Nov. 3, 1931. W. R. WILEY 1,829,972

PROCESS OF FORMING CAP NUTS

Filed Nov. 12, 1928

Fig. 1.

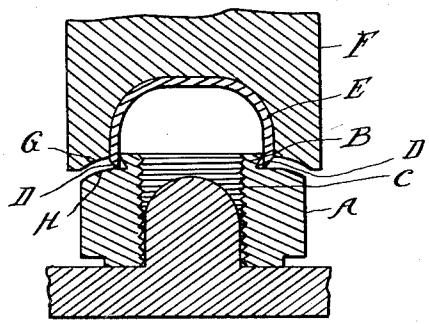


Fig. 3.

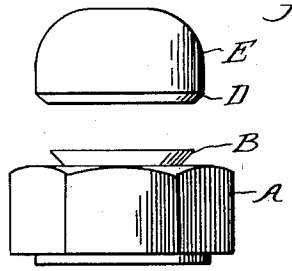


Fig. 4.

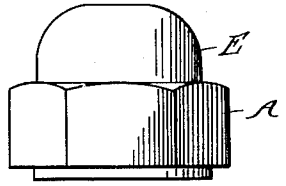


Fig. 2.

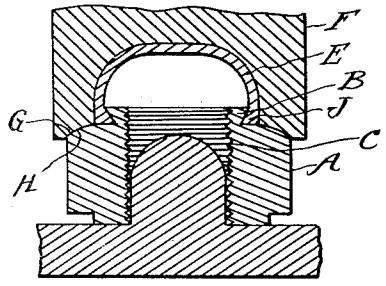


Fig. 5.

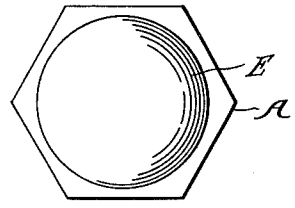
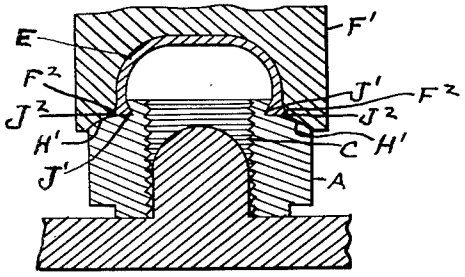


Fig. 6.



Inventor
William R. Wiley.

By Swan Frye and Murray
Attorneys

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UNITED STATES PATENT OFFICE

WILLIAM R. WILEY, OF DETROIT, MICHIGAN, ASSIGNOR TO DETROIT PLATING INDUSTRIES, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN

PROCESS OF FORMING CAP NUTS

Application filed November 12, 1928. Serial No. 318,809.

This invention relates to an improved process or method of forming cap nuts, and has for its object an improved series of process steps by means of which a lighter, and for most purposes equally satisfactory, article can be made at but a fraction of the cost incident to the formation of an integral nut of this type, wherein the cap or dome portion is expensively and laboriously machined out from a single solid piece of metal.

In the drawings:

Fig. 1 is a sectional elevational view of a nut positioned on a suitable holding die, and with a clamping die positioned thereover and above the initially separate cap or dome piece.

Fig. 2 is a similar view showing the descending die member in its extreme low position, and with the cap forced over the end in engagement with the head of the nut accordingly.

Fig. 3 is an elevational view showing the nut body and the cap disassociated from one another before the uniting process steps have been started.

Fig. 4 is an elevational view of the completed nut.

Fig. 5 is a plan view from above of the completed nut.

Fig. 6 is a sectional elevational view of a nut body, cap, and die in position similarly to Figure 1, but bringing out the possibility of using a cap having a straight, rather than beveled, peripheral edge.

For most purposes the cap or dome portion of a cap nut is largely ornamental and moisture-excluding, no structural strain being imposed thereon, consequently the formation of an integral cap nut from a single slug of metal involves a very expensive and long drawn-out blind tapping of the dome portion above the screw threadings, whereas, if an initially separate and cheaply stamped out cap piece can be structurally associated with the nut body with a sufficient degree of firmness, it will serve all the purposes above mentioned entirely satisfactorily; and, of course, the production of a plain bored nut involves only a fraction of the cost of a nut whose cap portion is integral therewith and has been tapped out.

To this end I provide a nut body A of the usual hexagonal contour, the top. end of which is provided with an undercut or cross-sectionally keystone-shaped collar B which surrounds the upper end of the internally threaded portion C. Over this I position a cap E, whose internal diameter is such that it will just fit over and about the undercut collar or neck portion B of the nut. The peripheral edges of this cap piece are preferably beveled or angularly sloped as shown at D, so that when the cap is rested upon the top edge of the nut body, just outside of the collar B, only a thin line of contact coincident with the interior surface of the cap B actually rests upon the top of the nut body, and interiorly thereof, between it and the extreme undercut portion of the neck B, a small and interiorly unoccupied space is left. I then bring down with adequate force or impact about and upon the cap E the descending die member F, the lower or engaging face of which is apertured or hollowed out, so as to accurately fit over the cap E, though without exerting any compressive effect on the side walls thereof. The aperture in the bottom of the descending die member F is of such depth that when it firmly and fully engages about the cap E, its lower and slightly inclined edges G are slightly spaced from the correspondingly sloped shoulder portion H of the nut body. The further power-induced descending movement of the die member F, therefore, centers all of its pressure as regards the cap I upon the thin peripheral edge thereof which rests upon the flat top portion of the nut body A, and because of the outward incline or bevel thereof, the only possible direction for the softer component metal of the cap to take, in yielding under pressure, is an inward, centripetal one, so as to force its sharp edge portion under the beveled portion B of the nut collar. When the sloping underface G of the die in its continued downward travel has reached a position of substantial contact with the sloping shoulder portion H of the nut body, the metal forming the peripheral edge of the cap E has thus

been forced into occupancy of substantially the entire angularly undercut space about the collar B, and that edge of the cap E has assumed the shape J shown in Fig. 2, thus, because of the undercut contour of the collar B, forming a firm and adequate interlock, whereby the cap is thenceforth structurally united with the body of the nut A.

While it has been my experience that the beveling of the peripheral edge of the cap E is preferable for many uses, it will be obvious that the use of a cap with a straight-across or imbeveled edge may often be resorted to without departure from the fair spirit of this disclosure. Generally speaking the use of a beveled edge is preferable where the assemblage of the cap and the nut body is effected by a press operation, while if this be done by a hammering or impact operation, the edge of the cap may be left straight. I have illustrated the consequences and possibilities of this latter in Figure 6, wherein it will be noted that with the die F′ at the lower limit of its possible path of travel, in addition to the underturned edge J′ on the inner face of the cap E′, there is an outwardly flowed portion J^2 of the cap edge which is pressed curvingly downward upon the slightly sloped shoulder H′ of the nut body, this being externally contoured to a suitable incline by the slight cutting away or curving-off of the shoulder of the die, as is indicated at F^2 in Fig. 6.

What I claim is:

1. The method of forming cap nuts, which consists in providing in assembled relation a nut body provided with a top collar portion having an undercut edge and an initially separate cap member provided with an outwardly sloping beveled edge, and applying downward pressure upon the cap structure as a whole while confining its side wall portion against substantial outward movement, thereby upsetting and thickening the beveled edge of the cap and forcing the metal thereof inwardly and into interlocking engagement under the undercut portion of the collar on the nut body.

2. The method of forming cap nuts, which consists in positioning a previously formed cap piece with its peripheral edge upon the top of a nut body, that portion of the nut body surrounding its bore and located interiorly of the peripheral line of contact of the edge of the cap being formed as an integral collar provided with an undercut edge portion, and forcing said cap confiningly downward, whereby its peripheral edge is upset inwardly and under said undercut edge of the collar to form an interlocking engagement therewith.

3. The process of structurally correlating a nut body and a sheet metal cap, consisting in providing a nut body having a peripherally undercut collar surrounding the bore at one end thereof, and an initially separate cap member, resting the peripheral edge of the cap member on the top surface of said nut body surrounding the collar, and effecting a downward pressure upon said cap member by means of a member which as well confines the lateral walls of the cap member against outward movement, thereby upsetting and thickening the peripheral edge of the cap and forcing the metal thereof under the undercut peripheral edge of the collar on the nut body.

4. The process of structurally associating a nut body and an end closure cap, which consists in providing a collar having an undercut peripheral edge on one end of the nut body, resting the peripheral edge of the cap upon the top surface of the nut body in surrounding relation to said collar, and applying downward pressure upon the cap structure as a whole while as well confining its side walls against outward movement from their initial plane, thereby effecting an upsetting and thickening of the peripheral edge of the cap, an inward movement of the metal thereof into interlocking engagement under the undercut peripheral edge of the colar.

5. The process of forming a cap nut from originally independent cap and body portions, consisting in providing a peripherally undercut collar on the top end of the nut, resting thereabout and upon the surrounding top surface of the nut body a cap member whose interior peripheral diameter is such as to just clear the peripheral edge of said collar, and surrounding all of said cap except its peripheral edge with a confining and downward-pressure-exerting body, whereby the edge of the cap is upset and thickened and forced radially inwardly into interlocking engagement under the overengaging peripheral edge of said collar.

6. The process of forming a cap nut from originally separate body and cap portions, consisting in beveling the peripheral edge of the cap portion and providing a collar with an undercut peripheral edge on one end of the nut body, and forcing the two into structural correlation by the applied pressure of a die member provided with a recess of corresponding curvature to that of the cap, which latter fits thereinto and the peripheral edge portion of which is held thereby against flowing elsewhere than into the space formed by the undercutting of the peripheral edge of said collar on the nut body.

7. The process of structurally correlating a nut provided with an undercut neck portion at one end, and an initially separate sheet metal cap of a peripheral diameter just sufficient to fit about the flared edge of said neck portion, consisting in subjecting the cap as thus positioned to the action of a descending die member which fits accurately though non-confiningly about the sides of the nut and

whose cap-engaging recess is shallower than the height of the cap, thereby forcing the lateral flow about the neck portion of the nut of the projecting peripheral edge of the cap.

8. The method of making a cap-nut comprising in providing an axially parallel collar on one end of a nut and providing said collar with a circumferential groove one side of which is substantially flush with said end, placing a sheet metal cup-shaped cap over said collar with the open end of said cap in contact with said end, said collar being relatively closely received in said cap, and then forcing said cap bodily towards said end while maintaining its exterior surface against expansion over substantially its entire area, whereby to cause said open end of said cap to upset and the metal thereof to flow inwardly into said groove to lock said cap to said nut.

9. The method of making a cap-nut comprising in providing an axially parallel collar on one end of a nut and providing said collar with a circumferential groove one side of which is substantially flush with said end, placing a sheet metal cup-shaped cap over said collar with the open end of said cap in contact with said end, said collar being relatively closely received in said cap, and then forcing said cap bodily towards said end while maintaining its exterior surface against expansion and flow of metal except in immediate proximity of said open end, whereby to upset the metal of said end into said groove to lock said cap to said nut.

10. The method of making a cap-nut comprising in forming a circumferentially grooved axially parallel collar on the end of a nut, placing a sheet metal cap over said collar and against an end surface of said nut, said collar being relatively closely received in said cap, and then subjecting the closed end of said cap to axial pressure while maintaining said cap against radial expansion over substantially its entire area whereby to cause the open end edge of said cap to be upset into said groove and secure said cap to said nut.

11. The method of making a cap-nut comprising in forming an annular groove on one end of a nut and concentric therewith, applying a cap to said nut with the open end of said cap in cooperative relation with respect to said groove, and then compressing said cap axially while maintaining its side walls against substantial expansion over substantially the entire height of said side walls whereby to upset the metal at the free edge of said cap and cause it to flow radially into said groove to lock said cap to said nut.

12. The method of making a cap-nut comprising in forming an annular groove on one end of a nut and concentric therewith, applying a knife edged cap to said nut with the open end of said cap in cooperative relation with respect to said groove, and then compressing said cap axially while maintaining its side walls against substantial expansion over substantially the entire height of said side walls, whereby to upset and thicken the edge of said cap and force said thickened edge inwardly, under the influence of said knife edge, into said groove.

13. The herein described method of making a cap nut which comprises forming a nut body with a projection on one face thereof having a peripheral groove at the base thereof, forming a cap with an open end of a size to fit over said projection, engaging said cap with a die conforming to the exterior of the cap but of less depth and pressing the open end of said cap onto the projection and the edge thereof against the face of the nut body to upset said edge and force the same into said groove to lock the cap to the nut.

In testimony whereof I sign this specification.

WILLIAM R. WILEY.