Oct. 15, 1935. L. M. POST 2,017,421

CRIMP NUT

Filed April 16, 1934 2 Sheets-Sheet 1

FIG. 2

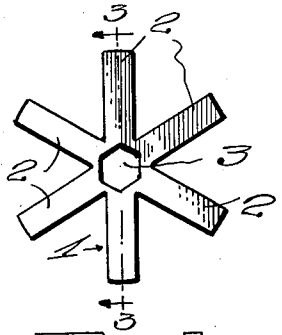


FIG. 1

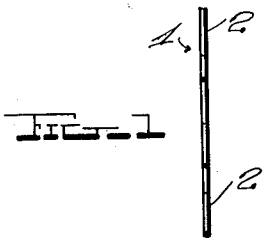


FIG. 3

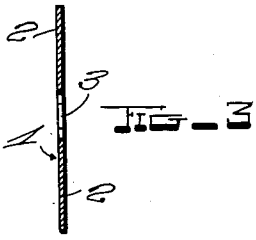


FIG. 5

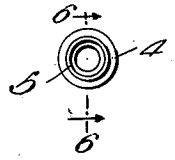


FIG. 4

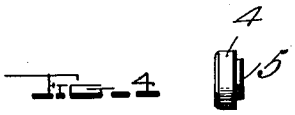


FIG. 6

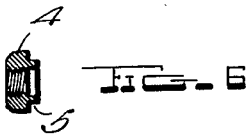


FIG. 8

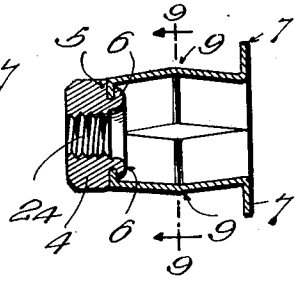


FIG. 7

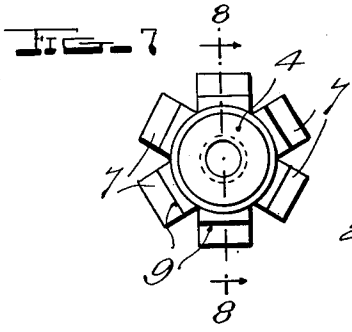


FIG. 9

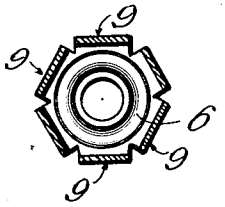


FIG. 11

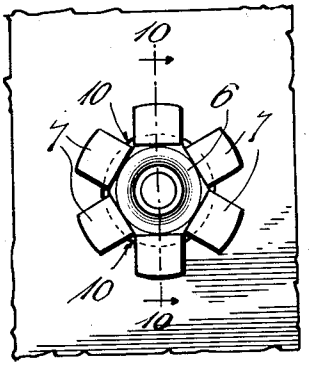


FIG. 10

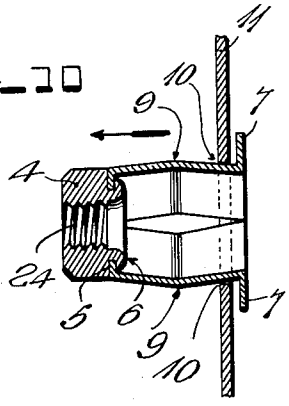
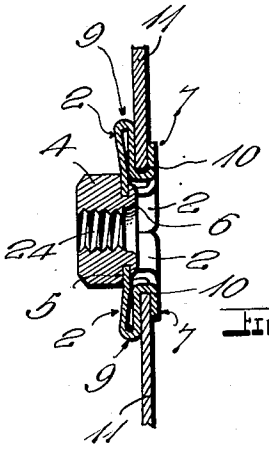


FIG. 12



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Oct. 15, 1935. L. M. POST 2,017,421

CRIMP NUT

Filed April 16, 1934 2 Sheets-Sheet 2

FIG. 13

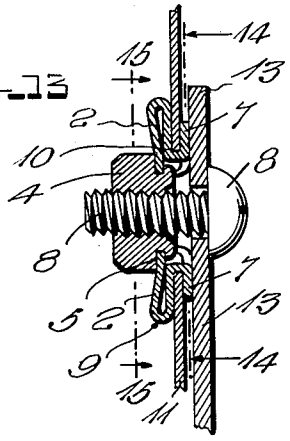


FIG. 14

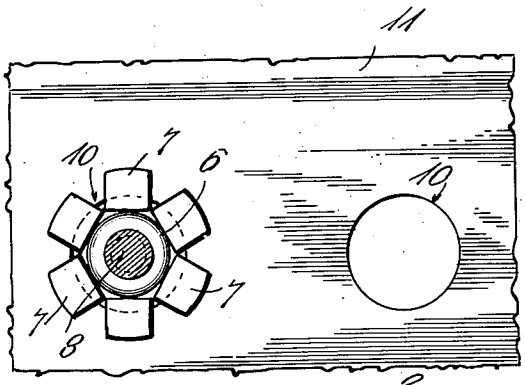
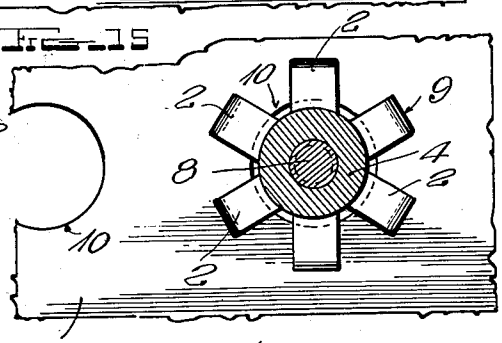


FIG. 15



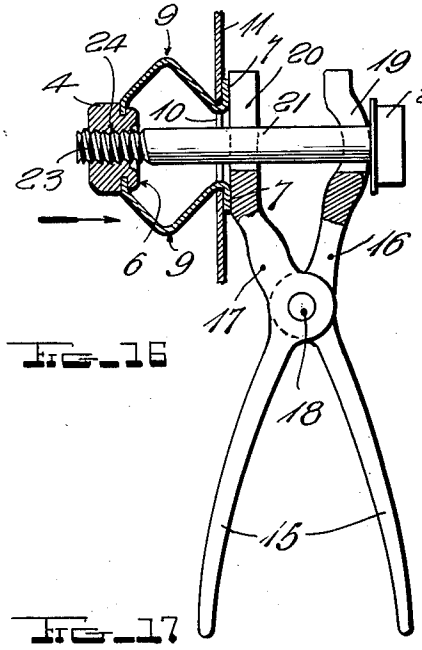
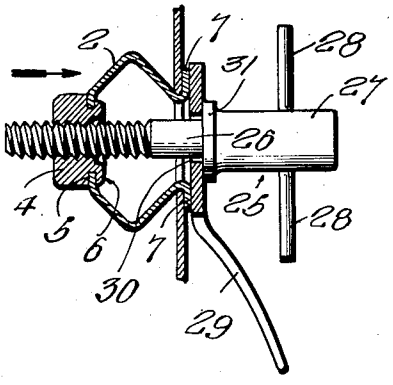


FIG. 16

FIG. 17



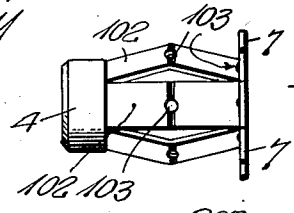


FIG. 18

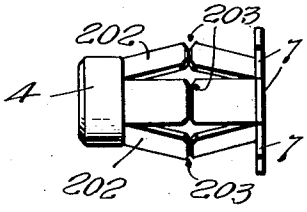


FIG. 19

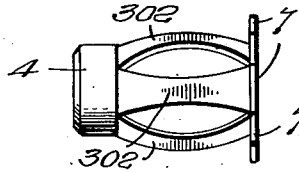


FIG. 20

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Patented Oct. 15, 1935 2,017,421

UNITED STATES PATENT OFFICE

2,017,421

CRIMP NUT

Lawrence M. Post, Drexel Hill, Pa., assignor to Henry B. Newhall Corporation, Garwood, N. J., a corporation of New Jersey

Application April 16, 1934, Serial No. 720,880

2 Claims. (Cl. 85—40)

My invention relates to crimp nuts, to be used for fastening anything to thin sheet metal structures, whether such structures be a sheet metal partition, drum, stack, pipe, ceiling, floor, wall, door, window frame, sheet metal furniture, or any other similar structure. Usually the rear surface of the supporting sheet metal surface is inaccessible, but my invention may be used whether such rear surface is accessible to the mechanic or not.

My invention further relates to such a crimp nut, which is economical to manufacture, of relatively few parts, and one which will always be centered in the hole of the metal support. This insures that the work, whatever it may be, will be brought up and held flush against all the fingers, and assume an absolutely true parallel position to the surface of the wall or other support.

My invention further relates to such a crimp nut which can be crimped or expanded in position quickly, and with the minimum effort, thereby reducing the cost of installation to the minimum.

My invention further relates to certain combinations, sub-combinations, articles of manufacture and details of construction, all of which will be more fully hereinafter described and pointed out in the claims.

In the figures I have shown different embodiments of my invention by way of example, the same reference numerals refer to similar parts in the several figures.

Fig. 1 is a side elevation of a blank preferably stamped from sheet metal.

Fig. 2 is a plan view of the blank.

Fig. 3 is a section on line 3—3 of Fig. 2.

Fig. 4 is a side elevation of the preferred form of nut employed.

Fig. 5 is an end elevation of the nut.

Fig. 6 is a vertical section on line 6—6 of Fig. 5.

Fig. 7 is an end elevation of the sheet metal attachment assembled, ready to be sold to the trade.

Fig. 8 is a cross section on line 8—8 of Fig. 7.

Fig. 9 is a cross section on line 9—9 of Fig. 8.

Fig. 10 is a section, on line 10—10 of Fig. 11, looking in direction of the arrow, through a sheet metal support and the attachment, which has just been inserted in a hole in the support.

Fig. 11 is a front elevation.

Fig. 12 is a section through the support and attachment, showing the attachment fully crimped in position to receive the supporting screw or bolt.

Fig. 13 is a sectional view, similar to Fig. 12, with the bolt and work in position.

Fig. 14 is a section on line 14—14 of Fig. 13.

Fig. 15 is a section on line 15—15 of Fig. 13.

Fig. 16 is a view, partly in side elevation and partly in section, illustrating my crimping tool for quickly crimping, or pre-setting the attachment ready for the screw and work; see Figs. 12 and 13.

Fig. 17 is a view of a modified form of crimping tool.

Fig. 18 is a plan view of a modified form of sheet metal attachment, having weakening arms to insure that they will bend at the proper point, and do so with the least amount of effort on the part of the mechanic.

Fig. 19 is a plan view of another modification.

Fig. 20 is a plan view of still another modification.

It is often desirable and necessary to support brackets, shelves, hangers, and other objects, commonly called work to be supported, on sheet metal structures, such as partitions, drums, stacks, pipes, ceilings, metal floors and walls, doors, window frames, metal furniture, and similar structures. In most instances it is not feasible for the mechanic to gain access to the rear of the support to manually screw up a nut, because such surfaces are inaccessible.

My invention covers a crimp nut, which is formed of few parts, and that can be quickly positioned in a hole in the metal support, ready to be pre-set by a mechanic, or, if desired, crimped or expanded by the mechanic at the same time that he supports the work. If the work is relatively heavy or cumbersome, the attachments can be pre-set, if desired. If the work is light and easily handled, the mechanic can expand the attachment at the same time that he positions the work.

In the particular embodiments of my invention, shown by way of example, but to which my invention is not to be limited except as set forth by my claims, a blank 1 is struck out of thin sheet metal having a plurality of arms 2, 2, six of said arms being the preferred number. The center of the blank is provided with a non-circular opening 3, usually hexagonal. I employ a nut 4, having a cylindrical shoulder 5, to fit into the opening 3 in the blank 1.

The blank 1 is then assembled with a nut 4, the opening 3 being mounted on the cylindrical shoulder 5. The end of the shoulder 5 is then riveted, swaged or upset at 6, to securely hold the nut 4 and blank together. This operation

causes the cylindrical shoulder to conform, more or less, with the non-circular opening 3 in the blank to prevent relative rotation between the blank and the shoulder 5. The arms 2, 2 are then bent down into the position illustrated in Fig. 8, to form a slotted barrel the very ends of each arm being bent up to form fingers 7, 7. The portions of said fingers by which they are connected to the barrel, together form a resilient self-centering head, adapted to center the crimp nut in a circular hole in a sheet metal support and insure that the longitudinal axis of the crimp nut coincides with the longitudinal axis of the hole, so that the work to be supported will be held flat and true against the sheet metal support.

By employing more than two arms, preferably six, they form substantially a circular bearing for the attachment and true it in the hole, as will be more fully hereafter described.

Further, by employing more than two arms, with their attached fingers, a greater friction surface between the attachment and the sides of the hole is obtained. Among other advantages the attachment will be more readily held to the support and will be prevented from turning in the hole.

The arms 2, 2 are preferably bowed slightly at 9, 9, so that when the attachment is located in a hole 10 in the metal support 11, as shown in Fig. 10, the bows 9, 9 will be compressed slightly by the sides of the hole 10. This will prevent the fastening dropping out of the hole before it is crimped or expanded in position, because movement in one direction is limited by the upturned finger 7, 7, and in the other direction by the bows 9, 9.

The attachment, Fig. 8, may or may not be sold with the cooperating screws or bolts 8. In some instances the customers may prefer to supply their own screws or bolts, while in other cases the screws or bolts may be sold with the attachment.

After the attachment is located in the hole 10, Fig. 10, it may be pre-set or pre-crimped by any suitable means, such as by tools shown in Figs. 16 and 17, or, it may be expanded or crimped by the screw or bolt 8, as it secures the work 13 to the metal support 11, see Fig. 13. In this Fig. 13 it is to be noted, that the attachment may have been pre-set or pre-crimped, as illustrated in Fig. 12; or, it may have been expanded or crimped by the bolt or screw 8.

In Fig. 16, I have shown a pre-setting tool 15 having arms 16, 16 and 17, 17, pivoted at 18. Through openings 19 in the arm 16, and through the opening 20 and the arm 17, a screw-threaded member 21 is mounted, having a knurled head 22.

In use the tool 15 is brought up to one of the attachments located in a hole in a metal support, and the knurled head 22 is rotated by the thumb and forefinger of the mechanic until the male threads 23 cooperate with the female threads 24 of the nut 4. Then, by pressing the free ends of the arms 16, 17 together, as by operating a pair of scissors or shears, the nut 4 is caused to approach the inside of the metal support 11, the arms 2, 2 bending or crimping to permit this operation. By then rotating the knurled head 22 in the opposite direction, it will disengage the nut 4 and permit the tool 15 to be removed, leaving the attachment pre-set or pre-crimped, as shown in Fig. 12. The work 13 can then be secured by the bolt or screw 8, as previously described.

In some cases I may pre-set or pre-crimp the attachment by means of the tool 25, Fig. 17. In this tool, the screw-threaded member 26 is provided with a head 27, having arms 28, 28 which are used by the mechanic to rotate the member 26. With this tool I preferably employ an arm 29, having an opening 30 through which the screw-threaded portion 26 passes. The portion 27 is provided with a circular shoulder 31 to bear on the arm 29. By holding this arm 29 in one hand while actuating the screw-threaded member 26 by the other hand, the fastening will not rotate in the hole while it is being crimped or expanded.

It will be noted that by using a sufficient number of arms 2, 2 to make a complete, true bearing, the crimp nut will be accurately and truly positioned in the hole and in the support. That is, the axial bore of the nut 4 will coincide with the axial bore of the hole in the support.

This insures that the work 13 will be supported against all the fingers 7, 7 and be held parallel to the surface of the metal support, instead of at an angle to it, which would be the case if the sheet metal attachment was not accurately positioned in the hole. Where the attachment is not accurately centered in the hole, the work 13, whatever it may be, will be supported out of line, or at an angle to the support, giving a slovenly and unworkmanlike appearance to the job.

In some cases I may weaken the arms of the attachment, preferably at the pre-bent portions of the arms, to insure that the arms will collapse outwardly and bend uniformly. This also insures that the crimping of the attachment can be accomplished with a minimum effort on the part of the mechanic.

In Figs. 18, 19 and 20, I have shown different modifications by way of example.

In Fig. 18, the arms 102 are provided with weakening apertures 103. In Fig. 19, the arms 202 are provided with cutaway portions 203, to accomplish the purpose described. In Fig. 20 the arms 302 are formed tapered, the thinnest portion of the arms being approximately midway of their length, and at a point where they are pre-bent.

It will be noted that my crimp nut is formed preferably of two members, the nut and the bent blank attached to it. This lessens the number of parts to be handled and cheapens the cost of assembling and manufacturing the attachment. It is to be noted that my invention is particularly adapted to be used in sheet metal constructions previously herein mentioned, in which round holes of the minimum diameter are drilled for their reception. Further, my crimp nut or attachment, is one that is meant for, and capable of, heavy duty, for the particular size of crimp nut used for the particular job, or to support the particular work on the sheet metal wall, ceiling, partition, or other sheet metal structure.

To drill a relatively large hole adds to the expense of installation. The cheapest hole to drill is a round one of the minimum diameter for the particular work to be supported. To drill a hole of excessive diameter through sheet metal is an expensive proposition. It is more expensive if the hole has to be a slot, or has to be square in contour, or other non-circular configuration to permit the insertion of a portion of the crimp nut or attachment. Besides the cost of drilling, such non-circular holes mar the appearance of the job. In some situations such non-circular holes might

appreciably weaken the support, particularly if a large number of them have to be used in a limited area.

In my invention the crimp nut or attachment centers itself simply by pressing it into position in the hole. This is due to the fact that the barrel of the crimp nut is slightly bowed at 9, so that it has to be slightly compressed to insert it into a hole in the support. It is held from falling out of the hole, prior to expansion, by the bowed portion 9, which is of slightly greater diameter than the hole in which it is mounted, and the fingers 7, 7 on the plurality of arms, which arms are more than two, so that the barrel is symmetrical and will center the crimp nut in the circular hole. This insures that the longitudinal axis of the crimp nut coincides with the center of the hole. This in turn makes a neat workmanlike job in which the work 13 will be held parallel to the sheet metal support 11, and spaced from it only by one thickness of metal; that is, the thickness of the fingers 7, 7, see Fig. 13.

It will further be noted that my barrel is stamped from a sheet metal blank and provided with a center or hub, having a non-circular opening 3 and a plurality of arms 2, 2 all of equal length, and arranged symmetrically around the center or hub. To insure that the longitudinal axis of the barrel coincides with the axis of the hole I use three or more arms 2. Preferably I employ six symmetrically spaced arms 2, 2 so that when bent down they form a substantially continuous split spring barrel. This not only centers the crimp nut, as previously described, but permits the arms to be bent or crimped (Fig. 12) with a minimum effort of the mechanic, thereby saving time in installation.

The nut 4 with its cylindrical shoulder or projection 5 is preferably, to save expense, made in a screw machine, by placing the non-circular opening 3 of the barrel on the cylindrical shoulder, or projection, 5 and then swaging or upsetting the end 6 of the shoulder 5, the metal of the shoulder is forced into the corners of the non-circular opening 3, so that the nut 4 and the barrel are immoveably secured together.

Having thus described this invention in connection with illustrative embodiments thereof, to the details of which I do not desire to be limited, what is claimed as new and what is desired to secure by Letters Patent is set forth in the appended claims.

What I claim is:—

1. A crimp nut adapted to withstand the relatively heavy strains and stresses of supporting work on a sheet metal partition, or similar sheet metal support, comprising a screw threaded nut, a sheet metal resilient barrel, the diameter of which is slightly greater than the diameter of the hole into which it is to be pressed and than that of its nut, and provided with a center or hub, and with three or more bendable arms extending symmetrically from the center or hub forming the resilient barrel, the ends of each arm being bent to form a finger, the portions of said fingers by which they are connected to the barrel together forming a resilient self-centering head adapted to center the crimp nut in a circular hole in a sheet metal support and insure that the longitudinal axis of the crimp nut coincides with the longitudinal axis of the hole, so that the work to be supported will be held flat and true against the sheet metal support, and means to secure the screw threaded nut and resilient sheet metal barrel together.

2. A crimp nut adapted to withstand the relatively heavy strains and stresses of supporting work on a sheet metal partition, or similar sheet metal support, comprising a screw threaded nut, a sheet metal resilient barrel, the diameter of which is slightly greater than the diameter of the hole into which it is to be pressed and than that of its nut, and provided with a center or hub, and with three or more bendable arms extending symmetrically from the center or hub forming the resilient barrel, the ends of each arm being bent to form a finger, the portions of said fingers by which they are connected to the barrel together forming a substantially cylindrical resilient self-centering head to insure self-centering of the crimp nut when applied to a circular opening in a sheet metal support and insure that the longitudinal axis of the crimp nut coincides with the longitudinal axis of the hole, so that the work to be supported will be held flat and true against the sheet metal support, and means to secure the screw threaded nut and resilient sheet metal barrel together.

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