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W. D. BARTLETT ET AL

1,551,631

PROCESS OF MAKING TAPPETS

Filed May 23, 1923

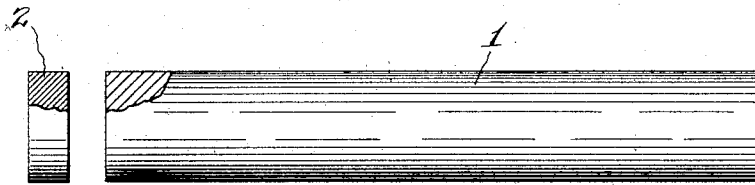


FIG. 1.

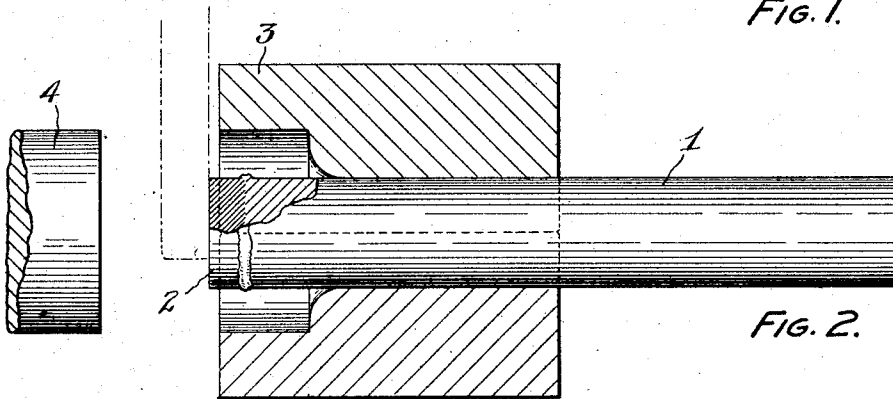


FIG. 2.

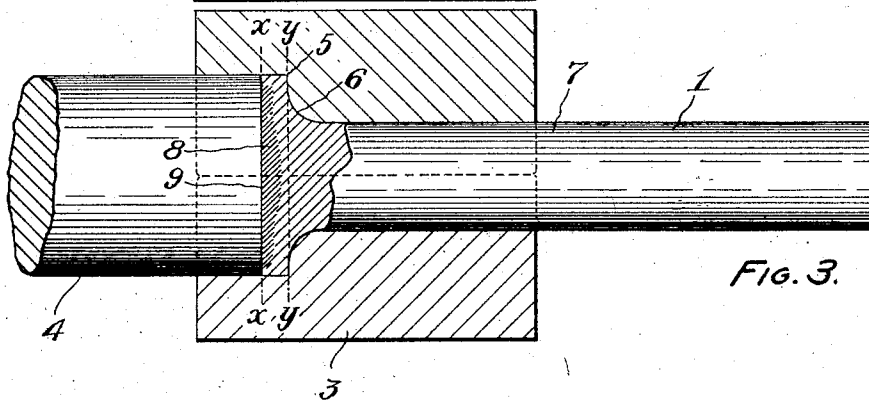


FIG. 3.

INVENTORS:
WILLIAM D. BARTLETT
WILLIAM H. SPIRE
BY *W. E. Merkel*,
ATTORNEY

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UNITED STATES PATENT OFFICE.

WILLIAM D. BARTLETT AND WILLIAM H. SPIRE, OF CLEVELAND, OHIO, ASSIGNORS
TO THE STEEL PRODUCTS COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF
OHIO.

PROCESS OF MAKING TAPPETS.

Application filed May 23, 1923. Serial No. 640,855.

To all whom it may concern:

Be it known that we, WILLIAM D. BARTLETT and WILLIAM H. SPIRE, citizens of the United States, residents of Cleveland, county of Cuyahoga, and State of Ohio, have invented new and useful Improvements in Processes of Making Tappets, of which the following is a specification, the principle of the invention being herein explained and the best mode in which we have contemplated applying that principle, so as to distinguish it from other inventions.

Our invention relates to machine elements in which it is necessary to provide a hard wearing-surface, as for instance a tappet for internal combustion engines; together with a method of making same.

Said invention has for its object, the provision of an element of the above described character which will be economical of manufacture and efficient in the performance of its function, and consists of a structure and method hereinafter fully described and particularly set forth in the claims.

More specifically our invention consists of a method and structure produced thereby, which method consists of welding to a steel blank of a character suitable for forming the tappet stem, a blank of steel of a character different from that of the stem and such as will provide a wearing surface capable of resisting efficiently the wear to which the element is to be subjected; then deforming the end of the structure so produced so as to form the required head of which the wear-resisting metal will form a part of the contact surface.

The annexed drawing and the following description set forth in detail a method and means embodying our invention as applied to the manufacture of a tappet, such disclosure, however, constituting but one of various ways in which the principles of our invention may be applied.

In said annexed drawing:

Fig. 1 represents a side elevation of two unjoined blanks used in producing a tappet in accordance with our invention.

Fig. 2 represents said two blanks after they have been welded, showing also the die and plunger in axial section and in the positions which they occupy prior to the upsetting operation.

Fig. 3 represents the tappet structure and an axial section of the die and plunger in

the positions which they occupy after the die and plunger have performed the upsetting operation.

One method of carrying out our invention as applied to tappet manufacture, is to first take a cylindrical bar 1 or blank of steel of a "non-hardening" character, such for instance as a low-carbon steel, of suitable dimensions for making a tappet of required size, making proper allowance for the final finishing operations. To one end of this blank is then welded a short cylindrical blank 2 of a steel susceptible to a hardening process such as will produce thereon a surface of sufficient hardness to efficiently withstand to the required degree, the wear to which the tappet is to be subjected, as for instance a "high-carbon," "tool," "tungsten" or "silchrome" steel, and to which we refer generally herein as "hardening" steel. The term "non-hardening" as herein used refers to a steel which when subjected to a hardening process is incapable of having imparted thereto a surface of sufficient hardness to efficiently resist the wear to which the tappet is to be subjected.

The structure so formed is then placed in a suitable die 3 formed with a suitable die cavity, and so as to cause the end of the structure, to which has been welded the portion 2, to project into said cavity. Furthermore, a portion of the blank 1 is allowed to project into such cavity which is of greater volume than that of the attached blank 2, as shown in Fig. 2. The metal in the die cavity is then upset by means of a suitable plunger 4.

As a result of this upsetting operation the metal of the end of the blank 1 flows laterally as does also the metal of the blank 2 and such metal of blank 1 also is caused to surround the metal of blank 2 as shown in Fig. 3.

The die cavity is of a form such as will produce the required shape of head which in this case consists of a diametrically enlarged flange portion 5 and a fillet portion 6 joined to the stem 7.

The flange portion of the head is that portion lying between the end plane $x-x$ of the tappet, Fig. 3, and the plane $y-y$ which defines the outer end of the fillet portion.

The head of the rough tappet so formed is then subjected to a hardening process, whereby the metal insert 8 formed of the

blank 2 is hardened, after which the structure may be subjected to the desired finishing operations of turning, boring, tapping, grinding or polishing, as will be understood.

5 The outer surface 9 of the insert 8 of the tappet forms the contact surface which being hard, efficiently resists the wear to which the tappet is subjected. Since the area of such surface, in the illustrated embodiment of our invention, is less than that of the end of the flange portion of the tappet, and the insert is centrally located, it is laterally removed from the periphery of said flange portion and hence after being 10 hardened need not be subjected to any but a grinding or polishing process.

What we claim is:

1. The steps in a method of forming a tappet which consists in welding to the end 20 of a blank as an extension thereof a metal member capable of forming a wear-resisting surface, then deforming the end of said blank and said metal member by an upsetting operation to cause the metal of the blank and of said member to spread laterally into a head faced with the metal of said member substantially across the end of the head.

2. The steps in a method of forming a 30 tappet which consists in welding to the end of a blank of non-hardening steel as an extension thereof a metal member of hardening steel, then deforming the end of said

blank and said metal member by an upsetting operation to cause the metal of the blank and of said member to spread laterally into a head faced with the metal of said member substantially across the end of the head. 35

3. The method of forming a tappet which consists in welding to the end of a blank of non-hardening steel as an extension thereof a metal member of hardening steel, then deforming the end of said blank and said metal member by an upsetting operation to cause the metal of the blank and of said member to spread laterally into a head faced with the metal of said member substantially across the end of the head, and then hardening the latter. 40 45 50

4. The steps in a method of forming a tappet which consists in welding to the end of a blank a metal member capable of forming a wear-resisting surface, then deforming the end of said blank and metal member, while held in a die having a recess of the size of the head to be formed, by pressure applied in the direction of the axis of the blank to cause the metal of the blank and of said metal member to spread laterally into a head faced with the metal of said member substantially across the end of the head. 55 60

Signed by us this 29th day of April, 1923.

WILLIAM D. BARTLETT.
WILLIAM H. SPIRE.