June 28, 1966 C. WEIDAUER 3,257,876

MAGNETIC CHUCKING DEVICE

Filed Jan. 21, 1965 2 Sheets-Sheet 1

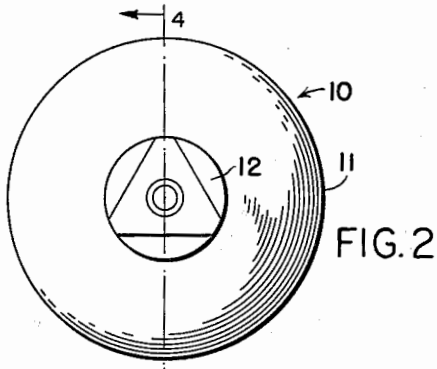

FIG. 2

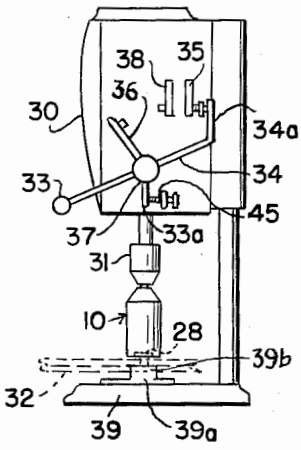

FIG. 3

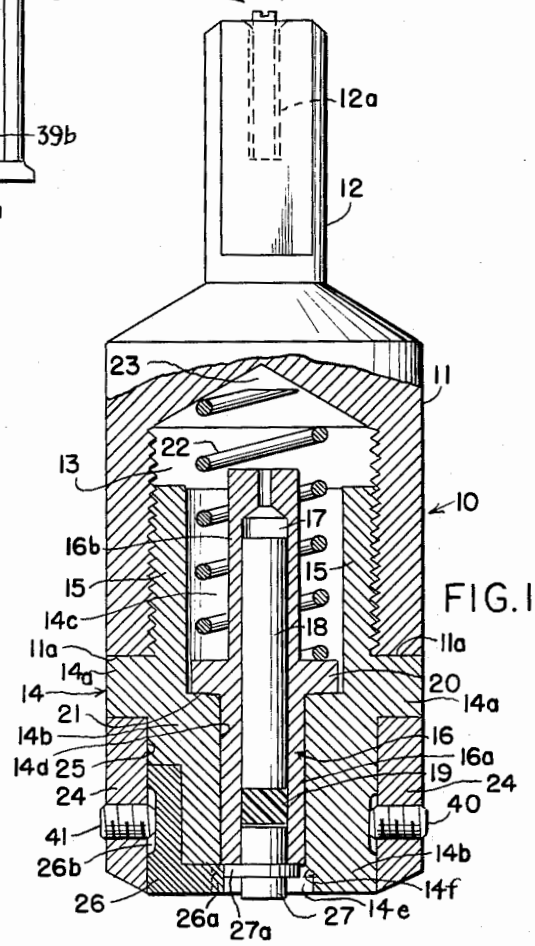

FIG. 1

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June 28, 1966 C. WEIDAUER 3,257,876

MAGNETIC CHUCKING DEVICE

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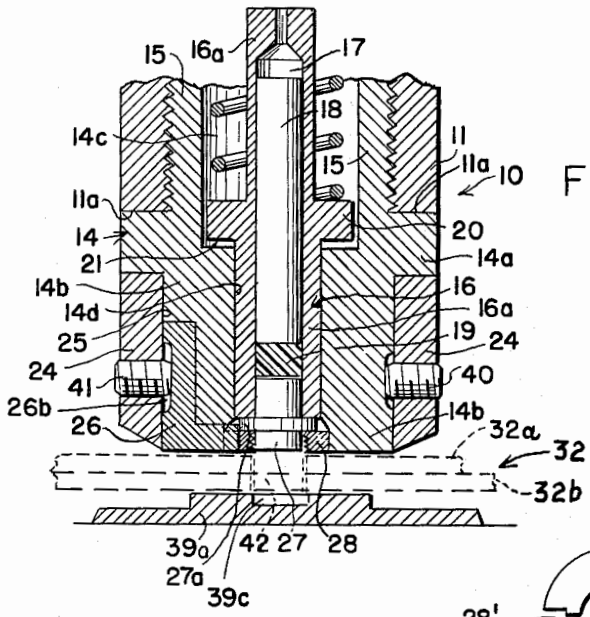

FIG.4

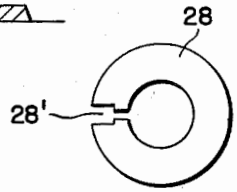

FIG. 5

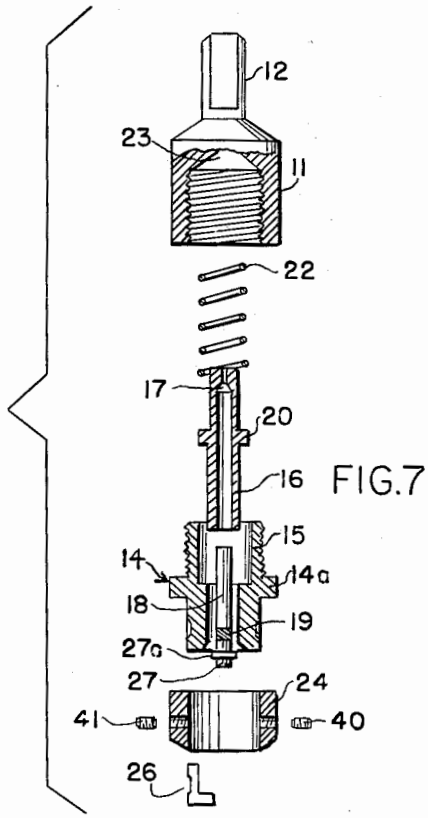

FIG.7

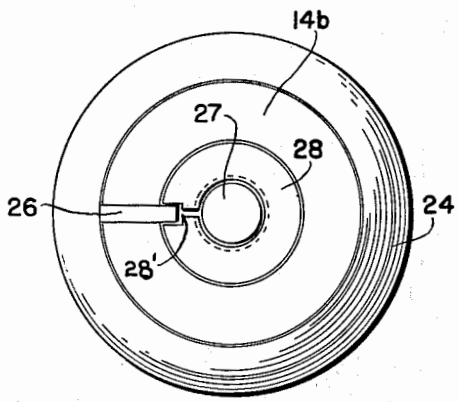

FIG.6

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MAGNETIC CHUCKING DEVICE

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Filed Jan. 21, 1965, Ser. No. 427,062
6 Claims. (Cl. 81—54)

This invention relates to chucking devices and particularly is a precision nut-setting tool or chucking device for receiving a nut to be threaded onto a pivotal stud, such as that used in pivotally connecting blades of shears, and is a continuation-in-part of my application Serial No. 226,041, filed September 25, 1962, now abandoned.

A final step in assembling shears, particularly pinking shears, is the screwing and tightening of the nut on the pivotal stud. Since the proper function of the shears depends to a great extent upon the correct force with which the blades of the shears are pressed together, it is very important that the nut on the pivotal stud is tightened properly, that is, neither too tightly, nor too loosely. Furthermore, since these nuts are small, have a special shape and require a suitable wrench for tightening, the process of screwing these nuts onto the studs by hand is inefficient and inaccurate, and depends largely on the skill and attention of the workman.

This situation is improved by the present invention which comprises a chucking device for setting a small nut on a short stud which constitutes a pivot for the intersecting movable blades of shears, scissors or like tool. The device has a body, which is provided with a shank for insertion within the socket end of the drill shaft of a conventional drill press. Basically, the body which consists of two interengaging parts having cavities, contains in its inner cavity a spring-loaded hollow plunger having a flange so that this plunger cannot move outwardly beyond a set limit. In the hollow of the plunger is a permanent magnet for holding the nut prior to being screwed onto the stud. A non-magnetic insert at the end of the magnet regulates the intensity of the magnetic flux by which the nut is held in place. Provision furthermore is made for preventing the nut from rotating freely; in other words, the nut is held in place so that only the setting device will rotate it. More specific details are shown and described in connection with the device herein disclosed by way of example only and as illustrative of a preferred embodiment.

Objects and advantages of the invention will be set forth in part hereafter and in part will be obvious herefrom or may be learned by practicing the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

It is the object of this invention to provide a novel contrivance for receiving a nut to be screwed onto a stud.

Another object of the present invention is to provide a new chucking device which can be used in a machine tool having a rotating tool spindle, such as a drill press or the like.

A further object of the invention is to provide a production device for attaching a nut on a pivotal stud used in connecting shear blades, which is efficient, easy and safe to operate.

Various further and more specific purposes, features and advantages will clearly appear from the detailed description given below taken in connection with the accompanying drawing which forms part of this specification and which illustrates merely by way of example one embodiment of the device of the invention.

In the drawing:

FIG. 1 is a longitudinal section of the precision nut-setting tool or chucking device;

FIG. 2 is a top view of the chucking device;

FIG. 3 illustrates the application of the device in a bench-type drill press;

FIG. 4 is a detail longitudinal section of a portion of the chucking device of FIG. 2;

FIG. 5 is a plan view of a nut to be tightened on the shear pivot stud;

FIG. 6 is a bottom view of the chucking device of FIG. 4 (slightly enlarged) with nut applied; and

FIG. 7 is an exploded view of the elements which comprise the nut-setting tool or chucking device according to the invention.

In the following description and in the claims, parts will be identified by specific names for convenience, but such names are intended to be as generic in their application to similar parts as the art will permit. Like reference characters denote like parts in the several figures of the drawing.

Referring now in more detail to the drawing illustrating a preferred embodiment by which the invention may be realized, there is disclosed in FIG. 1 a nut-setting tool or chucking device denoted by the general numeral **10** comprising a body **11** which has a shank **12** for being inserted in any conventional spindle chuck of a machine tool, for example, in a bench-type drill press **30**, as shown in FIG. 3. Body **11** has a cylindrical bore or cavity **13** which is internally threaded for receiving a bushing **14** made preferably of case-hardened steel and which is correspondingly externally threaded on its upper annular portion **15**.

Bushing **14** has an annular flanged portion **14***a* which abuts against the lower face **11***a* of body **11**, and further, has an annular portion **14***b* which extends from the flanged portion **14***a*. The outer wall of flanged portion **14***a* is preferably flush with the outer wall of body **11**. Bushing **14** has a cylindrical bore or axial cavity **14***c* and a reduced cylindrical bore or cavity **14***d* communicating therewith, an annular shoulder **21** being formed thereby. It is understood that body **11** and member or bushing **14** may comprise a unitary housing.

Within bushing **14** is a concentrically located insert or plunger **16**, which is provided with an annular flanged portion **20** adapted to coact with step or shoulder **21**, a lower cylindrical portion **16***a* fitting axial bore **14***d* and a reduced upper cylindrical portion **16***b* which extends upwardly from flanged portion **20** within bore **14***c*. Portion **16***a* of plunger **16** is shorter than bore **14***d*. Below portion **16***a* of plunger **16**, bore **14***d* is enlarged, providing an annular space **14***e* and by which enlargement an annular abutment or shoulder **14***f* is formed for the nut **28** when inserted in space **14***e* for a purpose hereinafter described.

One end of a helical spring **22** surrounding portion **16***a* of plunger **16** normally bears against flanged portion **20**, and its other end bears against the upper extremity **23** of cavity **13**. Thus, plunger **16** is resiliently held in bore **14***c*. Spring **22** is guided by the upper part **16***a* of plunger **16** and presses with its lower end plunger **16** through flange **20** against step or shoulder **21** of bushing **14**. Plunger **16** has a bore **17**, in which a permanent magnet or magnetic core **18** is located. A spacer or shoe **19** is located within bore **17** between magnet **18** and a stud or pilot **27**, preferably made of magnetic material. Plunger **16** and spacer **19** are preferably made of non-magnetic material, such as, for example, brass, aluminum, bronze, carbon, magnesium, etc.; plastics, such as, for example, nylon, Teflon, etc. Spacer or shoe **19** is adapted to limit, weaken or control the magnetic lines of force passing from magnet **18** to pilot **27**. Pilot **27** projects within bore **17** and preferably projects slightly beyond space **14***e* at the bottom of bushing **14**.

The lower extended cylindrical portion **14***b* recedes from flanged portion **14***a* of bushing **14** and forms an annular recess **25**. Disposed within recess **25** and co-

extensive therewith is a ring-shaped bushing **24** whose outer wall is preferably flush with the outer wall of bushing **14**. Bushing **24** is held in place by a set screw **40**. Portion **14***b* of bushing **14** has a vertically disposed L-shaped slot accommodating a corresponding L-shaped key insert **26** having its horizontally disposed angular extension **26***a* projecting inwardly below and in engagement with shoulder **14***f* and slightly within space **14***e*. Key insert **26** has a recess **26***b* and is secured in position by means of a set screw **41** threaded in bushing **24** and engaging at recess **26***d*.

Device **10** is employed to secure a threaded nut **28** (which has a locating slot **28'**) over shear blade **32***a* to the threaded stud **42** which projects from shear blade **32***b* of shears **32**, partly shown in dash lines (FIG. 4). For this purpose, there is provided the nut-receiving part or pilot **27** which has an intermediate flange or collar **27***a* abutting the lower end of portion **16***a* of plunger **16** within space **14***e* and against which nut **28** is magnetically held during operation of the device **10** as seen in FIG. 4. Slot **28'** of nut **28** is made to register with key extension **26***a*, thus locking nut **28** against turning, relative to device **10** when the latter is in operation. Pilot **27** and key extension **26***a* serve as the nut locator means. Bore or space **14***e* is slightly larger in diameter than nut **28** for ease of operation.

Shear blade **32***a* is positioned on shear blade **32***b* such that its pivot hole receives pivot stud **42** secured to shear blade **32***b*. The blade assembly, namely, the work, is placed on base **39** of drill press **30**. Suitable locating means **39***a* may be provided on base **39** to align stud **42** with nut **28**. For this purpose, the locating means **39***a* may be provided with a hole or recess in alignment with pilot **27** and a side stop **39***b* to prevent the work, such as the shears **32**, from turning during the threading operation. Nut **28** is inserted in space **14***e* on pilot **27**, while device **10** is rotating, and during such rotation slot **28'** will register with key extension **26***a*. Nut **28** is magnetically held within space **14***e* by pilot **27** which receives its magnetic force from permanent magnet **18** through spacer **19**. As heretofore stated, spacer **19** limits or controls the desired magnetic force capable of being transmitted to pilot **27** on nut **28**. By means of spacer **19**, the magnetic lines of force from magnet **18** are weakened or reduced so that nut **28** can be aligned more easily with key extension **26***a* and still be strong enough to hold nut **28** in position within space **14***e*.

As illustrated in FIG. 3, device **10** can be attached by its shank **12** to a motor-driven rotatable tool spindle **31** of drill press **30**, for tightening nut **28** on pivot stud **42** of shears **32**. Tool spindle **31** is hand-operated vertically (upwardly and downwardly) by means of manually operable, spring-loaded pivot lever **33**. Conventional connecting means (not shown) between lever **33** and spindle **31** may be employed for this purpose. Lever **33** has a rearwardly extending arm **34** provided with vertical extension **34***a* adapted to contact a cut-off microswitch **35** on extreme downward movement of lever **33** at the same time that lower extension **33***a* of lever **33** abuts against adjustable stop **45**. Lever **33** is provided further with arm **36**, adapted to contact a starting microswitch **38** on its extreme upward movement for starting rotation of spindle **31** and attached nut-setting device **10**. Microswitches **35** and **38** may be secured to the casting of power-driven tool or drill press **30**, as shown or adjacent thereto, and cooperate with a relay (not shown). The microswitches function through the relay. Spring-loaded lever or handle **33** is automatically normally in up position with its arm or extension **36** in contact with starting microswitch **38**.

As heretofore stated, the device **10**, according to the invention, is used for threading or tightening nut **28** on stud **27** a predetermined length or distance thereon. In normal position, the spring-loaded lever or handle **33** is in up position, and rotatable spindle **31** and nut-

setting tool or device **10** attached thereto are in an upward position, that is, away from jig **39***a*, and are rotating clockwise. During this rotation, the operator places nut **28** on a finger of his hand and inserts the same in opening **14***e* in register with pilot **27**. He holds the nut in this position until slot **28'** of nut **28** registers with key portion **26***a* of key **26**, at which time nuts **28** will rotate with device **10**, the nut **28** being magnetically held against pilot **27**. The operator now swings lever **33** downwardly, thereby moving in vertical downward direction spindle **31**, and thus device **10** against the work, thus permitting engagement of the threads of nut **28** and stud **27** of shears **32**. A slight pressure is applied manually to lever **33** by the operator in order to follow up the threading of nut **28** onto stud **42**.

Mechanical stop **33***a*–**45** in conjunction with power cut-off switch **35** determines the lowest possible position of device **10**, which in turn determines the lowest setting of nut **28** on stud **42**. A finer adjustment may be made by adjustable screw **12***a* on shank **12**. At the moment this occurs, lever extension **33***a* engages stop **45** and extension **34***a* contacts switch **35**, thus breaking the electric circuit causing spindle **31** to stop rotating. The nut **28** is now threaded onto stud **42**. The operator then swings lever **33** upward sufficiently so that the shears **32** to which the nut **28** has been threaded may be removed from device **10**. After the shears are removed, the operator continues the upward swing of lever **33** until arm **36** contacts starting microswitch **38**, at which time spindle **31** will start rotating again. A new set of shear blades is positioned on jig **39***a* and the aforementioned steps are repeated.

During the threading operation of nut **28** upon stud **42**, plunger **16** with assembly **18**, **19** and **27** recedes against spring action of helical spring **22**, the latter urging plunger **16** back to step or shoulder **21**, upon withdrawal of the tightened nut on the shears **32** from pilot **27**.

The device of this invention is a precision nut-setting tool which does not require the special attention and skill of an operator and invariably produces more efficient, uniform and precise results.

While the invention has been described and illustrated with respect to a certain preferred example which gives satisfactory results, it will be understood by those skilled in the art after understanding the principle of the invention that various other changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended therefore in the appended claims to cover all such changes and modifications.

I claim:

1. A nut-setting device comprising a hollow internally threaded body having a shank for insertion in a rotatable tool, a member having a first part, a second part and a flange part intermediate said first and second parts, said first part threadedly engaging the threads of said body with said body in engagement with said flange part, said member having connecting axial bores, one of said axial bores being larger in diameter than the other of said axial bores and forming an annular shoulder where said bores connect, an axially movable plunger extending within said bores, said plunger having a first portion, a second portion and a flange portion intermediate said first and second portions, said first portion and said flange portion being disposed within said one of said bores, with said flange portion abutting against said shoulder, said second portion of said plunger being shorter than said second part of said member forming an opening in said other of said axial bores forward of said plunger to accommodate a nut, a helical spring within said one of said bores surrounding said first portion, said spring having one end extending within said body and its other end disposed against said flange portion, said plunger having an axial bore, a substantially

permanent magnet within said plunger bore, a magnetic member projecting within said opening and extending within said plunger bore in spaced relation to said magnet, a non-magnetic member within said plunger bore and interposed between said magnet and said magnetic member, said magnetic member having an intermediate enlargement in said opening engaging an end of said second portion of said plunger and movable with said plunger, and means forming part of said device and cooperable with said nut for fixing said nut against rotation relative to said device.

2. A nut-setting device comprising a hollow body for connection with a rotatable tool, a member having a first part, a second part and a flange part intermediate said first and second parts, said first part being within said body, said member having connecting axial bores, one of said axial bores being larger in diameter than the other of said axial bores and forming an annular shoulder where said bores connect, an axially movable plunger extending within said bores, said plunger having a first portion, a second portion and a flange portion intermediate said first and second portions, said first portion and said flange portion being disposed within said one of said bores, with said flange portion abutting against said shoulder, said second portion of said plunger being shorter than said second part of said member forming an opening in said other of said axial bores forward of said plunger to accommodate a nut, said plunger having an axial bore, a substantially permanent magnet within said plunger bore, a magnetic member projecting within said opening and extending within said plunger bore in spaced relation to said magnet, a non-magnetic member within said plunger bore and interposed between said magnet and said magnetic member, said magnetic member having an intermediate enlargement in said opening engaging an end of said second portion of said plunger and movable with said plunger, means forming part of said device and cooperable with said nut for fixing said nut against rotation relative to said device, and resilient means to yieldingly resist pressure applied to said magnetic member and permit said plunger to retract.

3. A nut-setting device according to claim 2, and said means comprising an element projecting within said opening for engagement with said nut.

4. A nut-setting device according to claim 2, and said means comprising an element projecting within said opening for being receivable in a slot formed in said nut.

5. A nut-setting device according to claim 2, and said member having a slot, and said means comprising an element within said slot, said element projecting within said opening for cooperation with said nut.

6. A nut-setting device according to claim 5, and means for securing said element to said member.

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