is reduced considerably, which is of great importance, particularly in tappets having stems of relatively large diameter. By providing a tight fitting plug in the upper end of the bore of the shank, it is possible to flow the cast iron over the upper surface of the head and fuse it to the head and to the plug, thereby providing to all intents and purposes an integral structure formed, in part, of cast iron or white iron.

The cast iron or white iron facing 12 provides an extremely hard surface portion for the head which, as is well understood, contacts with the cams of internal combustion engines and is subjected to the friction and wear occasioned by the cam rubbing over the cam contacting surface. Being made of cast iron, the surface portion effectively reduces such wear and lengthens the life of the tappet to a considerable degree.

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 claims, to point out all of the invention disclosed herein.

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

1. The herein described process of making composite metal headed hollow valve tappets, which consists in closing the open head end of a hollow steel tappet body with a plug and depositing cast iron upon the end face of the head portion of the tappet body and fusing the cast iron thereto.

2. The herein described process of making composite metal headed hollow valve tappets, which consists in closing the open end of a hollow steel tappet body with a tightly fitting metal plug and depositing cast iron upon the outer end faces of the head and plug and fusing the cast iron to said parts.

3. The herein described process of making composite metal headed hollow valve tappets which consists in closing the open end of a hollow steel tappet body with a tightly fitting metal plug and fusing together the end face portions thereof with cast iron from a stick of cast iron.

4. The herein described process of making composite metal headed hollow valve tappets which consists in closing the open end of a hollow steel tappet body with a tightly fitting metal plug and depositing cast iron in a state of fusion upon the end faces of the head and plug and fusing said parts together with an electric arc welding tool.

5. The herein described process of making composite metal headed hollow valve tappets which consists in closing the open end of a hollow steel tappet body with a tightly fitting metal plug and electrically depositing cast iron upon the end faces of the head and plug and fusing it thereto.

6. The herein described process of making composite metal headed hollow valve tappets which consists in boring out the shank of a tappet to form a thin wall, enlarging the bore at the head end to leave a shoulder, inserting a metal block in the enlargement of the bore and depositing cast iron upon the end faces of the head and block and fusing the cast iron to said parts.

7. The herein described process of making composite metal headed hollow valve tappets which consists in boring out the shank of the tappet to form a thin wall, enlarging the bore at the head end and forming a depression in the head end to leave a marginal rim, inserting a metal block into the enlargement of the bore and depositing cast iron upon said plug and in the depressed part of the head, and fusing the cast iron to the plug and head.

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