Dec. 9, 1969 S. NEWELL ET AL 3,482,481

BOLT OR NUT HEAD

Filed Oct. 24, 1968 3 Sheets-Sheet 1

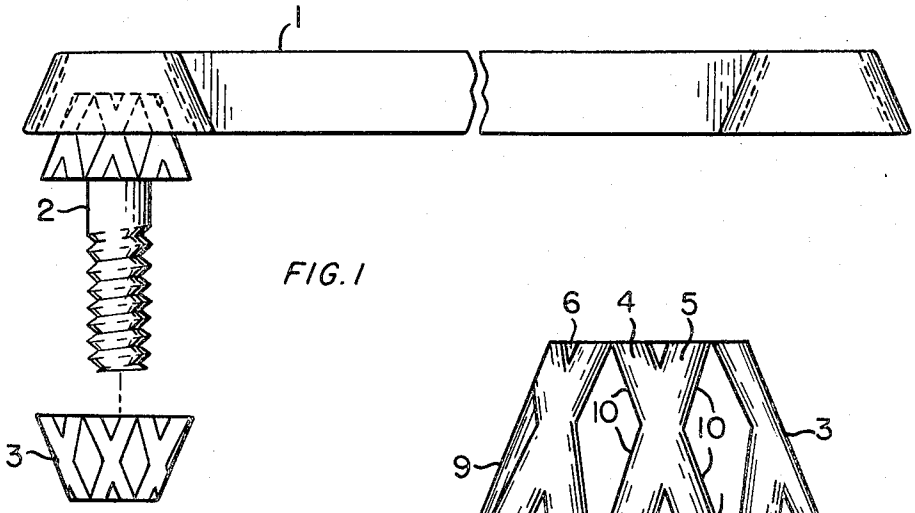

FIG. 1

FIG. 2

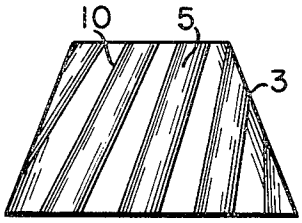

FIG. 5

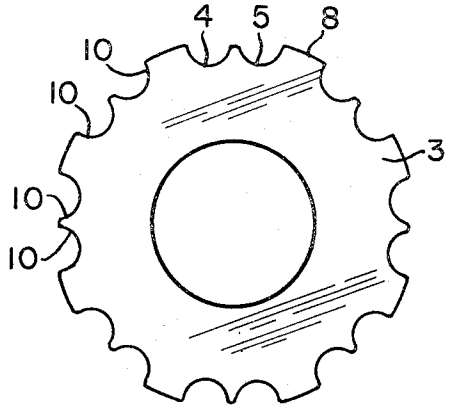

FIG. 3

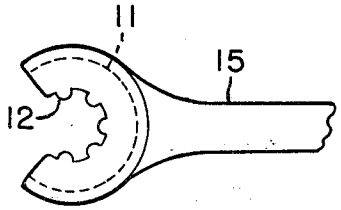

FIG. 4

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BOLT OR NUT HEAD

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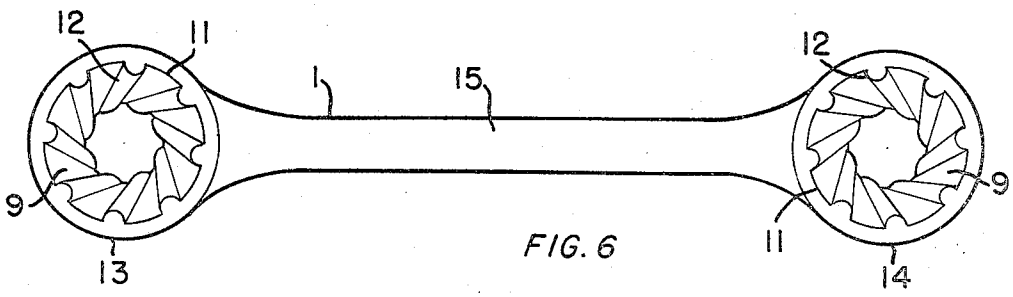

FIG. 6

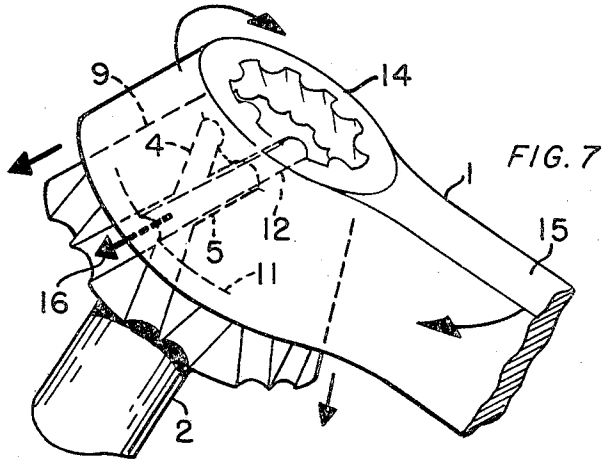

FIG. 7

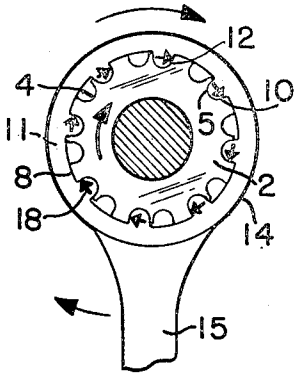

FIG. 8

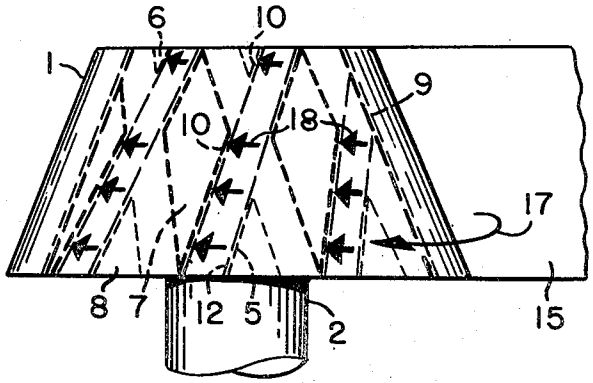

FIG. 9

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Dec. 9, 1969 S. NEWELL ET AL 3,482,481

BOLT OR NUT HEAD

Filed Oct. 24, 1968 3 Sheets-Sheet 3

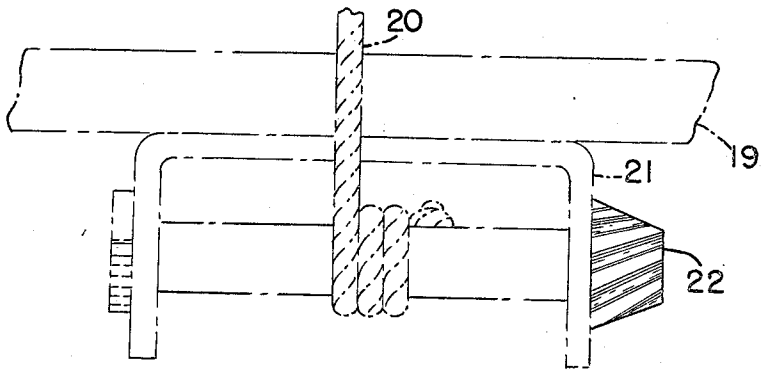

FIG. 10

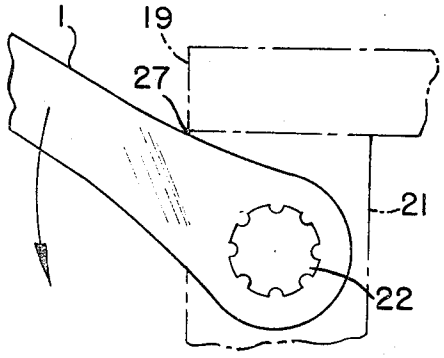

FIG. 14

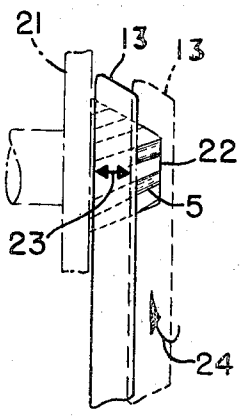

FIG. 11

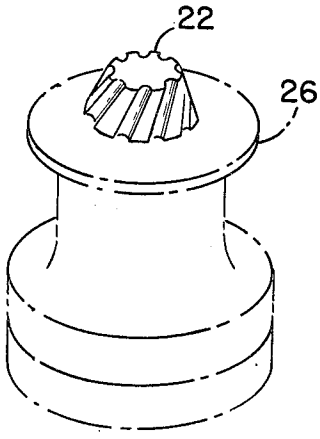

FIG. 13

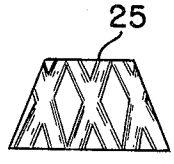

FIG. 12

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3,482,481

BOLT OR NUT HEAD

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Continuation-in-part of application Ser. No. 747,553, July 25, 1968. This application Oct. 24, 1968, Ser. No. 770,369

Int. Cl. F16b *23/00, 35/00;* B25b *13/02*

U.S. Cl. 85—45 6 Claims

ABSTRACT OF THE DISCLOSURE

A drive for nuts, bolts, winches, spools and the like including a drive head having a frustroconical shaped drive surface, said surface having grooves or ribs formed therein which have substantially parallel sides and are oblique to the generatrix of the surface, and a drive member for operative engagement with said head having cooperating ribs or grooves, the cooperating structure of the drive head and drive member providing a novel ratcheting function.

This is a continuation-in-part application of that filed herein on July 25, 1968, with Ser. No. 747,553, now abandoned.

BACKGROUND OF THE INVENTION

The vertical smooth faces of the usual polygon type nut often cause undesirable results. As is well known, wrenches cannot always get a good grip. Undesirable loose wrench fits and rounded corners on nuts are not uncommon. Slippage occurs. Also, the position of the nut in respect to other objects around it sometimes makes it difficult or impractical to tighten or loosen the nut. And too, time is lost and tools are sometimes damaged in attempting to seat the wrench on the nut. These problems occur with power wrenches sometimes even in visible positions such as with vehicle wheel lugs. In places invisible to the operator the problem of fitting the wrench on the nut is compounded.

Nut or bolt like drive heads are commonly formed to accept a wrench or handle in association with winches, spools or drums. In such structures threads are not involved. However, drive heads having faces like those of nuts or bolts are integral with that portion of the body upon which a rope or line is wound.

Present practice includes the use of wrenches or handles to revolve these drive heads. To get optimum leverage, the wrenches or handles are taken off and on the head several times during one tightening operation. Truck load and cargo securing devices are examples of such arrangements which can be improved by use of our invention. Ratchet arrangements have found very limited application in non-threaded winches and the like.

Ratchet wrenches are made to avoid the problem of re-locating and re-mating of wrench with nut for optimum leverage. Ratchet arrangements are in the wrench head. This enlarges the head and makes it less usable in tight places than it would be without the ratchet. The moving parts of a ratchet system are also disadvantageous. They add to manufacture and repair costs.

Problems are associated with conventional socket wrenches. Socket wrenches sometimes extend beyond the base of the nut. This may result in needless damage.

To overcome the problem of wrench extending beyond the nut, flanges are sometimes formed around the periphery at the base of the nut. Such flanges are often broken by the force of the tool. Improvement is indicated.

Until now no quick and easy way to avoid these hardships has been submitted.

SUMMARY OF INVENTION

Although "nut" is mentioned throughout, it is to be understood that my invention is equally applicable to drive heads for accepting a wrench or drive member during a turning action. The word "nut" as used herein shall include bolt and drive heads and the like, unless otherwise indicated.

My invention consists of a nut with a conventional inner structure but with the outer configuration of a cone segment, i.e., a frustroconical surface. The vertex of the segment is distal to the threads in the bolt head form of my invention. In its nut form, the base of the cone segment shall engage the threads first. In both forms the vertex end shall first confront a matching wrench.

There are a plurality of identical straight but slanted grooves uniformly spaced completely around the outer frustraconical surface of the body portion each of said grooves being oblique to the generatrix of the surface. Each groove extends from the base to the vertex of the frustrum. The size of the nut may determine their number. For best results each groove is pitched at an angle of about 20 degrees off a line along the surface of the body portion which is perpendicular to the circumference of the base of the frustrum, i.e., the generatrix.

A second set of such grooves is also arranged on said surface. They are like the first mentioned grooves except that they slant in the opposite direction. This results in the crossing of every groove with a member of the opposing set at a point slightly above the midsection of the frustrum when ends of opposing grooves are adjacent.

For practical use of the nut or drive head a matching wrench head or drive member is provided. It has splines or ribs to mate with the grooves of the drive head. I find that eight ribs is an optimum number. There may be eight similarly aligned grooves whereby the ribs will occupy all the aligned grooves. The inner surface of the wrench head is frustroconical and dimensioned to fit snugly on the nut. The remainder of the wrench may be of the box, open end or any other conventional variety.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings forming a part hereof:

FIGURE 1 is a side elevation showing a wrench aligned over a bolt head and my novel nut shown separate therefrom.

FIGURE 2 is a side elevation of my novel nut showing the lateral grooves.

FIGURE 3 is a top plan view of the nut with a double set of grooves.

FIGURE 4 is my novel open end or segmental complementary wrench for use with my novel nut which is particularly useful for drive heads which are close to an abutting wall.

FIGURE 5 is a side elevation of the nut with a single set of grooves.

FIGURE 6 is a plan view from the bottom showing a box wrench with splines at one end to tighten a nut and splines at the other end to loosen the same nut.

FIGURE 7 is a perspective view showing engagement of the wrench head with a bolt head.

FIGURE 8 is a plan view of my novel nut engaged with a closed end wrench.

FIGURE 9 is a side elevation thereof showing places of contact between the wrench ribs and the nut grooves.

FIGURE 10 is a side elevation view of the device used as a winch to secure loads on truck beds..

FIGURE 11 is a side view of a portion thereof with a portion of the associated wrench.

FIGURE 12 is a side elevation view of an unthreaded reversible drive head form of my invention.

FIGURE 13 is a perspective view of such drive head integrated with a drum.

FIGURE 14 is a side elevation of the form of the device shown in in FIGURE 10.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to the drawings numeral **1** represents a wrench having my novel drive head. One end of the wrench may have a head **13** containing ribs or splines **12** for occupying the slanted recesses or grooves **5** of the novel nut or bolt head. When handle **15** is turned in the direction of arrows of FIGURE 7, the angle of the grooves on the nut causes the wrench to slide down into grooves **5** in the direction of arrow **16**. The natural resolution of forces causes the wrench to seat. The leading edges **10** of ribs **12** abut the entire length of recess **5** at its wall. As can best be seen in FIGURE 9, the greater the force in the direction of arrow **17** the greater will be the deployed force represented by multiple arrows **18**. The force applied to turn the nut is in direct proportion to resultant force which retains the ribs in the grooves, not unlike the desired wedging action of the well known V-shaped pulley. Experience shows that strong wrench handles will break before shearing occurs.

A theft proof nut may take the form of that illustrated in FIGURE 5. There, a single set of grooves on surface **3** permits a wrench to tighten the nut but there is no reverse means to loosen the nut. This is designed to frustrate a thief since he would probably not be able to turn the nut.

For both tightening and loosening the double set of oppositely disposed oblique grooves **4** and **5** of FIGURE 2 are provided. Dotted line **9** suggests their optimum pitch. Such profile gives parallelogram **7** and triangles **6** and **8** configurations. Supposing such nut were on threaded member **2**, one end of the wrench of FIGURE 6 could be used to tighten the nut. To obtain the equivalent of ratchet action the operator merely reverses the wrench rotation a portion of a turn. Upon reversal, the equal and opposite force to that securing and holding engagement now causes the wrench head to partially separate from the nut. This separation occurs until the point is reached whereby each rib may slide across the frustroconical surface between the grooves, each rib then dropping into the next groove stopping the backward action, and the operator may again move the wrench forward as before. The ribs and grooves will naturally mate, as before, but the handle will be in a new and better position for leverage.

For loosening the nut the opposite end **14** of the wrench **1** of FIGURE 6 is set on the head. Easy alignment occurs, even in invisible places, because the small vertex of the nut first meets the much broader base of the wrench's inner frustrum **11**. The other set of slanted grooves of the nut are automatically mated because only they are aligned with the wrench ribs. Force on the handle loosens the nut. The advantage of ratchet action is again available. The operation is the same except that the direction is reversed.

Turning now to the unthreaded form of the invention shown on the last page of the drawings, number **25** of FIGURE 12 illustrates such head with crossed-grooves for tightening or loosening with a wrench.

FIGURE 10 shows the novel head **22** in position for accepting mating handle **1** to tighten rope **20**. Usual brace **21** secures the device to the underside of truck bed **19**. To get "bites" during the rope tightening process, handle **1** is only partially removed (the distance of arrows **23**) from nut **22**, the operator raises the handle in direction of arrow **24** to point of contact **27** with bed **19**. Further tightening may then result as the handle is moved in the direction of the arrow of FIGURE 14.

The spool **26** of FIGURE 13 indicates a form which our invention may take, when it is desired to wind a rope or a line, under tension, around a surface.

Having described my invention, I claim as follows:

1. A bolt having a threaded shaft and drive head therefor;

said drive head being adapted for driving rotation by engagement with a driving tool;

said drive head comprising a body portion provided with a frustroconical shaped surface symmetrically disposed around the central axis of the body portion; and

the said surface of said body portion having a plurality of uniform grooves formed therein disposed equidistant one from the other, said grooves having substantially parallel sides and being oblique to the generatrix of said frustroconical surface.

2. In a nut combination of:

(a) a drive body portion adapted to being rotatably driven by engagement with a driving tool;

(b) said body portion being provided with a frustroconical shaped surface symmetrically disposed around the central axis of the body portion; and

(c) the said surface of the body portion having a plurality of uniform grooves formed therein disposed equidistant from one another, said grooves having substantially parallel sides and being oblique to the generatrix of said frustroconical surface.

3. A structure according to claim **2** wherein said grooves are inclined approximately twenty degrees from said generatrix.

4. A structure according to claim **2**, wherein said grooves comprise two groups, one group of said grooves being inclined in one direction and a second group being inclined in an opposite direction, the individual grooves in one of said groups intersecting their counterparts in the other of said groups.

5. In a nut combination,

a driven head member and a drive head tool member for rotating said driven head;

each of said members being provided with a frustroconical shaped surface symmetrically disposed around the central axis of its head, said surfaces being dimensioned for mating engagement;

one of said frustroconical surfaces having a plurality of uniform grooves formed therein disposed equidistant from one another, said grooves having substantially parallel sides and being oblique to the generatrix of the said frustroconical surface; and

the other of said frustroconical surfaces having a plurality of ribs formed therein oblique to the generatrix of said other frustroconical surface, said ribs being dimensioned and positioned to cooperatively engage the grooves in said first surface.

6. A combination as set forth in claim **5**, the ribs or grooves of at least one of said frustroconical surfaces comprising two groups, one group thereof being inclined in one direction and a second group being inclined in an opposite direction, the individual ribs or grooves in one of said groups intersecting their counterparts in the other of said groups.

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RAMON S. BRITTS, Primary Examiner

U.S. Cl. X.R.

81—119