Jan. 1, 1957 J. DELISO 2,775,913

SELF-GRIPPING TOOL WITH RESILIENT WIRES FOR TURNING SOCKET HEAD FASTENERS

Filed July 20, 1955

FIG. 1

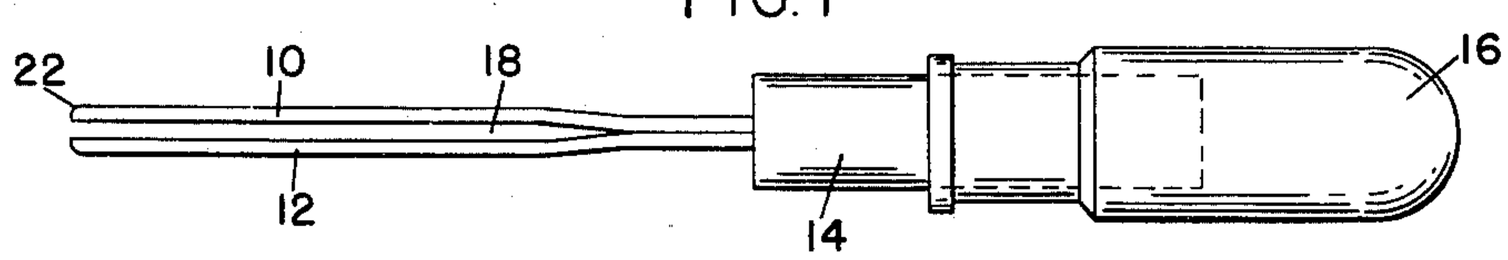


FIG. 2

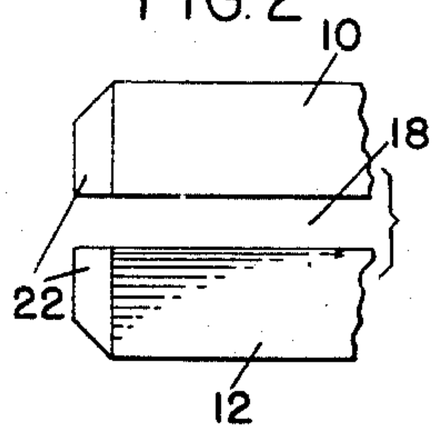


FIG. 3

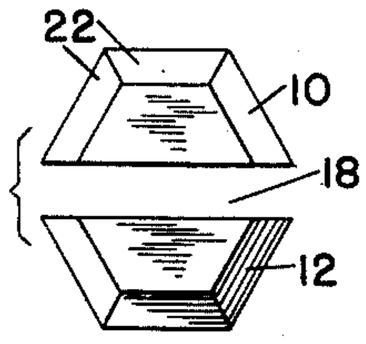


FIG. 4

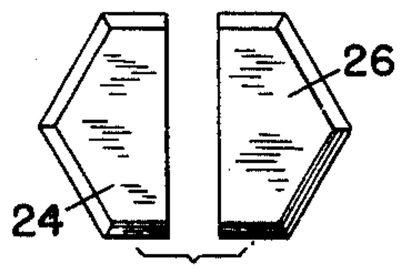


FIG. 9

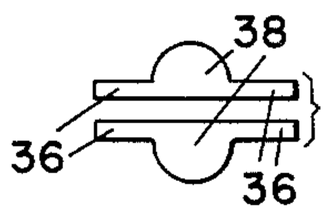


FIG. 5

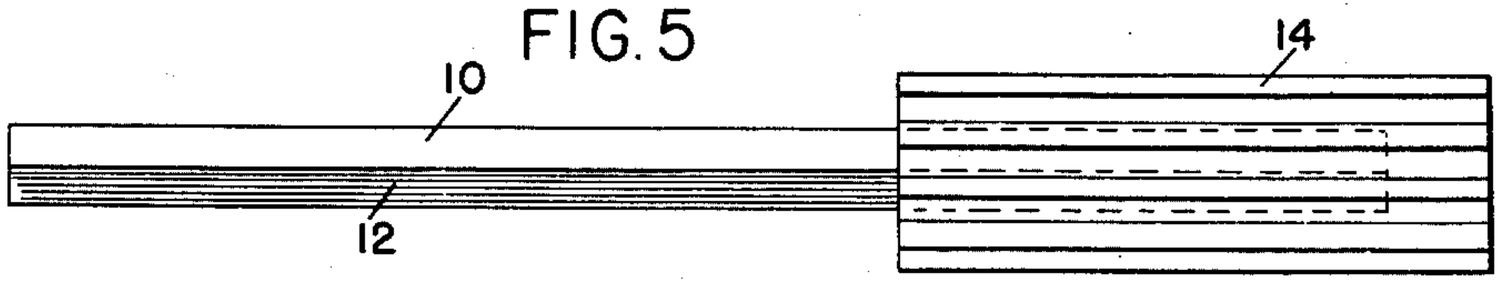


FIG. 6

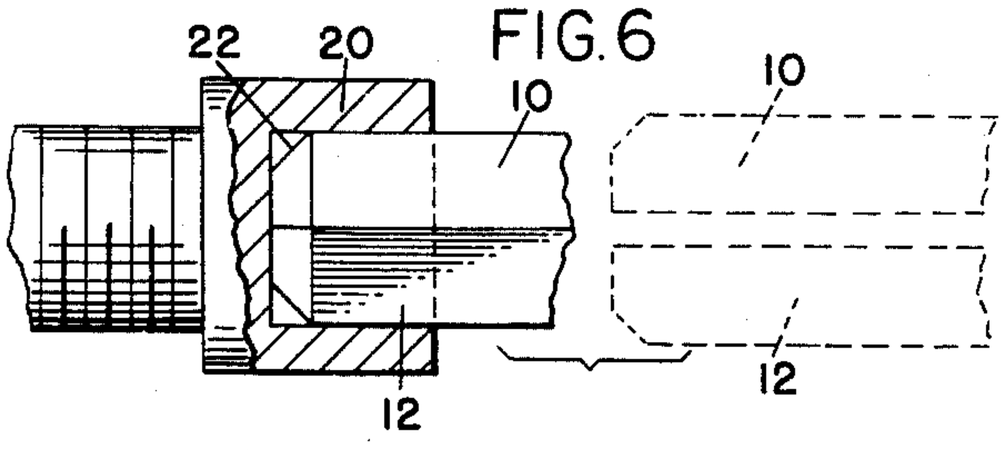


FIG. 11

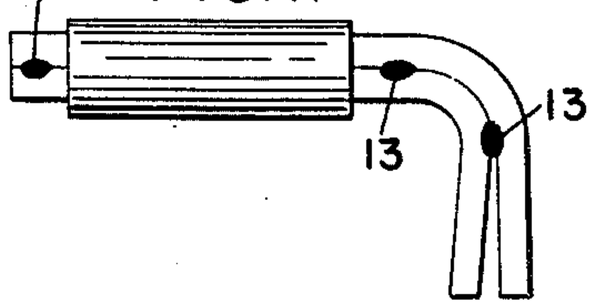


FIG. 7

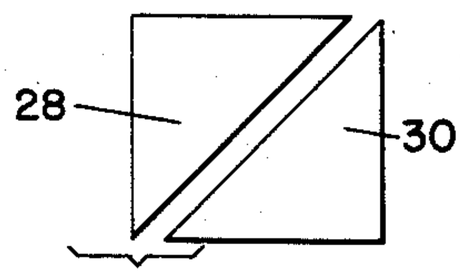


FIG. 8

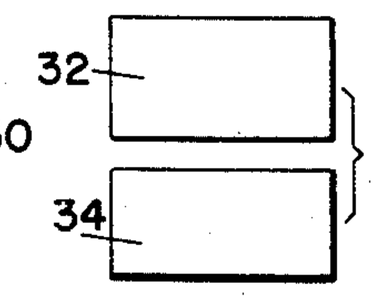


FIG. 10

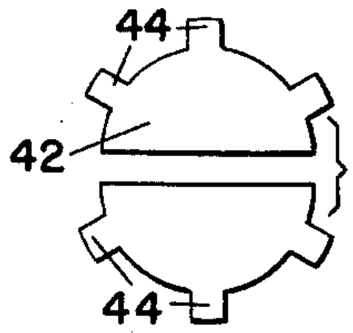


FIG. 12

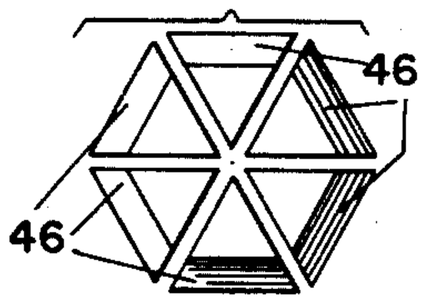
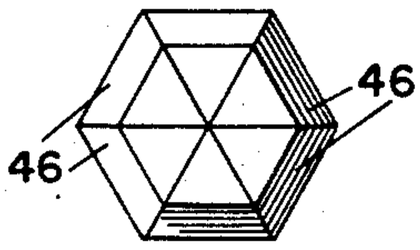


FIG. 13



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SELF-GRIPPING TOOL WITH RESILIENT WIRES FOR TURNING SOCKET HEAD FASTENERS

John Deliso, Worcester, Mass.

Application July 20, 1955, Serial No. 523,214

2 Claims. (Cl. 81—72)

This invention relates to a new and improved tool particularly adapted to act in the manner of a wrench or nut runner for turning socket head fasteners such as Allen-head screws or the like, and the principal object of the invention resides in the provision of a self-gripping tool of this nature which is easily and quickly insertable in the socket and tends automatically to expand to grasp the fastener at the interior walls of the socket, whereby such fastener may be held releasably to the tool for quick and easy application thereof where desired.

Further objects of the invention reside in the provision of a tool of the class described comprising a plurality of separate elongated wire members shaped complementarily to fit the socket, said members being held together in flatwise contacting relation by welding or by other means such as a ferrule, said wire members being permanently sprung slightly apart and providing for resilient compression thereof, so that when the free ends thereof are inserted in a socket, they will be compressed or sprung toward each other to exert a reactionary force outwardly against the walls of the socket and frictionally hold the same thereto; and the provision of a multi-part, secured wire wrench wherein the separate parts are made to be substantially on size to fit the socket, when compressed, so that the wire parts support each other laterally to make a stronger tool.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings, in which

Fig. 1 is a view in side elevation of a tool according to the present invention;

Fig. 2 is an enlarged view illustrating the tips of the socket-holding members in side elevation;

Fig. 3 is an end view thereof;

Fig. 4 is an end view of a modification;

Fig. 5 is a view in side elevation illustrating a step in the process of making the tool;

Fig. 6 is a view illustrating the use of the tool;

Figs. 7, 8, 9 and 10 are end views illustrating other but non-limiting shapes of wire;

Fig. 11 illustrates another form of wrench; and

Figs. 12 and 13 are end views illustrating a further form.

In carrying out one form of the present invention, a pair of elongated drawn wires generally indicated at **10** and **12** are provided and these wires are alike in section but reversed in the finished tool, so as together form a shape complementary to the socket. Reference is made to Patent No. 2,729,998 issued January 10, 1956.

The cross section of the wire may be multi-sided and of any shape as illustrated, and the split between the wires may be either on a long or a short axis relative to the resultant solid. In actual use, the Fig. 3 form is preferred, but the invention is not limited to this form and could be made in the forms shown in Figs. 4 and 7–10 inclusive.

The two wires **10** and **12** are flatly held together and

secured by sinking the same in a ferrule **14** (see Fig. 5) or by welding as in Fig. 11, see the numeral **13**. The ferrule is preferably provided with longitudinal keys or the like, and the same may be sunk into a handle **16** which may be a conventional handle for tools such as screw-drivers, nut runners, etc.

In any event, it will be clear that the wires **10** and **12** are sprung slightly apart as clearly illustrated in Figs. 1 to 4 inclusive, and this forms a space or slit **18** between the wires, regardless of the shape of the wires. This separation is formed in such a way as to preserve the resiliency of the wires, and they are held in the spaced relation shown and do not return to the original flat contacting position of Fig. 5 except when under the influence of inwardly directed pressure. When so compressed, the wires assume a complete and exact shape of the socket, and are "on size" and contact each other at their flat sides providing lateral support.

The fingers of the operator may press the wires together so as to easily enter the same into the socket head **20** of a conventional socket head fastener. On the other hand, the free ends of the wires may be beveled as at **22**, so that the free ends of the wires may be thrust into the socket as illustrated in Fig. 6. In this figure, the tool is shown in normal condition in dotted lines, and it is merely necessary to advance the same toward the socket and then press axially on the handle of the tool so that the beveled portions **22** act to cam the two wires in toward each other as shown in solid lines in this figure. In this position, of course, the nut or other socketed fastener is firmly frictionally held by the tool, and once the tool has provided for attachment of the fastener where desired, it is quickly and easily withdrawn, whereupon the wires **10** or **12** may snap back to their original position in spaced relation to each other, as in Fig. 1.

It will be seen that this invention provides a relatively simple and inexpensive nut runner or similar type of tool which grips the socket head fasteners and holds the same while being applied to the desired locations. By using the two separate wires, any size of tool can be made down to the extreme smallest size of nut or screw and this would of course be impossible if it were attempted to make the tool by first providing a shaped section wire and then cutting it, as so much material would have to be removed as to make the wire ineffective for the purpose at hand.

Furthermore, relatively expensive cutting or slitting operations are completely avoided by making the present tool in the form of the two wires and also tempering, etc. is largely avoided, the only necessary thing being to permanently separate the wires by forming the space **18** as described above.

Any sectional shape is possible, and various forms are shown in the Figs. 7–10 inclusive. These forms are illustrative and not inclusive, and in all cases, the socket outline or shape is the same as the wires when contacting, so that the socket is always filled and the parts are solidly but releasably connected.

In Fig. 4, the wires are indicated by the numerals **24**, **26** and these are the same in section, and can be parts of the same extruded wire, as is also the case with wires **10** and **12**. In Fig. 7, the wires **28**, **30** are triangular in section and make a square when compressed, as do the rectangular section wires **32** and **34** of Fig. 8. In Fig. 9, the wires are formed with fins or flanges **36** and a central irregularity or hump **38**, and of course the nuts or other fasteners would be complementarily shaped. In Fig. 10, the wires **40**, **42** are more nearly semi-circular and are provided with tabs or keys **44** for turning corresponding nuts or the like.

The hexagonal shape of the socket is conventional in Allen head fasteners in common use, and the hex type of

tool of Figs. 3 and 4, 12 and 13 can be used without the necessity of making special fasteners. Where more than a pair of wires is desired, the wires are made in sets of six, as at 46 in Figs. 12 and 13, and this form has the advantages of the form of Fig. 3, plus the fact that the wires are moved inwardly from the entire circumference, and so tend to press outwardly equally in all directions against the flat sides of the hex socket, such as at 20 in Fig. 6, giving a somewhat better holding action.

The invention in any case still forms a multi-part tool completely filling the socket in contracted condition, and preventing slip and twist of the parts as the fastener is turned.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:

1. A tool for holding and turning a hexagonal socket head fastener, said tool comprising a plurality of elongated conjoined but separate wires arranged around a central axis, each wire having a cross section in the form of a triangle, means holding the wires in parallel relationship, said wires having corresponding free ends slightly spaced apart, said wires being springy and each having substantially flat sides, a flat side of each wire facing a corresponding side of an adjacent wire so that they

will form a full regular hexagon section when pressed together, to substantially fit and fill the hexagonal socket of the fastener.

2. A tool for holding and turning a hexagonal socket head fastener, said tool comprising six elongated conjoined but separate springy wires arranged around a central axis, means for holding the wires in substantially parallel relationship, said wires having corresponding portions free and distorted to be slight spaced at the free ends thereof, said wires when pressed together forming a regular hexagonal section to fit exactly the socket of the fastener and each wire having a flat side to contact a like flat side of another wire, said flat sides being diametrical of the hexagonal section from a corner to an opposite corner thereof.

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