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METHOD OF STAMPING SCREW THREADED FASTENERS FROM FLAT BAR STOCK

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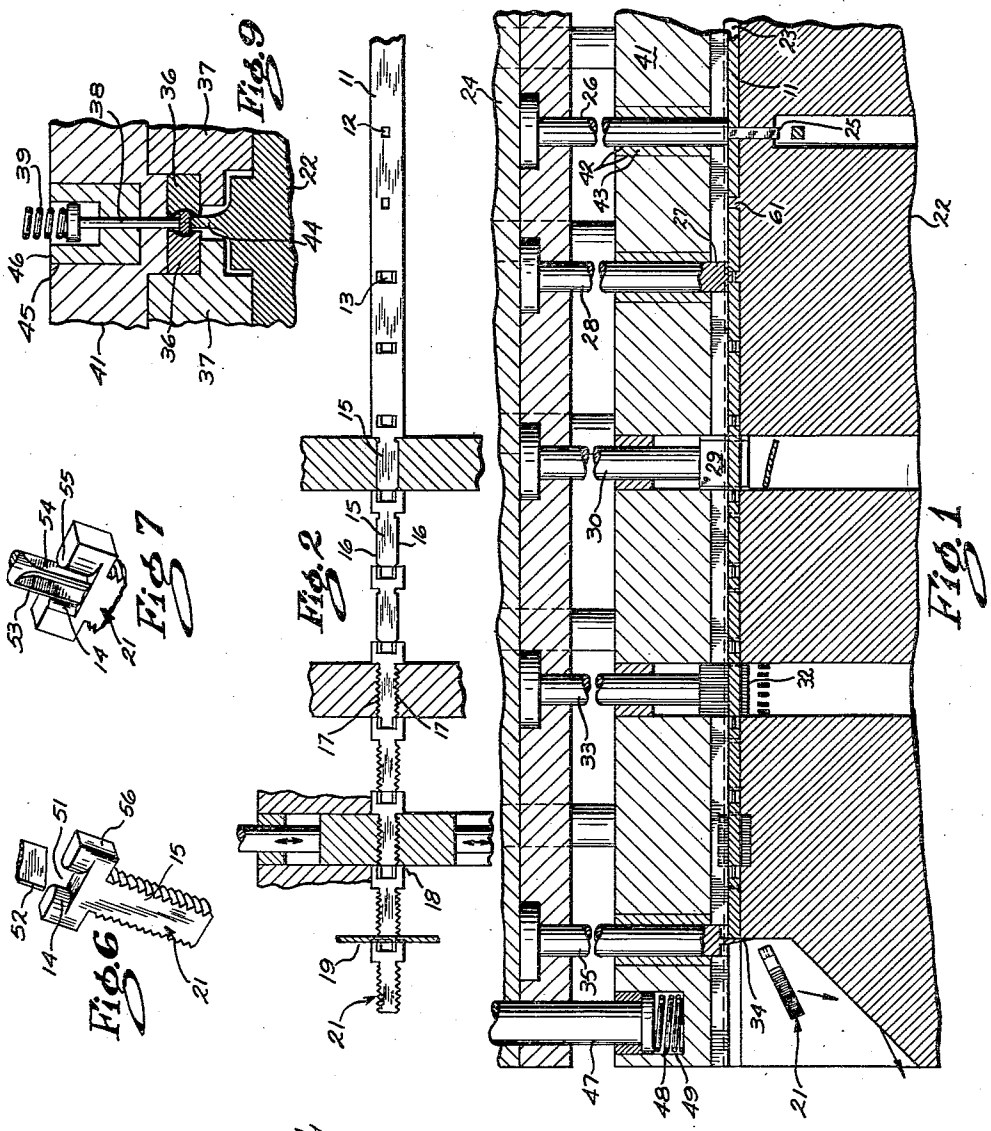


Fig. 1

Fig. 2

Fig. 9

Fig. 7

Fig. 6

Fig. 5

Fig. 4

Fig. 3

Fig. 8

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METHOD OF STAMPING SCREW THREADED FASTENERS FROM FLAT BAR STOCK

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1 Claim. (Cl. 10—10)

My invention relates to fastening devices and methods and apparatus for making them.

It is an object of my invention to provide simplified light, strong, efficient fasteners of reduced cost and weight which may be stored readily and compactly.

A further object of my invention is to provide a novel, relatively inexpensive method of making fasteners and threaded devices, which method is readily adapted to automatic operation and to using readily obtainable sheet or strip material.

A further object of my invention is to provide machine screws or like fastenings which may be driven by either flatblade or Phillips screw drivers.

A further object of my invention is to provide inexpensive spade lugs with threaded shanks.

Other and further objects, features and advantages of the invention will become apparent as the description proceeds. In carrying out my invention in accordance with a preferred embodiment thereof, I utilize a blank in the form of a metallic strip and provide a die head for a press with a plurality of stations for performing successive operations on the stock or blank strip. First the strip is pierced to form an opening which will become the screw eye and also to provide for locating the stock in the forming apparatus during successive operations. After piercing, the slot is coined to provide tapered edges. Thereafter a portion of each side of the strip is trimmed to form a shank; thereafter the edges of the shank are shaved to form a thread. Thereupon, the serrated shaved edges are laterally pressed in order to round the threads thereupon. The strip material is then severed in order to cut apart the individual fasteners or machine screws.

A better understanding of the invention will be afforded by the following detailed description considered in conjunction with the accompanying drawings, in which:

Fig. 1 is a fragmentary view, in vertical section, of apparatus which may be employed in carrying out the method of my invention, showing the blank strip in the condition operated upon in the successive steps of the forming process.

Fig. 2 is a plan view of the blank strip, showing the effect of successive operations and illustrating the operations performed thereon.

Fig. 3 is a plan view of a fastener in accordance with an embodiment of my invention.

Fig. 4 is a side view of the article of Fig. 3.

Fig. 5 is an end view of the articles illustrated in Figs. 3 and 4, showing the novel shape of the screw driver slot adapted for either flat blade or Phillips type screw drivers.

Fig. 6 is a perspective view of the articles illustrated in Figs. 3, 4, and 5, showing the manner in which a flat bladed screw driver is used.

Fig. 7 is a perspective view of the head portion of the fastener of Figs. 3 to 6, illustrating the manner of using a Phillips type screw driver.

Fig. 8 is a perspective view of a spade lug forming another embodiment of my invention, which may be formed in accordance with my invention.

Fig. 9 is a fragmentary sectional view illustrating the coining operation for rounding the thread and fragmentarily illustrating the apparatus for this purpose.

Like reference characters are used throughout the drawings to designate like parts.

Threaded fasteners such as illustrated in Figs. 3 to 7 inclusive are made from strip stock **11**, as illustrated in Fig. 2 in accordance with my invention. First an opening **12** is pierced. The opening **12** serves both for locating strip stock **11** in successive operations thereon and for providing a slot for receiving the screw driver blade. The next operation is coining the slot as illustrated at **13** in order to form tapered edges **14** thereon. The next operation is trimming away the sides of the shank portion **15**, which is subsequently to be serrated to form threads.

In forming the threads, the first operation is shaving the shank sides **16** to form rough threads or serrations **17**. Thereafter the serrated edges **17** are pressed laterally so as to round the thread and adapt is for mating a conventional nut or tapped hole in a piece to be assembled by means of the fastening illustrated. The coining operation for rounding the thread is illustrated at **18** in Fig. 2. The final operation is severing the lengths of strip as shown at **19** for forming the individual fasteners **21**.

The operation may be carried out by means of a conventional power press using a six-station die-head as illustrated in Fig. 1. To the bed of the press is secured a bed plate **22** having a slot or groove **23** of suitable width for receiving strip stock **11**. To the reciprocating portion or moving head of the press is secured a head **24**, carrying a plurality of forming tools. These includes a piercing tool **25**, having a shank **26**, secured to the head **24**, a coining tool **27** with a shank **28** secured to the head **24**, a side trimming tool **29**, having a shank **30**, secured to the head **24**, a side-serrating or thread shaving tool **32**, having a shank **33**, and a cut-off tool **34**, having a shank **35**, secured to the head **24**. As illustrated in Fig. 9, laterally moving thread-rounding dies **36**, which may if desired take the form of thread chasers, are provided, which are carried by horizontally sliding members **37**, suitably connected by a driving means (not shown) synchronized with the driving means for the die head **24**, so as to make the same number of strokes as the head **24**.

Since the tools, **25**, **27**, **29** and **32** as well as **34**, tend either to drive the work into position in the slot **23**, or hold it therein, a separate hold-down mechanism is not required for these stations. However, for the station representing the operation at **18**, a hold-down rod or bar **38** is preferably provided, which is carried in the head **24**. The bar **38** is shown yieldably mounted in the head **24**, with a suitable diagramatically indicated back-up spring **39**.

As illustrated in Fig. 1, a plate member **41** is provided with suitably bushed openings **42** for receiving the shanks **26**, **28**, **30**, **33**, and **35**. Preferably, non-friction sleeves **43** are pressed into the openings **42** for receiving the shanks **26**, **28**, **30**, **33** and **35**.

For resisting the thrust of the hold-down rod **38** a foot post **44** is provided in the bed plate **22** at the coining station **18**. The plate member **41** is recessed at **45** to receive mounting member **46**, secured to the head **24** for carrying the spring-biased rod **38**.

To insure retraction of the tools **25**, **27**, **29**, **32** and **34**, from the work, suitable means such as a retraction post **47**, mounted in the head **24** and a push-back spring **48** are provided. The spring **48** is shown as mounted in a socket **49** in the plate member **41**. A corresponding unit at the other end of the plate **41** is omitted for simplicity in the drawing.

As illustrated in Fig. 6, the fastener **21**, when com-

pleted, has a slot 51 readily adapted to receive a flat blade 52 of a flat-bladed screw driver for driving the fastener 21 into or out of a threaded hole or into a nut in the same manner as a conventional machine screw. As illustrated in Fig. 7, the same slot 51 is adapted also to receive a point 53 of a Phillips type screw driver which has flutes 54 securely engaging the nibs 55 at the edge of the slot 51 in the fastener 21. The head portion 56 of the fastener 21 is integral with the shank portion 15. Since the fasteners are flat, they may be stored readily and take up little space in a warehouse. Being formed from flat sheet stock, they are relatively inexpensive and lend themselves readily to automatic production.

The fasteners 21 may also be formed with great accuracy, since they are formed by a repetitive process. For simiplicity, in Fig. 1 a simple locating pin 61 has been illustrated which may if desired be fixed or may be of a retractable type. If a simple, fixed locating pin 61 is employed, the strip 11 is lifted up after each stroke of the head 24 and advanced to another position with the just-formed locating slot 12 changed from the station of the piercing tool 25 to that of the locating pin 61. Consequently, the length of each of the fasteners 21 is precisely determined; likewise the location of the threads 17 in relation to the head 56 is also precisely determined.

Although the invention has been described as carried out in connection with the formation of threaded fasteners, having a universal head for flat blade or Phillips type screw drivers, the invention is not limited to this use and may be employed in connection with the formation of other threaded devices and fasteners. It may be used, for example, in producing spade lugs 63 of the type illustrated in Fig. 8. A strip similar to the blank 11, is employed, and if desired, a circular mounting aperture 64 may be pierced instead of the square slot illustrated in Fig. 2 for locating the blank strip and for subsequent use in connection with the mounting of the lug, for receiving a rivet or the like. As shown, the spade lug 63 illustrated in Fig. 8 has a head portion 65 of the same width as the strip blank 11 and a shank portion 15 with threads 66 formed on the edges 16 thereof. The process of forming the spade lug 63 is the same as described in the formation of the screw fastener 21 except that the step of coining the slot at 13 is omitted. No screw driver slot is desired in this case, and the settings of the cut-off tool 34 as well as the trimming and shaving tools 29 and 32 in relation to the locating pin 61 are suitably adjusted so that the spade lug 63 is cut off at the line 67 beyond the opening 64 instead of at the edge thereof, as required in connection with the formation of the headed screw fasteners 21. Accordingly, the operation of forming a spade lug 63, illustrated in Fig. 8, consists of the steps of piercing the slot 64, trimming away the sides 16 to leave the head 65, thereafter shaving the side 16 to form rough threads 17 as illustrated in Fig. 2, thereafter laterally pressing the serrated sides 16 as at station 18 of Fig. 2 to round the edges and complete the formation of the threaded sides 66, whereupon, the completed spade lugs are cut off along the margin line 67. The shoulder 68, formed in the spade lug 63 serves for securing the head 65, against a slotted wall when a suitable nut or the like is threaded upon the shank portion 15 to secure the spade lug 63 in such a slotted wall. The

spade lug so mounted is adapted to receive knurled nuts or the like for making electrical connections to such spade lugs. The pierced holes 64 are provided for receiving rivets or the like for making internal electrical connections in electronic and in other light electrical apparatus of the type employing insulating mounting panels.

I have discussed the use of the cut-off tool 34 for separating the fasteners 21 or 63 completely from the adjacent fastener formed from the same strip. It will be understood, however, that my invention is not limited thereto and does not exclude the arrangement of the cut-off tool 34 to effect only a partial severance, so that strips of fasteners may be stocked in which the individual fasteners are joined only by very thin necks of metal to permit breaking them apart readily when one is ready to use them. Such strips of fasteners may consist of a predetermined number of fasteners adapted to be stacked in a pneumatic or other automatic screw driving machine for assembling apparatus employing such strips. For producing such strips an additional stage is provided in the die-head following the stage in which the partial severance is effected. The additional stage consists of a cut-off tool like the tool 34 but indexed to make a stroke only after the predetermined number of fasteners for a strip has been formed.

I have herein shown and particularly described certain mebodiments of my invention and certain methods of operation embraced therein for the purpose of explaining its principle of operation and showing its application but it will be obvious to those skilled in the art that many modifications and variations are possible and I am, therefore, to cover all such modifications and variations as fall within the scope of my invention.

What I claim and desire to secure by Letters Patent of the United States is:

The method of forming threaded fasteners comprising the steps of piercing continuous strip metal at spaced positions to form openings each serving to locate the work in subsequent steps and beginning formation of a screw driver slot, forming tapered edges on the side surfaces of the slot by stamping, trimming the sides from portions of the strip in the region between successive pierced holes to form shank portions, shaving the edges of the shank portions to commence the formation of screw threads, laterally pressing the metal at the edges of the shanks to produce curvature in the edges and complete the formation of the screw threads, and thereafter severing successive portions of the strip at the margins of the pierced holes to form completed fasteners.

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