

UNITED STATES PATENT OFFICE

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NUT DRIVER

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5 Claims. (Cl. 81-125)

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This invention relates to tools and more particularly to tools of the nature known as nut drivers for use in quickly securing a plurality of nuts to their studs. This tool is particularly useful where it is necessary to use large quantities of nuts when assembling built-up parts, such as in work on airplanes; automobiles; radios, etc., wherein valuable time is wasted while nuts are threaded first by hand and later tightened by a wrench of some type.

This invention also has as a further object an improvement in a magazine type nut driver wherein the unscrewed nuts are stored within the bore of a detachable magazine, said magazine being disposed within the main body of the driver, which driver permits only the subsequent expression of the nuts one at a time under the influence of a control system located within the head of the tool.

While the drawings illustrate an embodiment of the invention, it is to be understood that in adapting the same to meet different conditions and requirements, various changes in the form, proportion and minor details of construction may be resorted to without departing from the nature of the invention.

The above and other objects will appear more fully from the following description, and from the drawings, wherein

Fig. 1 is a side elevational view of the device per se;

Fig. 2 is a sectional view taken substantially on line 2-2 of Fig. 1;

Fig. 3 is a sectional view taken substantially on line 3-3 of Fig. 2;

Fig. 4 is a section taken substantially on line 4-4 of Fig. 2;

Fig. 5 is a section taken substantially on line 5-5 of Fig. 2;

Fig. 6 is a sectional view of the head showing the dogs in a different position;

Fig. 7 is an elevational view of the tube which contains the magazine, showing the bayonet lock connection;

Fig. 8 shows a split ring spring which forms part of the coupling mechanism shown on the upper end of tool, Fig. 1; and

Fig. 9 shows a socket which is detachably connected to the spindle of a driving mechanism and which socket fits over the hex projection shown on the driven end of the tool, Fig. 1.

Referring now to the drawings, numeral 10 designates a cylindrical tube formed of tool steel, plastic or other well-known substance substantial enough to stand the strain required of a tool

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of this character. Formed as an integral part of tube 10 is coupling 11 which consists of a projection formed hexagonally, the hex being the same size as the nut being used in the tool. Midway on hex 11 there is formed an annular recess adapted to receive split ring 32, shown in Fig. 8, the hex and ring forming a locking or coupling mechanism later to be described. Detachably secured to the opposite end of tube 10 is head 12, the same being knurled to form a turning grip to enable the user to disengage the head from the tube when desired. Head 12 is formed in two parts, the front or active portion of the head 13 being formed in the shape of a cone to engage the threaded portion of the stud to be threaded or engage the nut being used. Section 13 is also threaded to engage section 12, and when the two parts or sections are engaged they form the complete head.

Suitably nested within tube 10 there is provided a detachable magazine 14, the same being open at both ends, hexagonal in shape and adapted to receive a plurality of hexagonally-shaped nuts and hold the same in aligned relationship within said magazine. It is necessary with the present invention to have one tool for each size of nut being used, but each tool may have any number of magazines which can be loaded at any time ready for use. The magazines may also be constructed of any cheap material, such as stiff paper, plastics, etc., but they must conform to the particular tool in which they are used as to the shape thereof and size of nut being used in that particular tool.

So that magazine 14 may be quickly inserted within tube 10, head 12 may be easily disengaged from tube 10 by a simple half-turn of same which will disengage same from bayonet lock 15, Fig. 7. A coil spring 17, having a piston 18 disposed within the lower end of same, is provided and formed to fit telescopically within magazine 14 and serves to eject the nuts 16 one at a time as permitted by the nut retention dogs 19, Figs. 2 and 6. These dogs 19 are located in head 12 and are mounted diametrically on either side of hexagonally-shaped opening 20, Fig. 3, the same being pivotally mounted on pins 21 which allow the dogs to rock. A split ring 22 is mounted in an annular groove 23, Figs. 2, 3 and 6, said ring 22 being mounted to engage the top of dogs 19 and limit their path of movement in a manner later to be described.

To compress spring 17, when desired, there is provided a knurled ring 24, slidably mounted on tube 10. A transverse shaft 25 is held securely

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by said ring 24 and rides in a pair of opposed slots 26 to allow longitudinal movement of ring 24. Shaft 25 also rigidly supports stud 27, which is adapted to receive one end of coil spring 17. A bayonet lock 28 is also provided for ring 24 to lock said ring in a set position for a purpose later to be described. Pins 28 in head 12 project inwardly to contact bayonet lock 15 to lock head 12 to tube 10.

The manner in which the device operates is as follows:

It is necessary to have a separate tool for each size of nut being used, but each tool may have any number of magazines just so long as the magazines are adapted to receive the size nut being used in the tool. The magazines are loaded in advance and kept ready for use when needed. To load the tool the complete head 12 is removed from the main body of the tool 10 and ring 24 is slid to the tool's extremity near the driver coupling at the top thereof. The ejecting end of filled magazine 14, with the flat side of nuts 16 toward ejecting end of said magazine, is first inserted into removed head 12 until same abuts against shoulder 31 formed therein and which acts as a stop and also aligns the nut-ejecting opening in the magazine with hexagonal opening 29 in head 12. By inserting the ejecting end of magazine 14 into head 12 first, the nuts are prevented from slipping out as spring pressure is later applied. The opposite end of magazine 14 is then inserted into tube 10 until its open end abuts against shoulder 30 formed therein. As the magazine is being inserted, piston 18, which in turn is disposed within coil spring 17, engages the last nut 16 in open end of magazine 14, and inasmuch as the opposite end of coil spring 17 is aligned with and engages stud 27, as the magazine travels into tube 10, coil spring 17 is compressed and pressure is brought to bear on nuts 16 tending to force them downwardly in the magazine toward the ejecting dogs 19. When the magazine has been inserted its entire length, head 12 is then locked into place by means of bayonet lock 15. The tool is then ready to use.

An air driver, or other type of driving mechanism, is then coupled to coupling 11. As shown best in Fig. 1 of the drawings, the coupling is formed hexagonally, the hex being the same size as the nuts being used in that particular tool. A split ring 32 is seated midway on said hex 11 in a groove provided therefor, and to engage said hex there is also provided a socket 35 adapted to engage said hex, the socket being hexagonal in shape and having an annular recess midway therein so that when the socket engages the hex the same is snapped into place in non-rotatable engagement so that when the socket and hex are locked, and the driver rotated, the entire tool 10 is turned in a clockwise direction. The spindle on most driving tools is threaded and the socket 35 is constructed with a threaded recessed end portion adapted to receive the threaded portion of the spindle used on most driving mechanisms. The reason for making the hex 11 the same size as the nut being used in that particular tool and the socket capable of fitting thereover, is that the user may use the socket 35 in the driving mechanism to further test if a nut has been driven home. The user simply disengages the socket from the hex and the socket being capable of engaging the nuts being used in that particular tool, the socket is placed directly over the nut to be tested to see if same is tight.

As the user places the active or housing nose

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portion 13 of head 12 against threaded stud 20, Fig. 6, which is to engage the first nut in magazine 14, and as the entire tool 10 rotates in a clockwise direction, the spring pressure exerted by means of spring 17 tends to force nuts 16 downwardly towards head 12 through magazine 14. As the first nut catches the tread of stud 30 the first nut has been forced out of magazine 14 into hexagonally shaped opening 20 located in head 12, where it rests, as shown in Fig. 2, with the forward or hooked portions of dogs 19 tending to prevent the nut from falling out of the head. As the nut engages the stud and is driven home, the opposed dogs 19 rock on their pivots the slight distance allowed by split ring 22, which passes thereover, and which expands sufficiently in annular groove 23 to allow this slight expansion to take place. As the nut 16 passes the hooked portion of dogs 19 the leg portion of the dogs is forced downwardly to prevent the next nut from being ejected, Fig. 6. Once the engaged nut has passed out of head 12, dogs 19 return to the position shown in Fig. 2 of the drawings and the operator moves the tool to the next stud to receive the next nut. As more nuts are threaded to their studs the tension on coil spring 17 is lessened and to take up this slack the operator simply slides knurled ring 24 downwardly in slots 26 and locks same in bayonet lock 28, Fig. 7. Inasmuch as stud 27 is held rigidly to shaft 25, and stud 27 engages coil spring 17, spring 17 is compressed against the nuts remaining in magazine 14 so that the nuts remaining in said magazine will be used. When the last nut in magazine 14 has been used, it is time to remove head 12 and reload. It will be seen from the above description that but one nut can be released at a time and once a nut has engaged its threaded stud and been driven home, the dog and spring mechanism has brought another nut into place ready to engage the next stud to receive a nut. In high speed production where it is necessary to thread a number of nuts on to a plurality of studs it will be seen that with this type of tool, its capacity is only limited by the activity of the user and his ability to reload the tool quickly with a filled magazine, once the one in the tool becomes exhausted. The tool is simple in construction and has but few working parts to wear. The working housing 13 of head 12 is threaded upon head 12 and may be quickly removed revealing the ejecting mechanism comprising the pivoted dogs and split ring spring which passes over the opposed dogs and tends to hold them in their normal position shown in Fig. 2. A refilled nut magazine may be inserted quickly by simply removing entire head 12 which is removed from its bayonet lock 15 by a simple half-turn. The magazine 14 fits neatly within tube 10, the lower or ejecting end of same aligning with hexagonal opening 20 in head 12 so that the nuts from magazine 14 pass downwardly in proper alignment and the ejection mechanism in head 12 is so constructed that but one nut at a time may leave the tool and simultaneously bring the next nut into position to engage the stud thread.

There has been disclosed herein a tool of unique design and one that has proven most practical in actual high-speed production where it is necessary to thread a great number of nuts onto a plurality of studs in a short period of time. Although the invention has been described as applied to a specific installation, it is understood that certain variations and modifications may be

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employed without departing from the fundamental principles as indicated by the scope of the following claims.

I claim:

1. In a driver for nuts of non-circular configuration, a tubular body, a detachable driving end on said body detachably secured to said tubular body and having a bore of the size and shape to drivingly engage a nut to be driven, means for receiving driving movement and imparting said driving movement to said body, an elongated tubular nut receiving magazine adapted to be inserted within said tubular body, and means to secure the tubular magazine to hold said nuts in vertical alignment with said driving end.

2. In a driver for nuts of non-circular configuration, a tubular body, a detachable driving end on said body detachably secured to said tubular body having a bore of the size and shape to drivingly engage a nut to be driven, means for receiving driving movement and imparting said driving movement to said body, an elongated non-circular tubular nut receiving magazine adapted to be inserted within said tubular body once said detachable driving end has been removed from said tube, the same being adapted to hold said nuts in vertical alignment with said driving end, and spring means for constantly urging the nuts out of said magazine and into driving relationship with respect to said bore in said head.

3. In a driver for nuts of non-circular configuration, a tubular body, a detachable driving end on said body detachably secured to said tubular body, an elongated non-circular tubular nut receiving magazine adapted to be inserted within said tubular body once said detachable driving end has been removed from said tube, said magazine being adapted to hold said nuts in vertical alignment with said detachable driving end, a sleeve member slidably mounted upon said tubular body, spring means interposed between said sleeve member and the nuts in said magazine, said sleeve member being capable of being moved toward said detachable head and locked, once said non-circular tubular nut receiving magazine has been partially depleted of its contents, to cause the remainder of said nuts in said magazine to be fed to said detachable driving head.

4. In a driver for driving nuts of non-circular

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configuration upon their stems, a tubular body, a detachable driving end on said body detachably secured to said tubular body, an elongated non-circular tubular nut receiving magazine adapted to be inserted within said tubular body once said detachable driving end has been removed from said tube, said magazine being adapted to hold said nuts in vertical alignment with said detachable driving end, means mounted in said driving end to deliver one nut at a time, said means comprising a pair of opposed double pronged dogs having pivotal mountings so as to permit spacing of the driven and undriven nuts so that the driven nut is driven completely home on its stem before release of the succeeding nut.

5. In a driver for driving nuts of non-circular configuration upon their stems, a tubular body, a detachable driving end on said body detachably secured to said tubular body, an elongated non-circular tubular nut receiving magazine adapted to be inserted within said tubular body once said detachable driving end has been removed from said tube, said magazine being adapted to hold said nuts in vertical alignment with said detachable driving end upon replacement of said detachable driving head, and means in said driving end, comprising opposed double pronged dogs arranged to deliver nuts in seriatim to their respective studs.

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