Dec. 29, 1942. E. KNIVETON 2,306,957

THREAD LOCK

Filed May 15, 1942

Fig. 1.

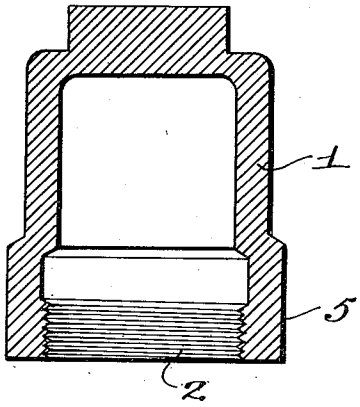


Fig. 2.

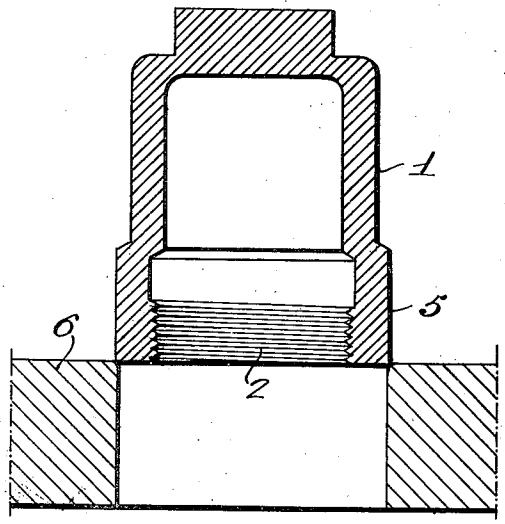


Fig. 3.

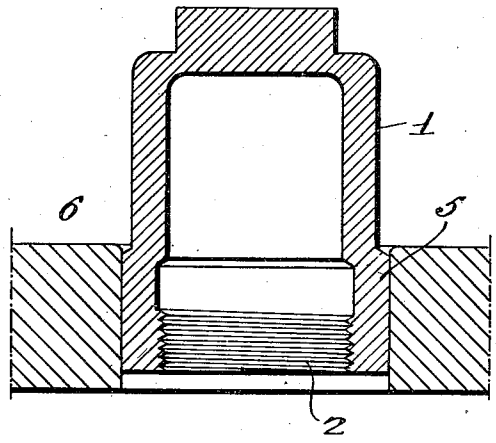
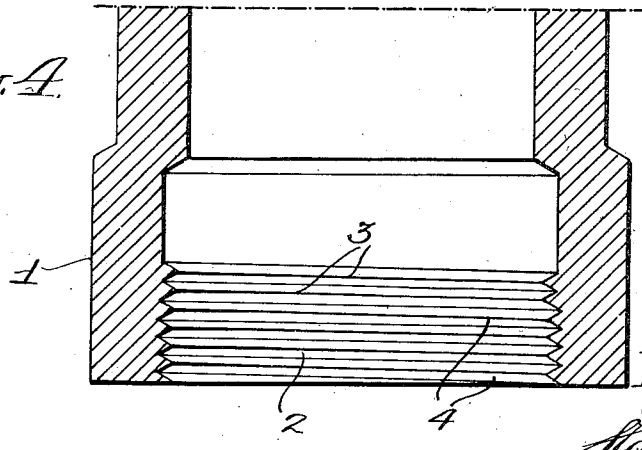


Fig. 4.



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THREAD LOCK

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4 Claims. (Cl. 10—86)

This invention relates to a means for imparting self-locking characteristics to nuts and like threaded elements and more particularly to nuts of the acorn type and to certain other threaded elements, such as dust caps, having similar characteristics.

A principal object of the invention is to provide a simple, practical relatively economical method for internally step-threading elements of this class, thereby to produce the self-locking characteristics as hereinafter set forth.

The invention will be more readily understood by reference to the attached drawing, in which:

Figure 1 is a sectional view of a dust cap of the type to which the invention relates;

Figs. 2 and 3 are corresponding views illustrating two of the operations in the step-threading of the dust cap, and

Fig. 4 is an enlarged fragmentary sectional view illustrating the finished product.

In the production of self-locking nuts and other threaded elements, it has been proposed to form a portion of the thread of a slightly lesser pitch diameter than the normal pitch diameter of the other portions of the thread. Usually this portion of reduced pitch diameter is limited to one or two convolutions of the thread, preferably at the end thereof which is last to engage the mating threads of the companion piece. It is important, where the locking device is applied to a large number of threaded elements of one type, that the locking action in all of the said elements shall be substantially uniform, and difficulty has been experienced in obtaining this uniformity by the prior methods of manufacture. The problem has been particularly difficult in threaded elements of the dust cap variety, illustrated in the drawings, and in acorn nuts and the like wherein the thread must be formed entirely from one end, and wherein no provision can be made for flexibility in that portion of the wall of the element which embraces the locking portions of the thread.

In the production of acorn nuts, dust caps and the like having the self-locking feature described above, it has been customary to employ two taps, one of standard size and the other slightly undersized and, therefore, of special construction. The procedure was to initially form the entire thread with the said slightly undersized tap, and thereafter to re-thread with the standard tap to within one or two convolutions of the inner end of the original thread. When it was attempted to practice this procedure on a machine and in quantity production, it was found impossible to prevent the undersized tap from cutting when being backed off after the initial pass, the result being that the undersized or locking threads not only lacked uniformity, but frequently were incapable of performing their locking function. Where uniformity and accuracy was required, therefore, it was necessary to perform the tapping operations by hand, with consequent loss of production and increase in cost.

The present invention provides a simple and practical method for internally step-threading articles of this character so as to produce a substantially uniform end product, insofar at least as the self-locking action is concerned. By this method, the tapping operation is done entirely with standard taps and by machine operation whereby production is greatly increased; and the method effects a further substantial economy in elimination of the undersized special taps, which are not only relatively expensive but difficult to obtain. Not only is the improved method relatively simple and inexpensive, but it possesses the degree of accuracy required for production of mechanical elements of the character described.

With reference to the drawings, the device therein illustrated comprises the typical cup-shaped body member 1 which is internally threaded at 2 so as to provide for attachment of the cap to a companion externally threaded element (not shown). As shown in Fig. 4, the inner two convolutions 3 of the thread have a somewhat smaller pitch diameter than the remaining convolutions 4. The pitch diameter of the convolutions 4 is normal and is calculated to fit the threads of the companion element with normal clearance, whereas the convolutions 3 of smaller pitch diameter are adapted to frictionally bind upon the threads of the companion element to a predetermined degree so as to frictionally lock the threads together. As previously set forth, it is essential that the locking portion 3 of the thread shall be produced with sufficient accuracy to insure that the frictional engagement of these threads with those of the companion elements shall afford a degree of binding neither too great nor too small, and that there be a substantial uniformity in this respect throughout the product.

In producing the device in accordance with my invention, it is essential that the outer cylindrical wall 5 of the dust cap body which embraces the threads 2 shall be held to a close tolerance, since as hereinafter described the outside diam-

eter of this portion of the body controls the extent of offset in pitch diameter of the locking threads 3. After production of the body in the usual manner and with regard to the outside diameter of the portion 5 as set forth above, the next step is to form the thread 2 with a standard tap, the thread then exhibiting a substantially uniform pitch diameter throughout. The threaded end of the dust cap is now forced through a closing-in die 6, see Figs. 2 and 3, which is, say, from .006 to .007 of an inch smaller than the outside diameter of the piece. The result of this operation is to radially contract the end portion of the dust cap which contains the threads 2. This contraction, however, has no effect upon the threads other than to reduce their pitch diameter, the shape and angles of the threads remaining unchanged. While it is preferred to use a die of the type illustrated in Figs. 2 and 3, a different form of closing-in die, such, for example, as a collet die, may be employed in this operation.

The final step of the process is to retap the thread to within, say, one and one-half to two convolutions of the inner end thereof, with the tap used in the production of the threads 2 in the initial operation, the result being as shown in Fig. 4 and as described above.

I claim:

1. The method of internal step-threading, which consists in forming the workpiece with an internal thread of predetermined pitch diameter, radially contracting the wall of the piece in the area immediately embracing the thread, and subsequently retapping the thread from one end thereof to a point short of the other end so as to reestablish the original pitch diameter in the retapped portion of the thread.

2. The method of manufacturing internally threaded elements of substantially cup-shape, said method consisting in forming the outside diameter of the piece within the thread-receiving area accurately to a predetermined diameter, forming the element with an internal thread of predetermined pitch diameter, radially contracting the wall of the element within the threaded area to predeteminedly reduce the said pitch diameter of the thread, and subsequently retapping the thread from the outer end to a point short of the inner end to reestablish in the retapped area the original pitch diameter of the thread.

3. The method of internal step-threading, which consists in forming the workpiece with an internal thread of predetermined pitch diameter, radially contracting the wall of the piece in the area immediately embracing the thread to a predetermined extent, and subsequently retapping the thread from one end thereof to a point short of the other end so as to increase the pitch diameter in the retapped area.

4. The method of internal step-threading, which consists in internally threading the workpiece to a predetermined pitch diameter, radially contracting the wall of the piece in the area immediately embracing the thread to a predetermined extent, and subsequently predeterminedly increasing the pitch diameter of a portion only of the thread.

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