Aug. 3, 1943. R. HOFSTETTER 2,325,608

NUT AND BOLT LOCK

Filed April 13, 1940

Fig. 1.

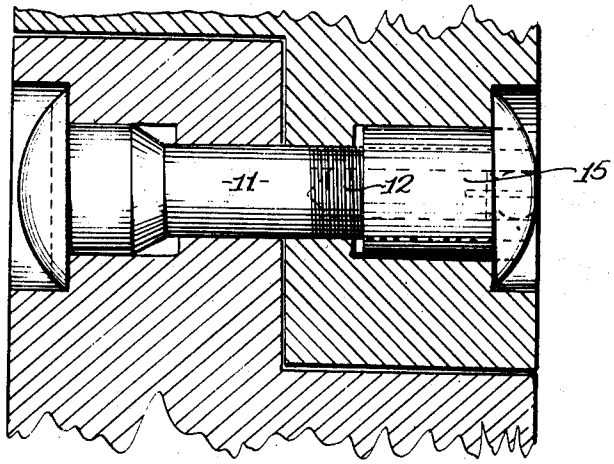


Fig. 2.

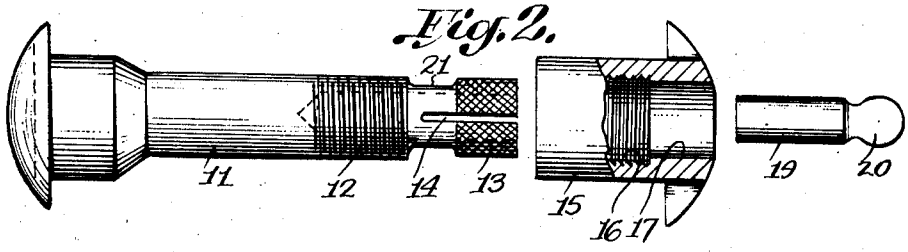


Fig. 3.

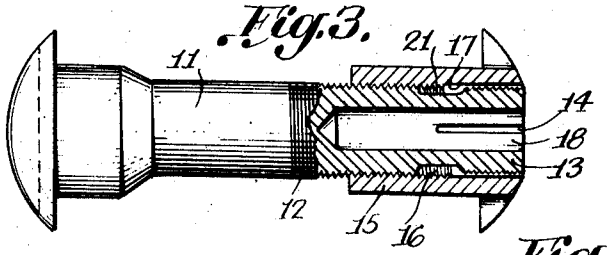


Fig. 4.

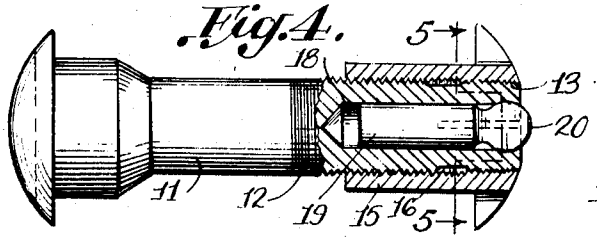


Fig. 5.

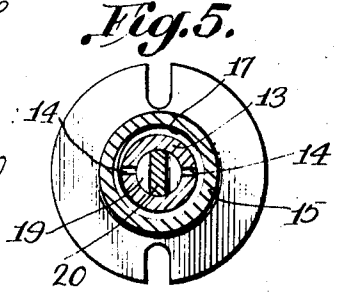
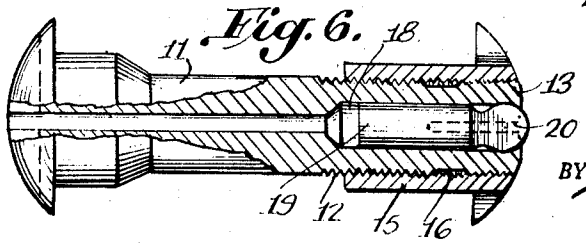


Fig. 6.



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UNITED STATES PATENT OFFICE

2,325,608

NUT AND BOLT LOCK

Robert Hofstetter, Alexandria, Va.

Application April 13, 1940, Serial No. 329,561

3 Claims. (Cl. 151—31)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government of the United States for governmental purposes without the payment to me of any royalty thereon in accordance with the provisions of the act of April 30, 1928 (Ch. 460, 45 Stat. L. 467).

This invention pertains to nut and bolt locks and more specifically to the type thereof wherein the bolt is expanded into locked engagement with the nut.

Among the objects of my invention are simplicity of construction and application, and security in locking effect to render the same fool proof as well as to prevent a loosening of the couple by ordinary strain, vibration, friction, etc.

With the foregoing and other objects in view, my invention resides in the combination of parts and in the details of construction hereinafter set forth in the following specification and appended claims, certain embodiments thereof having the characteristics of my invention and by which the same may be practiced being illustrated in the accompanying drawing, in which—

Fig. 1 is illustrative of an assembled embodiment in demonstrative application;

Fig. 2, an unassembled view of the elements of the combination;

Fig. 3 the nut in cross section as applied to the bolt prior to the locking of one with respect to the other as illustrated in Fig. 4;

Fig. 5 a cross section taken at 5—5 of Fig. 4; and

Fig. 6, an assembled modified form also illustrating characteristics of my invention.

Broadly, my invention comprises male and female members provided with cooperative means for journaling one within the other, an expansible end portion of one of which is adapted to pass within a portion of the other, said expansible portion being provided with means adapted to grip a portion of the inner side walls of the other, and means for expanding said expansible portion into non-reciprocative and non-rotative relation with respect to the other.

By reference to the drawing it will be seen that a practical form of my invention comprises a bolt, the body or shank portion 11 of which is provided with a threaded section 12 projecting beyond which is an expansible end portions 13. The end portion 13 is made expansible such as by the provision of a transverse slot or cut 14 in order that the segments formed by the cross cut may be spread or expanded. A section of the nut 15 is, of course, provided with female threads 16 for cooperatively receiving the male threads of section 12 of the bolt.

In the application of the foregoing improvements the bolt and nut once journaled by their cooperating threads, are fixed in non-reciprocative and non-rotative relation by the expansion of the bolt end portion 13 into gripping relation with the interior walls of the nut.

More specifically, with respect to the detail improvements of the foregoing, the surface of the expansible end portion 13 of the bolt is preferably knurled, serrated or otherwise provided with a roughened and hardened surface which will bite into the interior surfaces of the walls of the commercially soft nut 15 when the segments of the end portion are spread or expanded. The normal diameter of the expansible end portion 13 should preferably be no greater than the root diameter of the threads 12 of the bolt, as distinguished from the outside diameter or pitch of the threads, in order that it may pass through the threaded section of the nut 15.

If the nut 15 be threaded throughout, the biting action of the knurled section will not alone detroy the threads but a lesser gripping surface is provided. It is therefore found desirable that an outermost section 17, comparable in length with that of the knurled surface of the bolt, of interior walls of the nut be left unthreaded. It is also preferable that the section 17 be reamed or cylindrically bored out to a diameter substantially that of the crest diameter of the threaded section of the nut, as shown in Fig. 2, in order that a maximum amount of contact surface be provided for the expansible knurled segments of the bolt end portion and yet allow sufficient spread by a wedge to hold the wedge itself.

The segments of the bolt end portion 13 may be expanded into locking relation with the nut by any suitable method and means. A satisfactory method comprises providing the bolt with a longitudinal bore 18, intersected by the cross cut 14, to serve as a guide for a wedge or a portion thereof. A suitable wedge may therefore be carried by a guiding member which will pass into the bore 18 and guide a wedge acting portion to its most effective seat. Such an arrangement is shown in the drawing wherein it will be seen that a pin 19 which will pass into the bore 18 carries a commercially soft wedge portion 20 at the end thereof. A most practical method of forming such a wedge comprises reducing the diameter of the end section of the pin and then flattening the end of the reduced portion to a width sufficiently greater than the diameter of

the pin as will be required to force the knurled and hardened segments of the slotted end of the bolt into biting relation with the soft interior side walls 17 of the nut 15 when the soft wedge portion 20 is driven into the bore 18. By such formation the forward shoulders of the wedge are made sloping or at least rounded to provide a spreading or wedging action as the pin 19 stears the wedge to its final seat. In placing the wedge it is found desirable that it be set and driven crosswise of the segmenting cross cut or slot 14 where it will have its greatest spreading effect upon the separable segments and be prevented from passing down the cuts or slots 14 with less spreading effect, as shown in Figure 5. This method of applying the wedge would also seem desirable to prevent the wedge from spreading out through the cross slots and biting into the inner side walls of the nut.

To prevent a distortion of the threaded section 12 of the bolt by the application of the wedge 20, the cross cut 14 should terminate short thereof and in order to provide a ready yielding or bend point for the separable segments of the end of the bolt and to prevent their being broken off by the spreading action, an undercut section 21 may be provided, as shown in Fig. 2, at the base of the expansible knurled section, or intermediate that section of the bolt and the threaded portion.

If it is desirable to make the locking action absolutely fool proof, except by the drilling out of the applied wedge, the bore 18 should terminate short of passing completely through the bolt as shown in Figs. 1 through 4, to prevent punching the wedge out from its reverse end. Such removability may be desirable, however, in which event the bore should pass completely through the bolt as shown in Fig. 6 but preferably at a reduced diameter to prevent the driving of the wedge deep enough to release the separable segments of a spreading force. A reverse punching of the wedge may also be prevented in a through-bored bolt by the installation of a stud in the otherwise open end of the passageway.

The bolt head may be of any conventional type or of the screw driver slotted circular type, or of the type shown in Fig. 5, in connection with a type of nut, and be sunk, as shown in Fig. 1, to prevent tampering. For the same purposes the nut 15 may be of a hexagon or a circular headed sleeve type and sunk not alone to prevent tampering but to eliminate projections beyond the surface of the article to which the device is applied.

Having described my invention what I claim is:

1. In a nut and bolt lock, the combination comprising: a bolt having an end section with a peripheral surface, a male threaded section inwardly on the bolt of said end section, the root diameter of the threads of said threaded section being at least as great as the diameter of said end section, and a longitudinal, smooth-surfaced bore having a substantially uniform cross section and a depth extending at least through said end section, said end section being cross-slotted to provide spreadable segments; a nut having a female threaded interior section and a second interior section in the form of a generally cylindrical surface, said nut threads being of a pitch and diameter adapted to be cooperatively journaled with the threaded bolt section, and said cylindrical surface being of a diameter substantially that of the crest diameter of the nut threaded section; one of said bolt and nut surfaces being knurled and the other surface being unthreaded; and a pin having a leading guiding portion of substantially uniform diameter adapted to freely pass into said bore and having a following end portion of a width greater than the diameter of said guiding portion; whereby said pin is adapted to be driven by a sharp blow into said bore with said pin end portion guided into a wedging effect upon the segmented bolt end portion by said pin guiding portion sliding within said bore to force said segmented bolt end portion into engagement with said second interior section of the nut, and thereby to provide an interlocking relation of said knurled surface and said unthreaded surface for locking said bolt and nut into non-reciprocative and non-rotative relation.

2. In a nut and bolt lock, the combination comprising: a bolt having an end section with a peripheral surface, a male threaded section inwardly on the bolt of said end section, the root diameter of the threads of said threaded section being at least as great as the diameter of said end section, an undercut section of lesser diameter and intermediate of said end and threaded sections, and a longitudinal, smooth-surfaced bore having a substantially uniform cross section and a depth extending at least through said end section and said undercut section, said end section and at least a portion of said undercut section being cross-slotted to provide spreadable segments; a nut having a female threaded interior section and a second interior section in the form of a generally cylindrical surface, said nut threads being of a pitch and diameter adapted to be cooperatively journaled with the threaded bolt section, and said cylindrical surface being of a diameter substantially that of the crest diameter of the nut threaded section; one of said bolt and nut surfaces being knurled and hardened and the other surface being unthreaded and relatively soft; and a pin having a leading guiding portion of substantially uniform diameter adapted to freely pass into said bore and having a following end portion of a width greater than the diameter of said guiding portion; whereby said pin is adapted to be driven by a sharp blow into said bore with said pin end portion guided into a wedging effect upon the segmented bolt end portion by said pin guiding portion sliding within said bore to force said segmented bolt end portion into engagement with said second interior section of the nut, and thereby to provide an interlocking relation of said knurled surface and said unthreaded surface for locking said bolt and nut into non-reciprocative and non-rotative relation.

3. In nut and bolt locks, a bolt having a hardened end section surficially provided with a roughened biting surface, a male threaded section, inwardly on the bolt of said end section, the root diameter of the threads of said section being at least as great as the diameter of said end section, an undercut section of lesser diameter than and intermediate of said end and threaded sections, said end section and at least a portion of said undercut section being cross-slotted to provide spreadable segments, said bolt having a longitudinal smooth-surfaced-cylindrical bore of substantially uniform diameter for at least a depth extending through said end section and said undercut section and into said threaded section, in combination with a nut having a fe-

male threaded interior section and an unthreaded, relatively soft interior section, said nut threads being of a pitch and diameter adapted to be cooperatively journaled with the threaded bolt section and said unthreaded nut section being of a diameter substantially that of the crest diameter of the nut threaded section, and a wedge having a smooth-surfaced, guiding portion of substantially uniform diameter adapted to freely pass into the bore of said bolt and having a relatively soft end portion flattened to a width greater than the substantially uniform diameter of said guiding portion whereby said wedge is adapted to be driven by a sharp blow into said bore with said flattened end portion guided into a wedging effect upon the segmented bolt end portion by said wedge guiding portion sliding within said bore to force the roughened surface of said hardened segmented bolt end portion into biting and positive gripping relation with the relatively soft interior of said unthreaded nut section.

ROBERT HOFSTETTER.