Dec. 5, 1939. T. A. O'LEARY 2,182,092

SCREW AND THE METHOD OF MAKING SAME

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Fig. 1

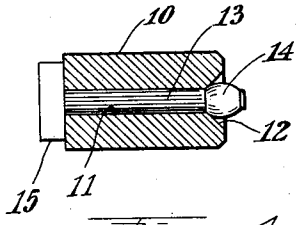


Fig. 2

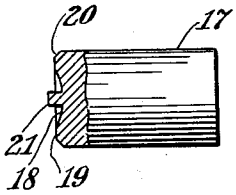


Fig. 3

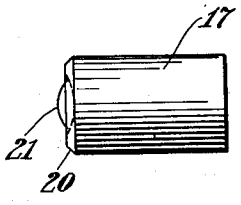


Fig. 4

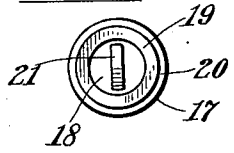


Fig. 5

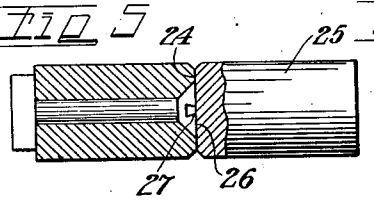


Fig. 6

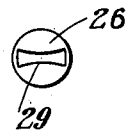


Fig. 7

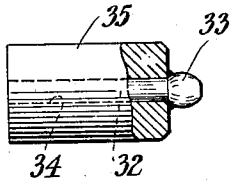


Fig. 8

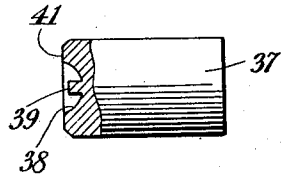


Fig. 9

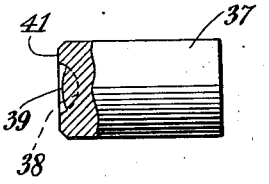


Fig. 10

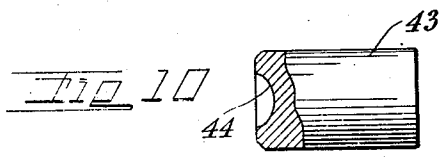


Fig. 11

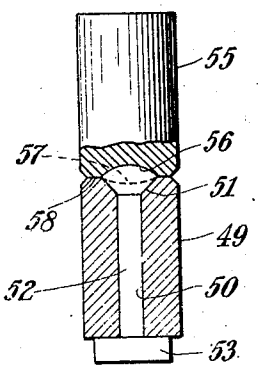


Fig. 12

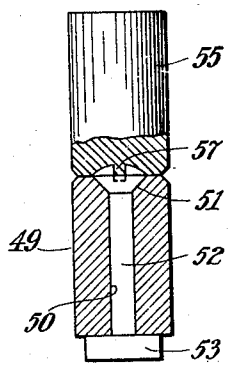
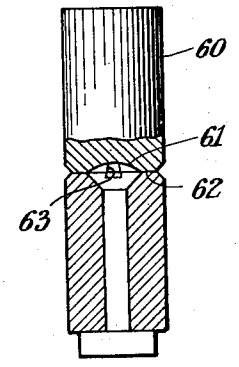


Fig. 13



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SCREW AND THE METHOD OF MAKING SAME

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Fig. 14

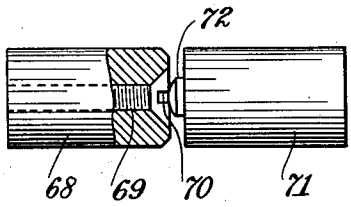


Fig. 15

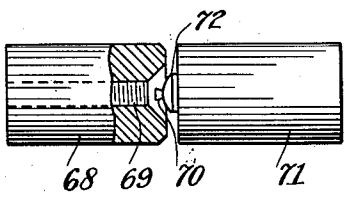


Fig. 16

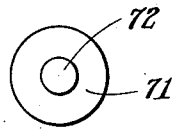


Fig. 17

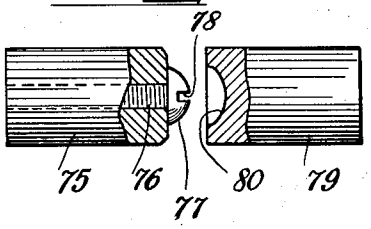


Fig. 18

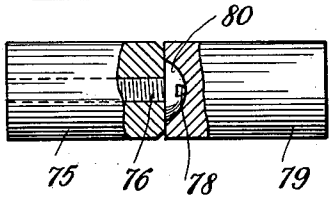
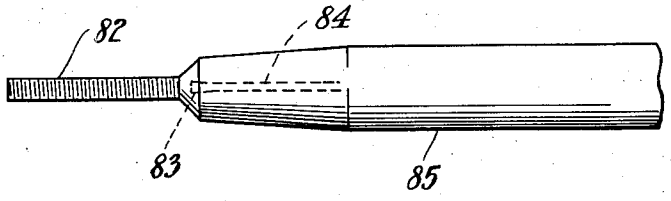


Fig. 19



INVENTOR.
Theodor A. O'Leary
BY John P. Chandler
his ATTORNEY.

Patented Dec. 5, 1939

2,182,092

UNITED STATES PATENT OFFICE

2,182,092

SCREW AND THE METHOD OF MAKING SAME

Theodor A. O'Leary, New York, N. Y., assignor of one-third to Winslow Foster and one-third to Herman Wunderlich, both of Brooklyn, N. Y.

Application April 21, 1936, Serial No. 75,611

5 Claims. (Cl. 10—10)

This invention relates to improvements in screws and to the method of making the same and relates more specifically to an improved screw, the head of which is provided with an undercut or dovetailed slot. The present improved screw is particularly adapted to be driven by a driver of the character disclosed in my copending application Serial No. 61,931, filed Feb. 1, 1936, the present application constituting a continuation in part of said application.

The improved driver includes a shank having a curved bit portion provided with flanged edges of such proportions as to more or less closely fit the inwardly converging side walls of an arcuate, transverse slot in the screw head of the type disclosed and described in said application. The shank carries a longitudinally movable sleeve, the lower end of which is caused to firmly engage the head of the screw under the influence of spring pressure or otherwise. Thus the screw is firmly held in axial alignment with the driver while it is being driven, the cooperating flanged bit and undercut slot preventing displacement of the screw from the driver. At the finish of the driving operation the sleeve is released and the bit portion removed from the slot by moving the handle portion of the driver through an arc.

The advantages of such a screw and driver are numerous. No effort is required to retain the bit in the slot during the driving operation and the slot can not be damaged, due to the inclination of the driving bit to cut down and into the screw slot, rather than to twist up and out, thereby damaging the head of the screw as well as the surface into which the screw is driven. The screw can be driven more quickly than can the conventional screw and with far greater ease, since after the screw is once well started no pressure against the head is required.

One of the principal objects of the present invention is the provision of an improved method for the production of the improved screws at a substantial reduction in cost over the cost of producing ordinary screws. Another object of the invention is to provide a screw having a far stronger head than the conventional screw, the slot being constructed in such a manner and shape as to preserve virtually the full strength of the head.

In the modern manufacture of screws a wire is cut to suitable length and the wire supported in a die and the head normally formed by the "upsetting" process. In actual practice, one end of the wire is first "coned-up" after which this end is forcibly struck by a heading die or punch, the slot subsequently being cut in with a milling cutter. Efforts have been made to form the slot simultaneously with the upsetting of the head, but a punch suitable for performing both the heading and slotting function at the same instant normally has a short life due to the relative thinness of the male portion in the punch which forms the slot, this male portion being broken down in a relatively short time.

In the improved screw which constitutes the present invention the finished slot is wider at the bottom than at the top, and in following the present method of screw manufacture the upsetting punch is provided with a transverse male portion of considerable thickness. Thus when the punch strikes the previously coned-up head portion, a slot of substantial width having parallel side walls is struck in at the same instant as the head is formed. The more substantial male portion makes for a punch which is not easily broken, thereby greatly reducing the cost of screw manufacture.

In its presently preferred form the lower wall of the slot is arcuate rather than straight and when the slot is struck in with the curved male portion in the punch the metal is caused to flow much more readily than would be the case if the slot were straight. After the slot, having substantially parallel side walls and a curved lower wall, is struck in the head of the screw the head is struck with a second punch or die which causes the upper central portion of the side walls to converge inwardly, thereby providing the desired dovetail effect.

In the drawings:

Fig. 1 is a longitudinal section taken through the preferred form of die for use in forming a flat head on a screw in accordance with the present invention, the view showing the previously coned-up wire in position within the die;

Fig. 2 is a side elevation, partially in section, of the head-forming and slot-striking punch;

Fig. 3 is also a side elevation of the punch, taken at right angles to the view shown in Fig. 2;

Fig. 4 is a front elevation of the punch;

Fig. 5 is an elevation, partly in section, of the die and the flat punch used for forming the dovetail portion in the head, the view showing the finished screw head;

Fig. 6 is a plan view of the head of the finished screw;

Fig. 7 is a side elevation; partially in section of the die employed in making a round head or button head screw, the view showing a length of

wire having a coned-up head portion in position within the die;

Figs. 8 and 9 are side elevations, partly in section, of the heading and slot striking punches for use in making a round headed screw;

Fig. 10 is a side elevation, partly in section, of the dovetail forming punch for use in making round headed screws;

Figs. 11 and 12 are side elevations, partly in section, of the die and punch assembly for forming the head and slot in oval headed screws;

Fig. 13 shows the die and punch assembly for dovetailing the slot in oval headed screws;

Figs. 14 and 15 are side elevations, partly in section, of the die and punch assembly for dovetailing a conventional flat headed screw in accordance with the present invention;

Fig. 16 is a front elevation of the punch shown in Figs. 14 and 15;

Fig. 17 is an exploded view of the die and punch assembly for forming a dovetailed slot in a conventional round headed screw in accordance with the present invention;

Fig. 18 is similar to Fig. 17 but shows the die and punch having been brought together and the dovetail formed in the slot; and

Fig. 19 is a side elevation of the finished screw mounted on a driver of the character described in my copending application.

The method of making a flat headed screw in accordance with the present invention is illustrated in Figs. 1 to 5. A substantially cylindrical die 10 is formed with a centrally disposed longitudinal aperture 11, having an outwardly flared die portion 12 corresponding in shape to the lower surface of the screw head to be formed. A wire 13 of suitable length is placed within the longitudinal aperture in the die, the wire first having been suitably coned-up as at 14. The precise shape of this coned-up portion is dependent upon the shape and size of the head to be subsequently formed, as will be appreciated by those skilled in the art. The coning-up step is not essential in carrying out the present method although it is desirable since it is a simple operation and reduces the wear upon the heading punch.

The wire 13 is suitably backed up at 15 and the coned portion is then forcibly struck with a combined head and slot forming punch or die 17. This punch is formed with a circular concave area 18 on its forward face 19, the edges of which face are bevelled as at 20. Within this concave area an outwardly protruding male portion 21 is formed, the male portion having a somewhat greater thickness than the width of the conventional screw slot. The side walls of the male portion are illustrated as being parallel with each other, although they may be formed somewhat thinner at the edge in order to facilitate the removal of the male portion after the slot has been struck in.

The outer surface of the male portion is convexly curved, as will be noted in Fig. 3, the male portion desirably terminating just short of the periphery of the concave area 18. The degree of curvature of this latter area is dependent upon the precise shape of the finished head. In the case of the flat headed screw, however, it is essential that the curve be not too great in order that the dovetailed portion can be formed to the proper proportions and at the same time having the screw head of the conventional dimensions or shape and with the minimum or no excess metal to be shaved.

After the punch has struck the coned head shown in Fig. 1, the head is formed with the arcuate slot conforming to the male portion 21 of the punch, the lower surface of the head taking the shape of the tapered portion 12 of the die and the upper surface thereof assuming the curvature of the concave area 18. The next and final step in the manufacture of the flat headed screw is to strike the curved upper surface with the forward face 24 of a cylindrical die 25. This blow flattens the head as shown at 26 in Fig. 5, and causes the upper central portion of the side walls of the slot 27 to converge inwardly. The extreme end portions of the side walls are not considerably affected by the blow since they are engaged by the die only at the end of the stroke. Accordingly, the edges 29 of the slot are curved as shown in Fig. 6 and the slot has its greatest width at its terminals in order to permit the flanged bit portion of the driver to be introduced thereinto.

In making the round or button head screw the wire 32 is coned-up at one end in substantially the shape shown at 33, the wire then being placed in the straight longitudinal aperture 34 of the die 35. In this instance the upsetting punch 37 is formed with a concave area 38 provided with a greater arc than that formed in the punch 17. In this punch the arcuate male portion 39 does not extend beyond the forward face 41 of the punch.

After the slot is struck in and the head and slot formed, the head is struck with a second die or punch 43, having a concave area 44 of such curvature as to somewhat flatten the central portion of the round head in order to secure the desired dovetail result. In other words, the second punch flattens the central portion of the head to provide the desired dovetail effect and also gives the head its final shape without materially changing the width of the slot at its terminals. It is essential, however, that the curved surface of this die does not engage the full length of the edges of the slot, otherwise insertion of the bit of the driver into the slot would be difficult.

In Figs. 11, 12 and 13 there is illustrated the preferred die and punch assembly for forming an oval head on a screw in accordance with the present invention. The die 49 is formed with an aperture 50 having an outwardly flared end portion 51 similar to that employed in making a flat-headed screw. As in the other embodiment, the wire 52 is suitably backed up at 53. The punch 55 is formed with a circular concave portion 56 and with an arcuate slot-striking male portion 57 which protrudes beyond the lower surface 58 of the punch. This male portion is also of somewhat greater thickness than the width of the conventional slot, as shown in Fig. 12. After the punch 55 has formed the head shown in Figs. 11 and 12, the head is struck with a second punch 60 provided with a circular concave portion 61 on its lower face 62, this concave portion having an arc of a slightly larger circle than the concave portion 56 in the punch 55. This punch 60 flattens the central portion of the head of the screw in the manner shown in Fig. 13, thereby forming the dovetailed slot 63. Substantially the same procedure, with a slightly differently shaped die, may be employed for forming a fillister head.

The herein described method of forming a dovetailed slot by the use of an upsetting punch may be employed in connection with a conventional flat headed or round headed screw. In Fig. 14 a die 68 similar to that shown in Fig. 1 receives a conventional flat headed screw 69 provided with a transverse slot 70. The punch 71 is formed with

a centrally disposed circular bevelled male portion 72 which strikes the central portion of the head, as shown in Fig. 15, which causes the central portion of the side walls of the slot to assume a dovetailed position. The die may be bevelled as shown or it may be flat, or even may have a plurality of protruding portions which engage the central portion of the head on either side of the slot.

Likewise, in Fig. 17 the die 75 is adapted to receive the screw 76 provided with a round or button head 77 which is formed with a conventional transverse slot 78. The punch 79 is formed with a circular concave portion 80 of substantially the contour shown, the essential thing being that the main force of the blow be exerted on the central portion of the head.

In Fig. 19 a flat headed screw 82 having an arcuate dovetailed slot 83 in accordance with the hereindescribed method and having an upper surface similar to that shown in Fig. 5, is shown mounted on a bit portion 84 of a screw driver of the type disclosed in my aforesaid copending application. The upper surface of the head is engaged by a sleeve 85 carried by the bit, which sleeve is in either positive or yieldable engagement with the head. The bit may be operatively connected with the handle (not shown) of the driver and the sleeve carried thereby and longitudinally movable thereon, or the sleeve may be secured to the handle and the bit portion carried in a transverse slot in the end of the sleeve. In the latter instance the bit is caused to revolve by the sleeve.

What I claim is:

1. The method of forming a screw head which consists in supporting a blank in a die, striking the head portion with a combined heading and slot forming punch and then striking the central portion of the formed, slotted head with an upsetting punch to cause the upper central portions of the side walls of the slot to converge inwardly.

2. The method of forming a screw head of the class described which consists in supporting a blank in a die, upsetting the head portion of the blank with a combined heading and slot forming punch, then upsetting the formed head with a punch which engages the head adjacent to the central portion of the slot to cause the upper central edges of the said slot to converge inwardly.

3. The method of forming a screw head which consists of supporting a blank in a die, the head portion of the blank protruding beyond the end of the die, striking the protruding portion with a heading punch provided with a male portion for striking a transverse slot in the head, then striking the slotted head with a punch adapted to somewhat flatten the head and cause the central portion of the side walls of the slot to converge inwardly to form a centrally disposed dovetail portion.

4. The method of forming a screw head which consists in upsetting the head to provide a curve of less radius on the upper surface than is desired in the finished screw, striking a transverse slot in the head and then striking the upper surface with a die of such contour as to flatten same and cause the upper central portions of the side walls to converge inwardly.

5. The method of forming a screw head which consists in the steps of supporting a screw blank in a die, striking the head portion with a die adapted to partially form the head, then striking the upper surface of the partially formed head with a combined head and slot forming punch, and then striking the central portion of the upper surface of the slotted head with an upsetting punch to cause the upper central portion of the side walls to converge inwardly.

THEODOR A. O'LEARY.