Oct. 16, 1934. R. L. WILCOX 1,977,164

MEANS FOR MAKING ARTICLES HAVING A POLYGONAL CROSS SECTION

Original Filed May 15, 1933

Fig. 1

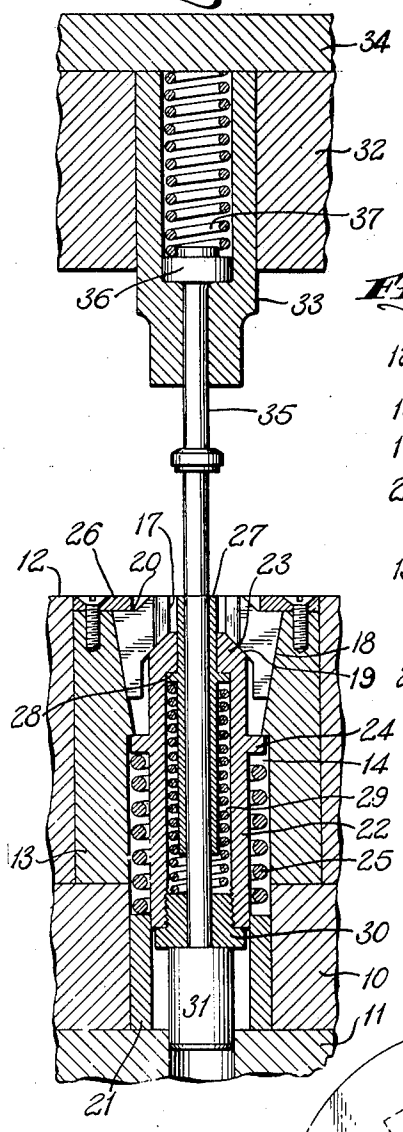


Fig. 2

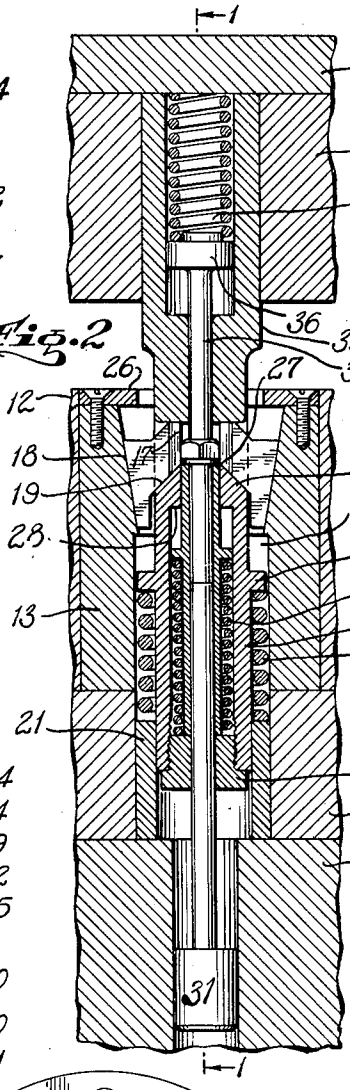


Fig. 5A



Fig. 5

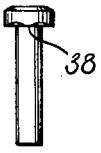


Fig. 5B



Fig. 6A



Fig. 6



Fig. 7A



Fig. 7



Fig. 4

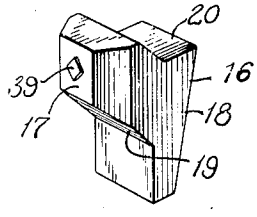
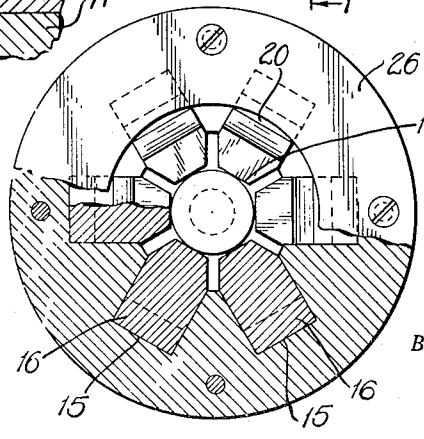


Fig. 3



INVENTOR.
RICHARD LESTER WILCOX
BY George E. Hall
ATTORNEY.

Patented Oct. 16, 1934 1,977,164

UNITED STATES PATENT OFFICE

1,977,164

MEANS FOR MAKING ARTICLES HAVING A POLYGONAL CROSS SECTION

Richard Lester Wilcox, Waterbury, Conn., assignor to The Waterbury Farrel Foundry and Machine Company, Waterbury, Conn., a corporation of Connecticut

Original application May 15, 1933, Serial No. 671,165. Divided and this application September 2, 1933, Serial No. 687,983

6 Claims. (Cl. 10—24)

This invention relates to new and improved means for making articles in a cold state having a polygonal cross section, particularly bolts, nuts, rivets, screws and the like.

This application is a division of an application filed May 15, 1933, by this applicant, and designated by the Serial Number 671,165.

In the co-pending application there is shown and described the means and method for making articles having a polygonal cross section by a cold process from a substantially cylindrical blank, by upsetting the same to form a blank of greater diameter and thereafter applying lateral pressure thereto initiated by the axial movement of other parts, so as to produce the desired polygonal cross section.

This present invention particularly relates to the means and the apparatus by which this latter pressure is applied.

As illustrated and described herein, the invention is applied in the manufacture of an article having an hexagonal cross section, but not limited, however, to such shape.

In the drawing, wherein like characters of reference indicate like parts in the several figures;

Fig. 1 is a transverse sectional view of one form of the improved apparatus, with a blank about to be presented thereto, and before operation thereon by the means herein disclosed;

Figure 2 is a similar view, with the parts in the position occupied by them after the polygonal shape has been formed on the blank;

Figure 3 is a fragmentary plan view of the forming die;

Figure 4 is a perspective view of one of the pressure dies;

Figures 5, 5A and 5B are views of one form of blank that may be presented to the mechanism herein disclosed; Figures 6 and 6A are views of another form of blank that may be so presented; and

Figures 7 and 7A are views of the completed blank.

In this invention the polygonal shape is acquired by pressure applied to the perimeter of the head of the blank as distinguished from endwise pressure, thereby producing a head of superior quality with a chamfered face and with side faces that have an attractive finish and the metal thereof toughened by its compression in the forming die. The resulting product is adapted for use under more severe conditions than is possible with bolt heads made under the old process.

In the embodiment of the invention, one form of which is illustrated in the drawing, 10 designates the bed as associated with the body 11 of the machine, upon which the die block 12 is secured in any preferred manner. Within this latter is a stationary forming die which is constructed with a body member 13. Through the body member is an opening 14 of plural diameters, in the walls of the smaller diameter of which are a plurality of radial slots 15. The rear walls of these slots, six in number, are at an angle to the axis of the opening 14, and as the apparatus is shown, are designed to produce an article that is hexagonal in cross section. A greater or less number of faces will correspondingly increase or reduce the number of slots. Movable in each slot is a pressure die 16 which has a flat inner face 17 of substantially the width of each face of the polygonal portion of the blank, each of the faces being in a plane substantially parallel to the axis of the opening 14. On each die opposite its pressure face is a cam face 18, which rides against the angular wall of the slots 15, an inner cam face 19 and a stop shoulder 20. Movably mounted within the opening 14 and a concentric opening in the bushing 21 is a sleeve 22, having a coned head 23, the angle of inclination of which is substantially the same as that of the cam faces 19 which engage therewith. Surrounding the sleeve 22 and between a collar 24 thereon and the bushing 21, is a coil spring 25 which maintains a constant tension upon the sleeve to move it toward the exposed face of the die block.

Secured to the body member 13 is a plate 26, against which the stop shoulders 20 engage when the pressure dies 16 are in their outer position, that is, preferably with the ends thereof substantially flush with the exposed face of the die block 12.

Within the sleeve 22 is a guide sleeve 27 which engages a shoulder within the bore of the sleeve 22 and limits the relative movement thereof in one direction. This position being shown and illustrated in Figure 1, wherein the face of this guide sleeve is substantially flush with the exposed face of the die block 12. Surrounding the sleeve 27, within the bore of the sleeve 22, and between the shoulder 28 and the nut 30, is a spring 29 that is much lighter than the spring 25.

Movable within the nut 30 and sleeve 27 is a knockout pin 31.

Opposite the die block is a punch holder 32, in which is mounted a punch carrier 33, which abuts against a backing plate 34. In the punch carrier 33 is a pressure pin 35 having a head

36 thereon, and between which and the backing plate 34 is a spring 37.

In practice, the die block and its associated parts are stationary and the punch holder 32 is moved toward and away therefrom in any manner well known in the art. By reason of this motion pressure pin 35 engages the blank in line therewith in timed relation with other parts.

In Figure 1 the several parts constituting the forming dies, punch carrier 33 and associated parts are in their relative positions as the blank is presented thereto, and still held by the transfer devices (not shown).

As the punch holder 32 moves toward the die block 12, the blank is pushed into the sleeve 27 by the pressure pin 35 and the underside of the head thereof engages the end of the sleeve 27. Further continued movement compresses the relatively light spring 29 until the inner end of the sleeve 27 abuts against the nut 30, at which time the opposite end of the sleeve is substantially flush with the face of the coned head 23, substantially as shown in Figure 2. The head of the blank is now positioned between the pressure faces of the dies 16, and the spring 37 is compressed during the further movement of the punch carrier until the end of the latter engages the outer face of the dies 16. Thereafter, continued movement of the punch carrier 33 imparts movement to the pressure dies 16. These dies, under this action, move inwardly toward the axis of the blank by reason of the engagement of the cam faces 18 with the walls of the angular radial slots 15. Endwise pressure is also thus applied to the sleeve 22 through the engagement of the cam faces 19 with the coned head 23. During the inward movement of these dies 16, the inner pressure faces 17 are forced against the outer wall of the head of the blank, causing the metal to flow by reason of such pressure until the inward limit of movement of the dies 16 is reached, that is, until the angular walls on each side of the pressure faces contact with each other, thus completely shaping the head.

As pressure is applied by the dies 16 and the metal flows as a result thereof both in an up and a down direction, this flow is not resisted to any appreciable extent. This results from the receding of the pressure pin 35 into the punch carrier 33 and the free space above the coned head. Such space is provided through the engagement of the cam faces 19 with the coned head 23, which moves the sleeve away from the head of the blank against the tension of the spring 25 faster than the metal flows. As the punch carrier 33 is withdrawn, the spring 25 forces the sleeve 22 outwardly, thus moving the pressure dies away from the axis of the blank and out of engagement with the head thereof. At the same time the knockout pin 31 projects the blank out of the guide sleeve 27, which moves outwardly relatively to the sleeve 22 by the tension of the spring 29. When the guide sleeve 27 is in its outer position, determined by the engagement of the collar 24, with the body member, the outer end of the guide sleeve 27 is flush with the exposed face of the die block 12. The transfer mechanism (not shown), now engages the blank and carries it to another station for further operations thereon. The sleeve 27 provides a convenient means for receiving and guiding the blank into the forming die. It is particularly advantageous for blanks with short shanks, because the outer end thereof is flush with the exposed face of the die block 12, while the coned head 23 is distant therefrom.

The open space between the coned head and the face of the die block is bridged by the sleeve 27. Thus there is produced, by the means and mechanism described and disclosed, a blank with a head shaped by lateral pressure, with a chamfered face. The lateral pressure applied by this apparatus produces a polygonal shaped head without the application of subsequent endwise pressure as where the head is preliminarily fluted by lateral or other means.

In Figure 5 is shown a blank formed with the underside of the head having irregularities, the high points of which are substantially opposite the corners of the polygon where there is less tendency to lengthwise flow than at the centers of the flat faces which are opposite the depressions. These depressions are entirely removed in the apparatus shown herein and the metal is caused to flow so that it is substantially flush with the high points 38, thus producing a flat as distinguished from an irregular surface.

It is desirable in some cases that articles of the character herein referred to should be identified by a symbol, trade-mark or the like, whereby to indicate the origin of manufacture, or to indicate the character of the material of which the article is made, and for other reasons. Attempts have been made to accomplish this result by forming the symbol on the top face of the article. This is unsightly and destroys its neat appearance, and if the symbol is raised rather than impressed, it is further objectionable, because it forms an obstruction upon which cloth, waste, or the like will catch and cling when the articles and adjacent parts are being cleaned.

Again, in the manufacture of such articles, symbols or marks have been utilized in the process of manufacture to indicate the character of material of which the article is made. In such cases these symbols are removed before the article is finished, so that the means of identification are thereafter lost.

In this invention the heretofore mentioned objections and others are eliminated and all of the advantages of a symbol or a trade-mark are preserved. This is accomplished by providing the pressure face of one or more of the dies 16 with an impression face 39, shown in Figure 4 as diamond shape. Obviously any other design may be used equally as well, the shape disclosed being merely for the purpose of illustration. The impression face 39 leaves a corresponding permanent impression in the flat face of the article as the die 16 is withdrawn therefrom. This result is accomplished without the aid of additional parts or operations. An impression upon a side face of an article as produced in this invention is not unsightly and does not destroy the neat and pleasing appearance of the article. Neither does it interfere with the grip of the article by a wrench or the like.

The above disclosure is given merely as one embodiment of the present invention, which is not to be considered as limiting the invention, the scope thereof being determined by an understanding of the present disclosure as one embodiment thereof and as particularly pointed out in the appended claims.

What I claim is:

1. In mechanism of the character described; a forming die; a plurality of pressure dies radially movable therein; a sleeve movable within the die that imparts movement in one direction

to the pressure dies; a guide sleeve or the like movable within the sleeve, the outer end thereof in its out position being beyond the end of the sleeve.

2. In mechanism of the character described; a forming die, a plurality of pressure dies radially movable therein; a sleeve movable within the die, that imparts movement in one direction to the pressure dies, said sleeve in its out position being spaced from the end of the forming die, and means for bridging the space between the sleeve and the blank as it registers therewith, comprising a guide sleeve having relative movement within the sleeve.

3. In mechanism of the character described; a forming die, a plurality of pressure dies radially movable therein; a sleeve movable within the die, that imparts movement in one direction to the pressure dies, said sleeve in its out position being spaced from the end of the forming die, and means for bridging the space between the sleeve and the blank as it registers therewith, comprising a guide sleeve having relative movement within the sleeve and being moved into the sleeve by pressure applied through the blank.

4. In mechanism of the character described; a forming die, a plurality of pressure dies radially movable therein; a sleeve movable within the die, that imparts movement in one direction to the pressure dies, said sleeve in its out position being spaced from the end of the forming die, and means for bridging the space between the sleeve and the end of the blank as it registers therewith, comprising a guide sleeve having relative movement within the sleeve, and moved outwardly by a resilient element.

5. In mechanism of the character described; a forming die, a plurality of pressure dies radially movable therein, a sleeve movable within the die, that imparts movement in one direction to the pressure dies, a guide sleeve within the sleeve that receives and supports the blank, and a spring or the like for moving the guide sleeve outwardly within the sleeve.

6. In mechanism of the character described; a forming die, a plurality of pressure dies radially movable therein, a sleeve movable within the die, that imparts movement in one direction to the pressure dies, a guide sleeve within the sleeve that receives and supports a blank, a nut connected with the sleeve, and a spring or the like between the guide sleeve and the nut for moving the guide sleeve outwardly within the sleeve.

RICHARD LESTER WILCOX.