

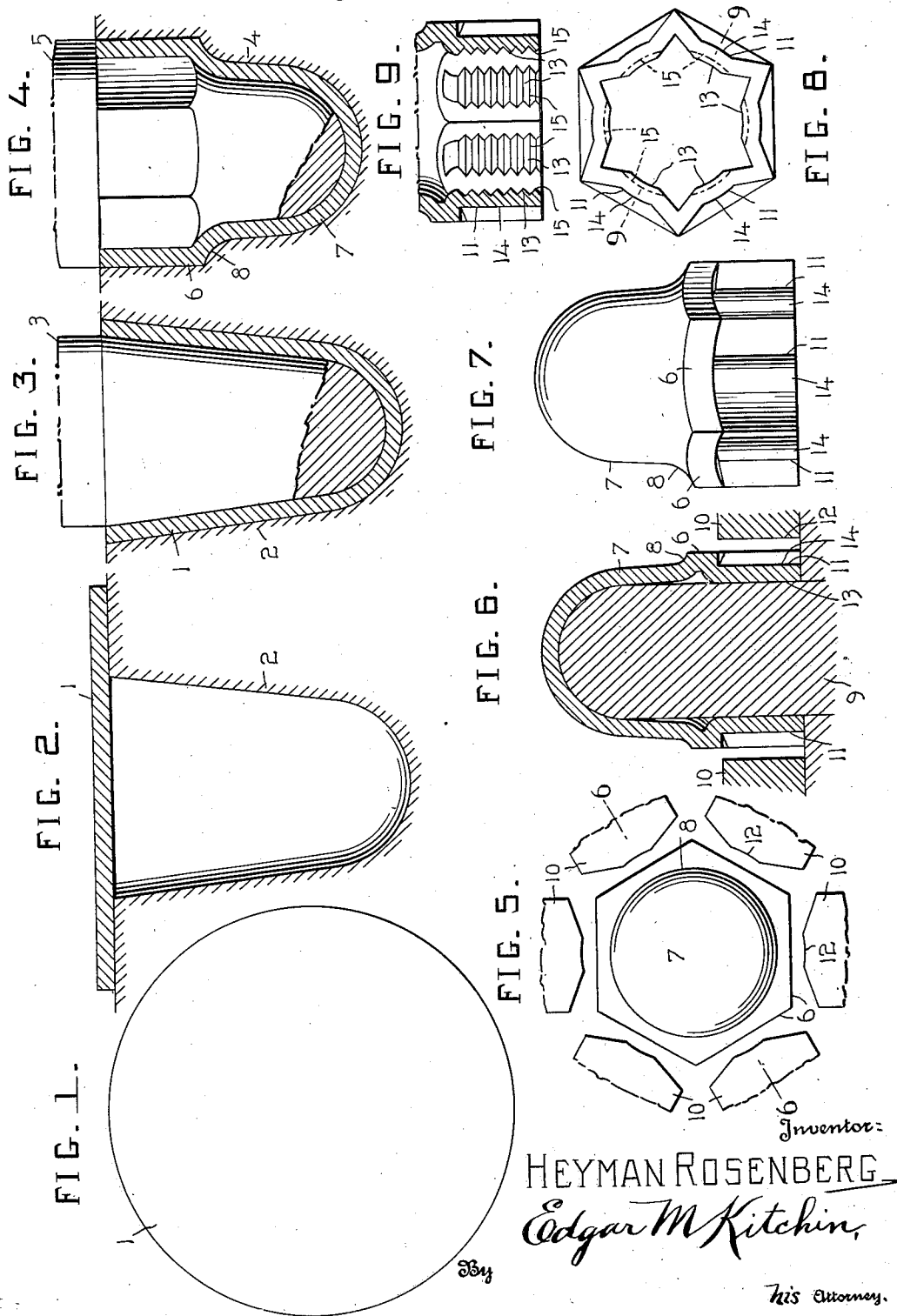
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CAPPED NUT AND ART OF PRODUCING SAME

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CAPPED NUT AND ART OF PRODUCING
SAME

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16 Claims. (Cl. 10—86)

This invention relates to improvements in the steps and combinations of steps of producing capped nuts, and to the novel combinations, constructions, and details of such nuts so produced.

5 It has heretofore been proposed to form nuts of the type commonly known as acorn or capped nuts in various ways including, in addition to the standard practice of cutting them from solid blocks of material, such modes of construction as
10 the stamping of such nuts by a cold-flowing operation of a mass of material usually beginning in the form of a sphere or ball, and the forming of such nuts by the adding of a cap or crown of stamped sheet metal to an otherwise plain nut
15 having a groove in one end into which the edge of the cap or crown is inserted and fastened. It has also heretofore been proposed to produce a nut stamped from a sheet of metal, but I am unaware of any successful attempt at producing a conventional acorn or capped nut having the usual high
20 parti-globular crown all stamped from a single sheet of metal.

It is one of the objects of the present invention to accomplish this last-named result from a single
25 sheet of metal, preferably beginning with a circular or disc sheet, but, of course, the sheet may have other peripheral contours if other marginal conditions in the finished nut are desired.

A further object is the production of a capped
30 nut from a single sheet of material, which nut shall be characterized by an unusually high degree of strength considering the inexpensiveness and reduced quantity of material employed.

A still further object is the production of a
35 thoroughly strong and dependable nut having a very attractive appearance from any angle of observation, and having the appearance of an ordinary capped nut when observed axially from a point in advance of the dome or cap.

40 With these and further objects in view as will in part hereinafter become apparent and in part be stated, the invention includes the art of manipulating by successive steps a sheet of metal to modify its contour from a substantially flat
45 condition through a series of shapes to a finally completed condition including the shape and requirements of a capped nut having a relatively high crown.

The invention also comprises such a capped
50 nut formed from such a sheet, and still further comprises such capped nut wherein certain of the surrounding walls are concaved with their inner faces arched to provide the cylindrical space to accommodate a bolt or screw on which the nut is
55 to be threaded.

The invention comprises certain other novel steps and combinations of steps and certain other novel constructions, combinations, and arrangements of parts as subsequently specified and claimed.

In the accompanying drawing,—

Figure 1 is a plan view of a blank such as is well adapted for use in the practicing of the present improved art and the production of the present improved capped nut.

Figure 2 is a vertical, axial section therethrough shown in position over a shaping matrix or female die.

Figure 3 is a similar view of the same after the blank has been pressed into the die by the die
15 plunger.

Figure 4 is a similar view of the same after the blank, shaped as seen in Figure 3, has been acted upon by a second plunger in a second female die or matrix to shape the hexagonal or other poly-
20 sided contour of the nut body, and to bring the crown of the nut into proper relation to that body.

Figure 5 is a plan view of the blank after achieving the condition of Figure 4, and shown mounted on a retainer mandrel to receive a series of lateral
25 plungers to produce concavities or depressions in certain areas of the hexagonal faces of the nut body.

Figure 6 is a view similar to Figures 2, 3, and 4 of the blank after the operation of the plungers
30 as seen in Figure 5, the plungers being shown in Figure 6 as in their retracted position after the stamping operation thereof.

Figure 7 is a view in side elevation of the completed nut blank.

Figure 8 is an end view observed from the open end of the nut and with the blank completed as a nut, having been tapped with internal threads.

Figure 9 is a fragmentary, vertical section taken approximately on the plane indicated by line
40 9—9 of Figure 8.

The preferred steps in their preferred succession comprising the present improved art may most readily be described by reference to the specific illustrations in the accompanying drawing, which description will at one and the same
45 time serve to set forth the details of the nut structure itself in its preferred embodiment.

Referring to the drawing by numerals, 1 indicates a disc of metal, such as sheet steel, sheet
50 iron, sheet brass, or other appropriate sheet material, and 2 indicates an internal die or matrix to receive the material of sheet 1 when compressed therein under the force of an internal die or plunger 3 which is caused to move axially
55

down upon the central portion of the sheet 1, as seen in Figure 2, until the sheet is compressed into and caused to smoothly fit within the die 2. When this operation has been completed, as shown in Figure 3, the plunger 3 is withdrawn and the blank 1 thus far advanced is removed from die 2 and inserted into a die or matrix 4, having its inner portion of the contour of the crown of a conventional acorn or capped nut with a high crown, and having its outer portion corresponding in cross section to the conventional, polysided body of a capped nut, usually hexagonal, and with the intermediate portion between the crown portion and the body portion curved to cause the one to blend into the other so as to give the appearance of the ordinary capped nut customarily turned out on a lathe from a solid block of material. A plunger 5 is provided for the die 4 corresponding in contour therewith, so as to be concentric thereto when inserted therein, but of sufficiently less cross section at any one point to accommodate the material of the nut blank between the plunger and the die, so that, when the nut blank is removed from the die 2 and inserted in the die 4 and then subjected to the expanding and shaping stresses of the axially incoming plunger 5, the nut blank is caused to take the shape of a conventional capped nut having the body 6, the relatively high crown 7, and the intermediate blending portion 8 blending the body into the crown.

When this operation is completed, the blank thus far shaped is removed from the die 4 and mounted endwise on the mandrel 9, which is generally cylindrical, terminating in a partiglobular end corresponding to and fitting in the crown 7. The diameter of the mandrel 9 is sufficiently less than the diameter of the body 6 to enable the operation following the application of the blank to the mandrel 9. The mandrel 9 outstands between a series of plungers 10 arranged to move laterally with respect to the body 6 of the blank, so that, when said plungers move inwardly or toward each other, they come in contact each with a face of the body 6, and the material of such face is compressed or offset inwardly, as plainly shown at 11 in Figures 6 and 7. The plungers move inward until the thus offset portions of the faces of the body of the nut are forced to engage the surface of the mandrel 9 and conform thereto transversely for as large area as is available while leaving the angles between the faces of the body 6 outstanding to their full extent as originally assumed under the action of the plunger 5. Each plunger 10 is preferably provided with a slightly arcuate terminal portion 12 corresponding in curve to the curve of the cylinder of mandrel 9, so that the inner face of each offset portion 11 is caused to assume the concaved form 13, and the corresponding outer face of offset portion 11 is given the convexed outer form 14. The plungers 10 are not of a width equal to the height or length of the respective faces 6, so that a portion of each of the flat faces comprising body 6 remains between the offset portions 11 and the curved or intermediate portion 8 of the nut blank.

The resulting blank product has the appearance generally of a hexagonal capped nut and corresponds in appearance exactly to a hexagonal capped nut when observed from the crown, as seen in Figure 5, and has the appearance of a six-pointed star when observed from the opposite end, as seen in Figure 8.

The blank is then tapped by any approved tapping operation, such as the insertion of a tap in an automatic tapping machine, and the threads of the tap form the threads 15 in those portions of the walls of the nut body comprising the concavities 13, as plainly seen in Figures 8 and 9.

The resulting product is an unusually strong, stable nut having the general appearance of a conventional capped nut, but substantially more attractive in appearance incident to the presence of the offset portions or depressions 11 and the resulting star points along the lines of the angles of the faces of the body 6. The nut is to be used for all purposes the same as any conventional capped nut however produced.

It will be observed, as clearly shown in Figures 2, 3, and 4, that the blank sheet is initially of sufficient size to provide ample material for producing walls of requisite thickness to afford sufficient stability and strength for all practical uses for which the nut is intended. To this end, also, it will be observed that the die or matrix 2 is of substantially greater depth or length than the die 4, so that, when the blank 1 is pressed by plunger 3 into smooth conformity with the walls of the die 2 and within the recess of said die, the product will be elongated thimble or shell tapering toward its rounded or parti-globular apex or flaring toward its open end. This thimble is of greater length than the final, finished nut, so that, when it is inserted in the die 4, there is ample material in the thimble to allow the walls to be expanded and certain portions of the material of the thimble to be cold-flowed to new relationships resulting in the straightened and expanded body portion. The longitudinal compression of the thimble or shell in assuming this new relation is sufficient to compensate for the lateral expansion, so that the walls of the shell of the shorter product are approximately in their finished condition the same in thickness as the walls of the thimble-like shell withdrawn from die 2. The thickness is thus ample to enable the walls to endure the action of plungers 10 while remaining sufficiently thick to insure against appreciable or objectionable weakness. The final product, the finished nut as seen in Figures 8 and 9, (a top plan thereof would be substantially identical with the showing of the nut blank in Figure 5) is a thoroughly practicable and dependable commodity available for any use to which the ordinary acorn or capped nut cut from solid block material is customarily used.

It is to be noted that by the offsetting of the portions 11, as above set forth, certain areas of the faces of the polysided body 6 remain unaltered, as plainly shown in Figures 6 and 7, which gives the appearance, when looking at the nut from the dome or cap end, of a perfect hexagonal nut, as seen in Figure 5, while at the same time, as seen plainly in Figure 6, a clearance area is left surrounded by the shell and located between the offset portions 11 and the cap portion, which clearance area is ample to accommodate the inner or free end of a tap when a tap is inserted into the blank to produce the thread 15, so that no injury is done to the cap 7 by the insertion of the tap, and this clearance also serves to allow the nut to be fully seated on an engaged bolt, the free end portions of the bolt being accommodated in such clearance area.

It will be seen by reference to the drawing that the high crown above referred to is such a cap or crown for the nut that its length (height) is practically equal to its diameter, and is at least

as great or greater than the radius of a circle touching the most outstanding portions of the body of the nut.

What is claimed is:—

5 1. In the art of forming capped nuts, the steps of forming a blank comprising shaping a sheet of metal into the form of an elongated thimble and then compressing and shortening the thimble longitudinally while expanding certain portions
10 of its wall laterally.

2. The art as claimed in claim 1 wherein said steps are accomplished in successive internal dies in cooperation with coordinating external dies.

3. The art as claimed in claim 1 wherein the
15 thimble first produced is substantially circular in cross section throughout the greater part of its length and the second step effects expansion to a polysided contour.

4. In the art of forming capped nuts, the steps
20 of forming a blank comprising drawing a sheet of metal to a substantially thimble-like shell, varying portions of the walls of the shell to a polysided condition to provide a nut body, and offsetting portions of the thus produced sides of
25 the nut body.

5. The art as claimed in claim 4 wherein the offset portions are offset inward toward the longitudinal axis of the shell.

6. The art as claimed in claim 4 wherein the
30 offset portions are offset inward toward the longitudinal axis of the shell, a portion of each offset portion being curved at its inner face to produce successive, curved portions conforming to an internal cylinder and adapted to be tapped to
35 provide a nut thread.

7. The art as claimed in claim 4 wherein the offset portions are offset inward toward the longitudinal axis of the shell, a portion of each offset portion being curved at its inner face to
40 produce successive, curved portions conforming to an internal cylinder and adapted to be tapped to provide a nut thread, and the walls of the shell at the offset portions between the curved
45 curved portions apart.

8. A capped nut blank comprising a stamped sheet metal shell pressed to a form providing a dome-like cap and a polysided body portion, the
50 sides of the said polysided body portion being offset relative to the cap and providing a clearance enclosed space beyond the body portion toward the cap for accommodating the free end of a tap such as employed to form a thread in
55 said body portion.

9. A capped nut comprising a stamped sheet metal shell pressed to a form providing a dome-like cap and a polysided body portion, the sides of the said polysided body portion being offset relative to the cap and providing a clearance enclosed space beyond the body portion toward the
60 cap for accommodating the free end of a tap such as employed to form a thread in said body

portion, and the said offset sides being formed with said thread.

10. A capped nut blank comprising a stamped sheet metal shell pressed to a form providing a dome-like cap and a polysided body portion with
5 portions of the faces of the polysided body portion offset inward and providing internal areas adapted to be formed with a nut thread.

11. A capped nut comprising a stamped sheet metal shell pressed to a form providing a dome-like cap and a polysided body portion with
10 portions of the faces of the polysided body portion offset inward and providing internal areas adapted to be formed with a nut thread, and the said areas having such a thread.

12. In the art of forming a capped nut, the steps of shaping a flat sheet blank into an elongated thimble-like shell, and subsequently
15 shaping the shell to that of a nut body and an integral dome-like cap, the said subsequent
20 shaping of the shell including longitudinal shortening and lateral expansion of parts of the shell.

13. The method of making a cap nut which comprises forming a metallic blank, shaping the
25 blank into an elongated thimble, compressing and shortening the thimble longitudinally while expanding the lower or skirt portion of its wall laterally to form a portion which is polygonal both
30 externally and internally, offsetting inwardly portions of the polygonal walls intermediate the vertices to form internal arcuate segments of less internal diameter than the internal diameter of said dome portion, and internally threading
35 said segments.

14. The method of making a cap nut which comprises forming a metallic blank of just sufficient mass to make the finished nut, shaping the blank into an elongated thimble, compressing and shortening the thimble longitudinally while
40 expanding the lower or skirt portion of its wall laterally to form a portion which is polygonal both externally and internally, offsetting inwardly portions of the polygonal walls intermediate the vertices to form internal arcuate segments of less
45 internal diameter than the internal diameter of said dome portion, and internally threading said segments.

15. A cap nut comprising a round dome portion and a skirt portion, the skirt portion being generally polygonal in contour and having the sides thereof intermediate the vertices displaced inward to form concentric arcuate segments, said segments being provided with an interrupted internal thread.

16. A cap nut having a hollow round dome portion and a polygonal skirt portion integral with the dome, said skirt portion having an interrupted internal thread, and said cap nut having a cavity above the thread large enough to receive the threaded end of a bolt to which the cap nut is applied.

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