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H. S. LEE

APPARATUS FOR FORMING VALVE TAPPETS AND THE LIKE

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Fig. 1.

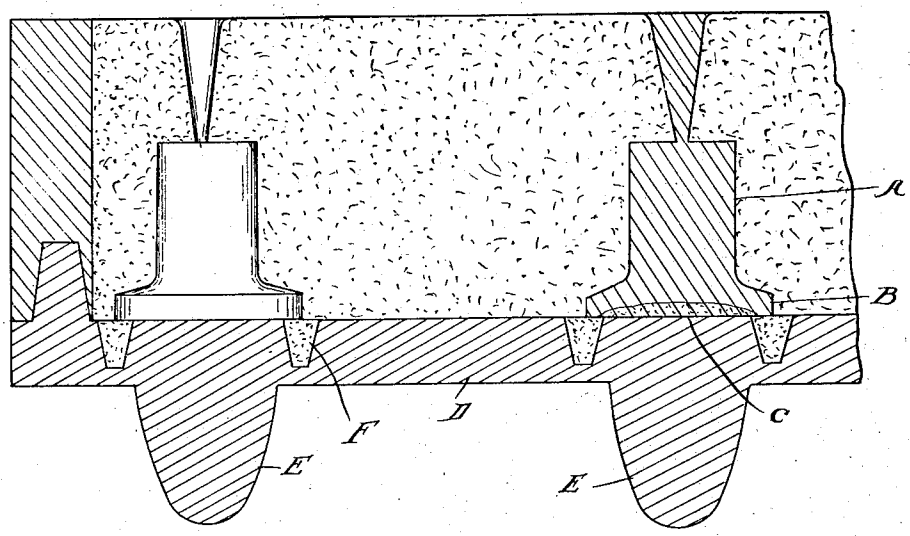
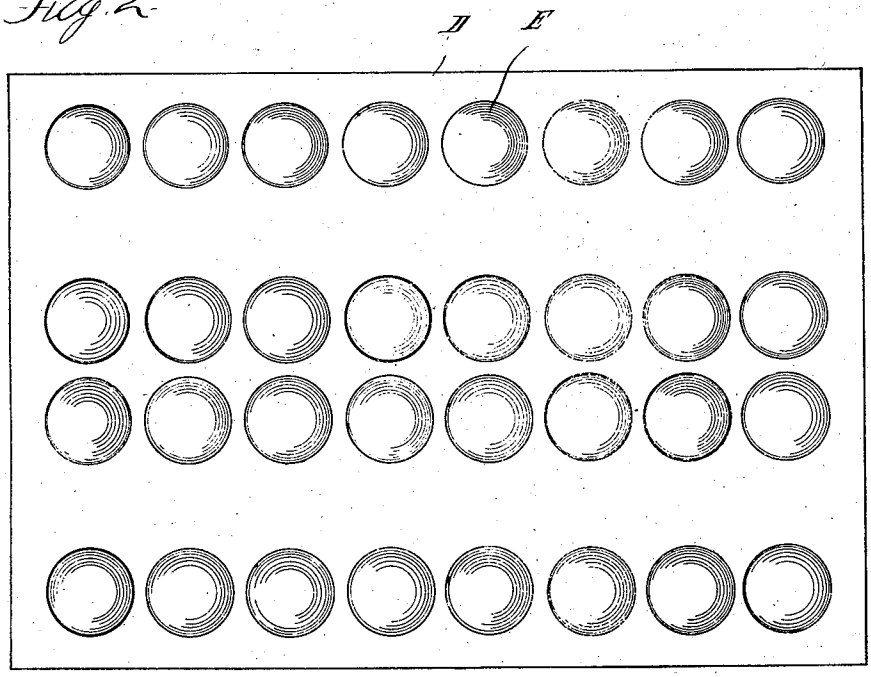


Fig. 2.



Inventor
Harry S. Lee

By Whittemore Hulbert & Whittemore
Attorneys

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UNITED STATES PATENT OFFICE.

HARRY S. LEE, OF PLYMOUTH, MICHIGAN, ASSIGNOR TO MERRILL M. WILCOX, OF SAGINAW, MICHIGAN.

APPARATUS FOR FORMING VALVE TAPPETS AND THE LIKE.

Application filed November 27, 1922. Serial No. 603,632.

To all whom it may concern:

Be it known that I, HARRY S. LEE, a citizen of the United States of America, residing at Plymouth, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Apparatus for Forming Valve Tappets and the like, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to the method and apparatus for forming chilled faces on cast metal articles and has for its object the obtaining of more uniform and satisfactory results. In particular, it is an object of the invention to provide for accurately predetermining the lateral extent and the depth of the chilled or hardened metal and for producing any desired variation. For instance, in the forming of valve tappets, it is desirable to have the center of the tappet of greatest hardness and to diminish this hardening effect towards the periphery. Such a result can be easily obtained by my improved method and apparatus.

While my invention is applicable to the production of various articles, I shall specifically describe it as designed for the manufacture of valve tappets.

In the drawings:

Figure 1 is a cross-section through the apparatus;

Figure 2 is a bottom plan view thereof.

As specifically shown, the members to be formed have cylindrical shanks A with enlarged heads B provided with flat bearing faces C, which are to be chilled and hardened.

As is well understood, the hardening of the metal is produced by the rapid cooling and the effect of a chill, which forms a portion of the molding surface, is to thus rapidly dissipate the heat. The rate of heat dissipation is dependent upon several factors, including the mass, the specific heat and thermo-conductivity of the material forming the chill and the amount of radiating surface. I have discovered that by properly fashioning the chill, any desired differential chilling effect may be produced, and the construction preferably used is one in which the greatest depth of hardening is at the center of the surface C, from which point the hardening is preferably decreased towards the periphery.

In detail, the chill D is preferably formed of a metallic plate which is of sufficient area to register with a plurality of mold cavities. Opposite each of these cavities the depth of the metal in the chill is increased beneath the center of the cavity, as indicated at E, diminishing therefrom progressively towards the periphery. If it is desired to leave the peripheral portion of the member in an unchilled condition, this may be accomplished by forming an annular groove F in the chill face, which groove may be filled with a material low in thermo-conductivity such as the ordinary core material.

With the construction as shown, the plate D is placed in the mold flask so as to form the bottom of all of the mold cavities. When the molten metal is poured into the mold cavities, the rate of heat dissipation will be greatest at the center, for the reason that there is the greatest mass of material in the chill opposite such point. From the center to the periphery the chilling will diminish and the exact character of this differential effect will depend upon the shape of the portion E. Preferably this portion is of oval form, which I have found from practice produces satisfactory results.

Where the grooves filled with core material are used, the peripheral portion of the face will be left unchilled and the hardening will gradually increase from the inner edge of the groove towards the center of the chill.

Another important advantage of my improved method is that I am enabled to secure uniform results in hardening where heretofore there has been considerable variation. For instance, it frequently happens that where a chill extends completely across the mold cavity, the chilling or hardening effect will sometimes extend only part way. The reason for this I do not fully understand, but I have discovered that by placing heat insulating material about the periphery, perfect uniformity is obtained in successive castings.

What I claim as my invention is:

1. In a mold, an apparatus for forming disk-shaped tappets and the like having differentially hardened surfaces, comprising a flat chill plate forming one face of the mold

cavity, said chill plate having a projection thereon, said projection greatest in depth opposite that portion of said tappet disk to which is imparted the greatest depth of chill, and of less depth opposite that part of said disk to which is imparted a lesser depth of chill.

2. In a mold, an apparatus for forming tappets having differentially hardened surfaces comprising a chill plate forming one face of the mold cavity, said chill plate having projections thereon, said projections greatest in depth opposite the center of the chilling surface, diminishing in depth from this point toward the periphery, an annular groove in said chill plate adjacent the periphery of said projection.

3. A apparatus for forming tappets and the like having differentially hardened disk faces comprising a chill plate for extending opposite a plurality of mold cavities and forming a molding face on each, said chill plate being provided with projections on the side opposite and registering with the respective cavities, said projections fashioned to produce chilling from the center towards the periphery of said disk faces.

4. In a mold, an apparatus for forming valve tappets and the like having chilled hardened disks in which the greatest depth of hardening is at the center of the disk and decreases toward the periphery, said apparatus comprising a chill plate forming one wall of the mold cavity, a chill projection on the side of the plate opposite the cavity, the projection having its greatest mass opposite the center of the chilling surface and diminishing in mass from this point towards the periphery.

In testimony whereof I affix my signature.

HARRY S. LEE.