

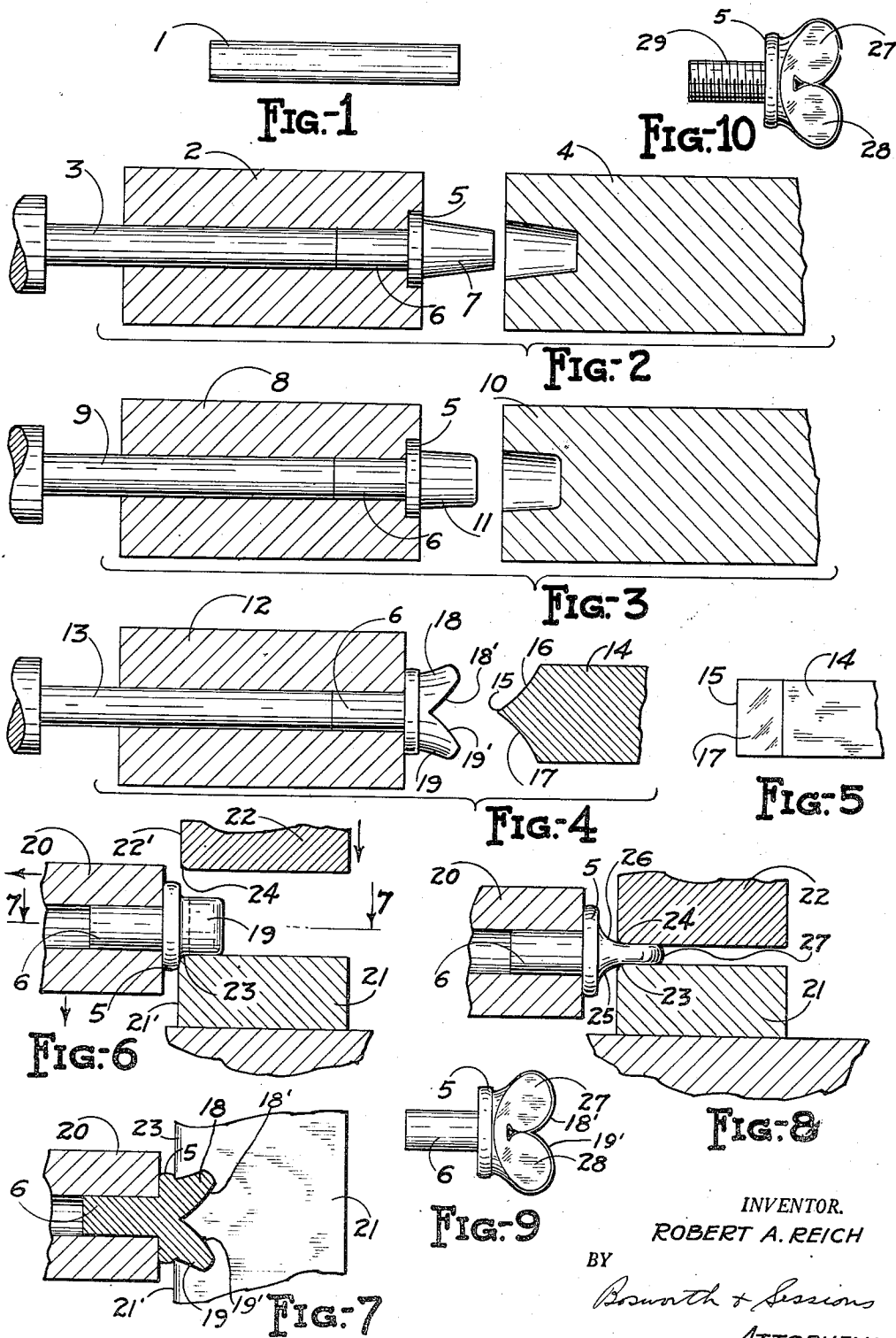
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THUMB SCREW AND METHOD OF MAKING SAME

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THUMBSCREW AND METHOD OF MAKING
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This invention relates to certain improvements in thumb screws or the like and to an improved method of making same.

In the manufacture of thumb screws, wing nuts, or the like, the head portion which is adapted to be grasped by the hand of the user may take various forms such as a flattened oval disc or a pair of laterally extending wings or webs. In a well designed article of this type it is desirable to have the overall width or spread of the head or wings sufficient to enable the user readily to tighten or loosen the threaded portion. So far as I am aware, prior to my invention thumb screws have not been made with a wing span as great as can be obtained by my cold forming procedure, except by casting or hot forging.

In the present emergency hot forging equipment and casting facilities are at a premium and it is therefore one of the objects of my invention to provide a method of making thumb screws or the like by cold forging operations which can be effected in punch presses or other machines not so greatly in demand.

Other objects of my invention are: The provision of a simple and effective method of producing thumb screws or the like by cold forging which results in an exceedingly rugged and easily operated screw having sufficient wing spread to permit effective hand tightening; the provision of an economical and rapid method of making winged articles by cold forging from rod or wire; the provision of a method of making thumb screws wherein a blank is employed having the diameter which is required to produce the desired thread size without change of said diameter, and a head having wings of the desired width is formed on the blank by cold forging without any forming operations, other than threading, on the screw portion; the provision of a thumb screw or the like which is characterized by having the grain structure resulting from cold forging; and, the provision of a thumb screw or the like which is exceedingly rugged and is so contoured as to assist in the rapid and effective manual tightening or loosening thereof.

The above and other objects of my invention will appear from the following description of one form of my improved thumb screws and a preferred procedure for making same by cold forging, reference being had to the accompanying drawing in which:

Figure 1 is a detached side elevation of a blank, cut from rod or wire stock, from which my improved thumb screw may be made.

Figure 2 illustrates the cold forging dies which carry out the first step of my process, the head end of the blank having been given its first upset.

Figure 3 is a view similar to Figure 2 but illus-

trating the dies for the next step, the screw being shown as it appears after the second upsetting operation.

Figure 4 illustrates the head splitting and flaring knife and shows the screw as it appears after the upset head is split and flared.

Figure 5 is a fragmentary side elevation of the splitting knife shown in Figure 4.

Figure 6 illustrates the flattening dies in cross-sectional side elevation, a split blank being positioned for flattening of the wing portions and the dies being retracted.

Figure 7 is a horizontal cross-sectional view taken substantially on line 7-7 of Figure 6.

Figure 8 is a view similar to Figure 6 but showing the flattening dies or plungers in advanced position after they have flattened the split upset head to form the wings.

Figure 9 illustrates a screw as it appears after removal from the flattening dies shown in Figure 8.

Figure 10 is a side elevation of the finished thumb screw after the shank portion has been threaded.

In making my improved thumb screws, blanks consisting of a length of round rod or wire of the desired material and proper diameter are employed. In Figure 1 such a blank is illustrated at 1 and it will be understood that the original diameter of this blank is such that the threads on the finished screw may be rolled or cut thereon without further sizing of the diameter of the blank 1.

In Figure 2 a blank such as that illustrated in Figure 1 has been inserted into the die 2, the usual knock-out rod 3 being employed to locate the blank and to remove the piece after the upsetting operation. The upsetting die 4 is shown in partially retracted position and it will be understood that the parts are illustrated as they appear just after a forging stroke has been completed. The blank 1 has been upset to form a flange 5, a shank portion 6 which retains the original diameter of the blank 1, and a tapered upset head 7.

This blank is next placed in the die 8, equipped with a knock-out rod 9, and the upsetting die 10 completes the formation of the head into the general shape shown at 11. During this operation the flange 5 and the shank 6 preferably remain substantially unchanged.

After the head has been formed by the die 10 the blank is supported in another die 12, having a knock-out rod 13, and the outer end of the head 11 is struck by a splitting and flaring knife 14 which has a cutting edge 15 and diverging side portions 16 and 17. This knife 14 is advanced toward the die 12, preferably to a point just short of the flange or collar 5, and splits the head 11 substantially on its axial center line.

At the same time the split head is flared outwardly into the diverging half portions 18 and 19. As illustrated, the angle between the inner surfaces 18' and 19' of the portions 18 and 19 is approximately 90° and, although I have found that splitting to this angle results in a satisfactory thumb screw, it will be understood that if it is desired to change the contour of the finished wings this angle may be varied as desired. It will also be understood that winged articles can be made without the flange 5 and/or without upsetting the blank to form the enlarged part 11. In such a procedure one end of the blank is split inwardly the desired distance and the split portions flared as described above.

In Figure 6 the split blank has been inserted in a supporting holder 20 with the split head portions 18 and 19 disposed between a fixed bottom die 21 and a movable top die 22. It will be observed that the inner surfaces 18' and 19' of the flared head portions 18 and 19 are disposed substantially parallel to the path of movement of the die 22. The tubular holder 20 in which the shank of the split blank is inserted is supported so that the blank and holder may move freely both downwardly in the direction of movement of the top die 22 and in a direction, substantially normal to said direction of movement, away from the dies 21 and 22. The arrows in Figure 6 indicate these directions of movement and the holder 20 may be supported by the hand of the operator or other suitable resilient means.

The blank is located by placing the flange 5 against the edge 21' of the bottom die 21, and the edge 22' of the movable top die 22 is aligned with the edge 21'. When the die 22 is moved downwardly into its final position the holder 20 and the blank are also moved downwardly and away from the dies 21 and 22 in a direction at right angles thereto into the position shown in Figure 8. This movement of the blank and holder occurs on account of the pressure of the dies 21 and 22 on the split portions of the blank and because no substantial resistance is offered to movement of the holder 20 and the blank. Thus, although the corners 23 and 24 of the dies 21 and 22 are preferably only slightly rounded, relatively large radius fillets 25 and 26 will be formed between the flange 5 and the flattened wings 27 and 28 of the article. Furthermore, by the above described floating support for the blank during the flattening operation, the wings 27 and 28 are automatically centered relative to the longitudinal center line of the blank.

By the very simple procedure just described wings can be formed having a spread greater than can be obtained by other cold forging procedures with which I am familiar. Furthermore, the strengthening fillets 25 and 26 are formed without the use of dies shaped to the contour of these fillets. With my improved procedure it is unnecessary to corrugate the surfaces of the dies 21 and 22 in a direction at right angles to the longitudinal axis of the blank, and, in fact, the dies 21 and 22 may be ribbed or corrugated in the general direction of the longitudinal axis of the blank, thus forming ribs on the wings which tend to prevent the operator's fingers from sliding off of the wings when the article is in use. Although the illustrated thumb screw is provided with a flange 5, and although the head portion has been upset from the original stock, it will be understood that my method may be employed to produce wide wing spread thumb screws or the like which do not have a flange between

the wings and the shank or which do not even have the head upset. The fillets 25 and 26 extend entirely across the flange 5 on opposite sides of the head formed by the wings 27 and 28 and not only form an exceedingly strong connection between the wings 27 and 28 and the flange 5 but also form a comfortable and natural grip for the thumb and fingers of the user of the screw.

As is best seen in Figure 9, during the flattening operation illustrated in Figures 6, 7 and 8, the portions 18 and 19 are flattened so that their outer peripheries move outwardly and the inner edges 18' and 19' come together and contact each other. Thus a pair of tightly abutting wing portions 27 and 28 are formed.

After the head is finished as described above, the shank 6 may be threaded either by roll threading or by thread cutting operations. The roll threading procedure is preferred and the finished thumb screw is seen in Figure 10 with the threaded shank indicated at 29.

It will be understood that it may be found desirable to anneal the blanks at one or more stages of the manufacturing procedure. With certain types of material it may be desirable to anneal the blanks between the steps shown in Figure 3 and Figure 4. Also the finished product may be annealed after threading if it is deemed necessary.

From the above description of a preferred procedure for making an improved thumb screw or similar winged article, it will be observed that the shank portion of the article is not subjected to forging operations. Moreover, the flange 5 which is disposed at the end of the shank is subjected only to a single cold forging operation. My novel step of splitting and flaring an end portion of the blank and then flattening the flared parts to form a pair of wings having the necessary width makes possible the production by cold forging of a thumb screw or the like having a relatively wide over-all wing spread. Furthermore, the finished product has an internal grain structure and an external physical form, due in some degree to the floating support of the blank during flattening of the wings, which results in a strong, easily operated, and attractive-appearing thumb screw.

Although I have described my process only as applied to the production of thumb screws, it will be seen by those skilled in the art that a number of the steps employed, particularly the head splitting and flattening steps, may be used in the production of wing nuts or other articles. The illustrated embodiment of my invention has been set forth in considerable detail but it will be understood that variations and modifications may be made in the procedure followed, and in the form of the screw or the like produced, without departing from the spirit of my invention, and I do not, therefore, wish to be limited to the exact form of the article and sequence of procedural steps described herein but claim as my invention all embodiments thereof coming within the scope of the appended claims.

I claim:

1. An article of the type described including a shank portion, a winged head portion at one end of said shank, said head portion comprising a pair of wings abutting at their inner edges and extending diametrically of said shank in opposite directions, and fillets between said wings and shank on each side of said wings.

2. A cold forged thumb screw of the type de-

scribed including a shank portion, a winged head portion at one end of said shank, said head portion comprising a pair of oppositely extending substantially identical wings disposed diametrically of said shank, and fillets between said wings and shank on each side of said wings and extending in the same direction as said wings and substantially normal to the axis of the shank, each of said fillets being substantially continuous throughout its length.

3. An article of the type described having a shank portion, a flange portion at one end of said shank portion, and a winged head portion on the opposite side of said flange from said shank, said head portion comprising a pair of wings abutting at their inner edges and extending diametrically of said flange in opposite directions and fillets between said wings and flange on each side of said wings, said fillets extending from adjacent the edge of said flange to said wings.

4. A thumb screw or the like having a threaded shank portion, a flange of greater diameter than said threaded shank portion and disposed at one end thereof, and a pair of wing portions extending diametrically of said flange in opposite directions, said wing portions having fillets on each side thereof, said fillets extending between said flange and said wing portions across substantially the entire width of said flange.

5. A thumb screw or the like having a threaded shank portion, a flange of greater diameter than said threaded shank portion and disposed at one end thereof, and a pair of wing portions extending diametrically of said flange in opposite directions, said wing portions having fillets on each side thereof, said fillets extending between said flange and said wing portions across substantially the entire width of said flange, and said wing portions being characterized by a grain structure resulting from upsetting, splitting and flattening while the metal is cold.

6. The method of making a thumb screw or the like having a threaded shank and a flange or collar portion and having a pair of oppositely extending wings formed integrally with said flange portion which includes the steps of forming a blank from stock having substantially the diameter required for threading the shank, upsetting one end of said blank by cold forging to form a flange of greater diameter than the shank portion and an upset head, said shank being of smaller diameter than said flange and said head being of greater diameter than said shank, splitting said head portion substantially on its axial center line to a point adjacent said flange, and exerting pressure on opposite sides of said split head portion simultaneously in a direction substantially parallel to the inner sides of the split head portion to form a pair of adjoining wing members.

7. The method of making a winged thumb screw or the like which includes the steps of upsetting one end of a cylindrical blank to form a head portion of larger diameter than the cylindrical blank, splitting said head portion longitudinally into two parts, flaring said parts away from each other, and flattening said flared parts by pressure applied substantially at right angles to the direction in which said parts are flared.

8. The method of making a winged article of the type described which includes the steps of

forming a head portion on the article, splitting said head portion on its longitudinal center line to form two parts, flaring apart said two parts, and flattening said flared apart parts by pressure applied substantially at right angles to the direction in which said parts are flared.

9. The method of making a thumb screw or the like which includes the steps of upsetting the end of a cylindrical blank, of the proper diameter to permit forming the threads of the finished screw thereon, to form a head portion of greater diameter than said blank while leaving a shank portion of the same diameter as said blank, forming a flange of greater diameter than the base of said head portion between the head and the shank, splitting said head portion longitudinally on its axial center line to a point adjacent said flange and simultaneously spreading apart the split portions of said head, and flattening said split head portions to form oppositely projecting wings and fillets on opposite sides of said wings between said wings and said flange.

10. The method of making a thumb screw or the like which includes the steps of upsetting the end of a cylindrical blank, of the proper diameter to permit forming the threads of the finished screw thereon, to form a head portion of greater diameter than said blank while leaving a shank portion of the same diameter as said blank, forming a flange of greater diameter than the base of said head portion between the head and the shank, splitting said head portion longitudinally on its axial center line to a point adjacent said flange and simultaneously spreading apart the split portions of said head, and flattening said split head portions to form oppositely projecting wings and fillets on opposite sides of said wings between said wings and said flange, all of said forming steps being performed while the metal of the article is cold.

11. The method of making a winged article of the type described which includes the steps of splitting one end of an elongated blank in a direction longitudinally of the blank, flaring apart the split portions of the blank, and flattening said flared parts by pressure applied transversely of the blank to form oppositely extending wing portions.

12. The method of making a winged article of the type described which includes the steps of splitting one end of an elongated blank in a direction longitudinally of the blank, flaring apart the split portions of the blank, and flattening said flared parts by pressure applied transversely of the blank while permitting movement of said blank both in the direction of applied pressure and normal thereto.

13. The method of making a winged thumb screw or the like which includes the steps of upsetting one end of a cylindrical blank to form a head portion of larger diameter than the cylindrical blank, splitting said head portion longitudinally into two parts, flaring said parts away from each other, and flattening said flared parts by pressure applied substantially at right angles to the direction in which said parts are flared while said blank is permitted to move in the line of direction of application of said pressure and in a direction substantially normal to said direction of application of said pressure.

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