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MEANS AND METHOD FOR FORMING BLANKS

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2 Sheets-Sheet 2

*Fig. 3.*

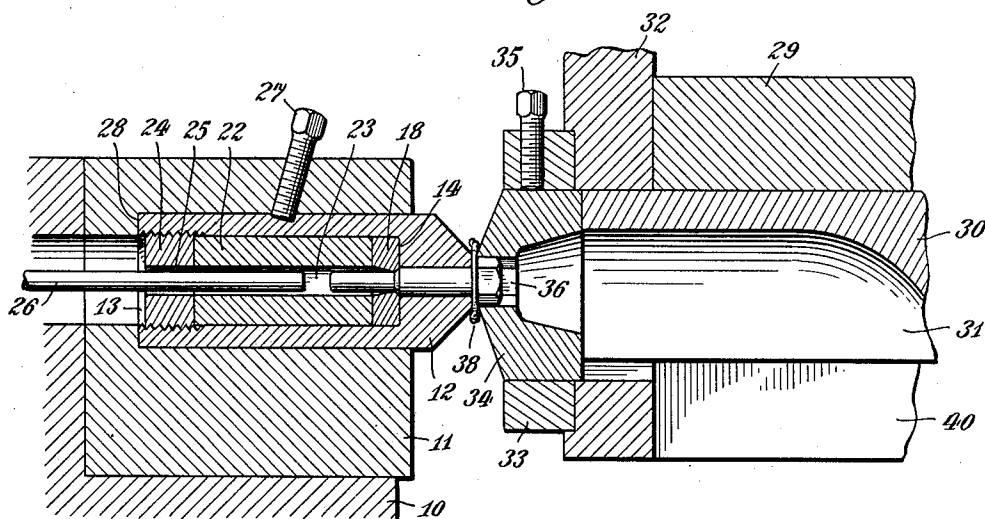
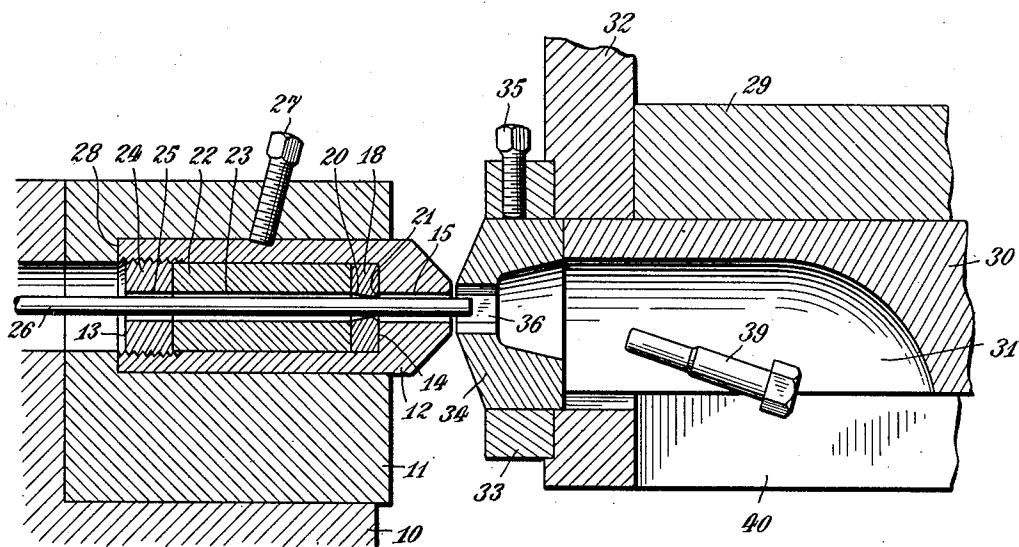


*Fig. 4.*



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## MEANS AND METHOD FOR FORMING BLANKS

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This invention relates to new and improved means and method for trimming blanks and it is the principal object thereof to extrude the shank of a blank and trim the head thereof at a single operation.

Among other improvements and objects of the invention may be recited the provision of means for insuring a predetermined length of the shank of the blank between the extruded portion and the head thereof; to provide means whereby the extrusion die may be rigidly and unyieldingly supported irrespective of the thickness thereof, and in these and other ways, to produce the desired result in the minimum time and in a single operation.

The details and arrangement of the parts used in my new and improved means and method will be apparent from an inspection of the accompanying drawings, in connection with the description hereinafter contained, and wherein a preferred embodiment of the means is disclosed for the purpose of imparting an understanding of the same.

In the drawings, wherein like reference characters indicate corresponding parts in the several figures:

Figure 1 is a sectional elevation of a portion of a trimming machine, arranged to embody the features of the invention, with a blank presented between the die and punch before any operations are performed thereon;

Figure 2 is a similar view with the blank projected into the punch and the die in contact with the head;

Figure 3 is a similar view with the die and punch closer together and the trimming of the head being partially but substantially completed; and

Figure 4 is a similar view showing the blank completely trimmed and extruded, and being ejected from the die and punch.

Referring to the drawings, 10 indicates a fixed part of the trimming machine, or the like, 11 the punch holder, 12 the punch having a bore 13 in one end thereof which terminates at its bottom in a shoulder 14 between which and the opposite end of the punch is an opening 15 of substantially the same diameter as the blank 16. A screw 27 provides a

convenient means for rigidly securing the punch within the holder 11 with its rear end abutting against a shoulder 28.

The blank herein shown, being only one of the many forms of blanks that may be successfully subjected to my improved method, is provided with a circular head 17. Frequently these blanks are formed with heads of substantially the same cross section as the finished head and the blanks are completed by trimming the faces thereof.

Within the bore 13 is an extrusion die 18, which is formed with an opening 19, the diameter of which is substantially the same as the outside diameter of the extruded portion of the blank and upon opposite sides thereof are outwardly flaring conical faces 20 and 21, the latter being preferably shorter than the former, in fact just sufficient to make a proper shoulder between the two diameters of the shank at the junction point thereof. If it is desired that this shoulder be sharp instead of slightly flaring, the face 21 may be omitted.

The extrusion die is held rigidly within the punch by the sleeve 22 therethrough, backed up by a nut 24 threaded in the outer end of the bore 13, and through the opening 23 and the opening 25 in the nut, projects the knockout rod 26.

As the extrusion die 18 wears, it may be readily removed from the punch, reground, reshaped, and returned to its former position in the punch against the shoulder 14. Therefore, irrespective of its thickness, the position of the extrusion die 18 will always be constant relative to the end of the punch.

The gate of the trimming machine is designated 29, within which is a backing block 30 having an opening 31 therein. Connected with this gate is the die plate 32, upon which is the die holder 33, and within which is the die 34 secured by the screw 35 or the like. The opening 36 in this die is substantially the same shape in cross section as that of the finished head of the blank.

The blanks are successively presented with their axes coincident with the openings in the die 36 and the opening 15 in the punch by transfer mechanism 37, which is withdrawn

as soon as the shank of the blank has been projected into the punch a sufficient distance to support it. The detail construction and operation of the transfer mechanism is not important in the description of this invention, and therefore, is not shown or described more in detail herein.

In operation, the blanks are presented between the punch and die substantially as shown in Figure 1, and during the movement of the parts the open space between the punch and die is reduced until they are in the position substantially as shown in Figure 2. During this time the pressure upon the blank is such that the shank is forced through the opening in the extrusion die 18, and its diameter reduced thereby. When this extrusion process is completed, the underside of the head of the blank is against the outer face of the punch, thus fixing accurately the length of that portion of the shank of the blank that remains of the original diameter. Thereafter, the parts are further moved so that the punch and die occupy the relative position substantially as shown in Figure 3, and during this further movement the head of the blank is trimmed by reason of its projection into the opening in the die. At the completion of this operation a very limited space is left between the faces of the die and punch, which is sufficient, however, to permit the chip or shaving formed around the head to pass therebetween and form a fin 38. While the punch and die are in these relative positions, the knockout rod 26 moves forwardly, engages the end of the shank and projects the blank through the opening in the die and the finished product 39 drops through the openings 31 and 40. The fin 38 is trimmed off the head, thus completing the trimming operation during the return movement of the head through the die. By this improved means and method the blank is both extruded and trimmed at one and the same operation. The length of the non-extruded portion of the shank is fixed definitely and accurately and if the extruded portion of the shank should be slightly lengthened or shortened, according to the density of the material of which the blank is made, it does not affect the length of the shank retaining its original diameter. It is desirable that the length of the non-extruded portion of the blanks should be accurate, otherwise damage is liable to ensue to the thread rolling dies if threads are rolled on the extruded portion.

What I claim as new and desire to secure by Letters Patent, is:—

1. In means for forming blanks; a punch; an extrusion die therein; a die, which projects the shank of the blank into the punch and extrusion die and trims the head of the blank; and adjustable means for holding the extrusion die against a wall in the punch,

comprising a sleeve and a nut threaded into the punch.

2. In means for forming blanks; a punch having a bore therein; an extrusion die, a sleeve within the punch, and an exteriorly threaded nut within the bore of the punch, said sleeve and punch holding the extrusion die against one wall of the bore in the punch; and a die which projects the shank of the blank into the punch and extrusion die and trims the head of the blank.

3. The method of making screws and bolts which consists in bringing the head of a previously headed blank into contact with a head trimming die, forcing a die having a constricted portion over a portion of the shank of the blank to extrude the metal of such portion and thereby lengthen and reduce the diameter of the same, and continuing the relative movement of the said dies to force the head of the blank into the trimming die and thereby trim the same.

4. In combination in a machine for trimming headed blanks, a punch holder, a tubular punch having an opening of a size to permit the entrance of the shank of the bolt to be trimmed, detachably mounted in the punch holder, an extruding die having a tapering mouth, in the punch holder back of said punch, and adapted to reduce the diameter of the shank of the bolt to be trimmed, and a backing block held in the punch holder back of the extruding die.

5. In combination in a machine for trimming headed blanks, a punch holder, a tubular punch having an opening of a size to permit the entrance of the shank of the bolt to be trimmed, detachably mounted in the punch holder, an extruding die having a tapering mouth in the punch holder back of said punch and adapted to reduce the diameter of the shank of the bolt to be trimmed, and a backing block held in the punch holder back of the extruding die, said punch, extruding die, and backing block being separably secured together and associated with and removed from the punch holder as a unit.

6. In combination in a machine for trimming headed blanks, a punch holder, a tubular punch having an opening of a size to permit the entrance of the shank of the bolt to be trimmed, detachably mounted in the punch holder, an extruding die having a tapering mouth in the punch holder back of said punch and adapted to reduce the diameter of the shank of the bolt to be trimmed, and a backing block held in the punch holder back of the extruding die, the front end of the punch holder forming an anvil to support the head of the blank while being trimmed.

7. The method of making screws, bolts and the like, which consists in bringing the head of a previously headed blank into contact with a head trimming die, forcing a die having a constricted portion over a portion

of the shank of the blank to extrude the metal of such portion and thereby lengthen and reduce the diameter of the same, and continuing the relative movement of the said dies to force the head of the blank into the trimming die and thereby trim the same, during which movement the underside of the head is in contact with a fixed face in advance of the die having a constricted portion.

8. The method of making screws, bolts and the like, which consists in bringing the head of a previously headed blank into contact with a head trimming die, forcing a die having a constricted portion over a portion of the shank of the blank to extrude the metal of such portion and thereby lengthen and reduce the diameter of the same, and continuing the relative movement of the said dies to force the head of the blank into the trimming die and thereby trim the same, during which relative movement the blank and the die, having the constricted portion, maintain a constant relative position.

In testimony whereof, I have hereunto affixed my signature.

RICHARD LESTER WILCOX.