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Winter et al.

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[54] **BACKUP TOOL**

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[52] **U.S. Cl.** **72/465**; 29/243.53; 29/275; 29/283; 72/479; 72/481

[51] **Int. Cl.** **B21j 15/38**

[58] **Field of Search** 29/243.53, 243.54, 271, 29/275, 283, 280, 282; 72/464, 465, 466, 479, 481, 478, 482; 227/15, 140, 151, 154

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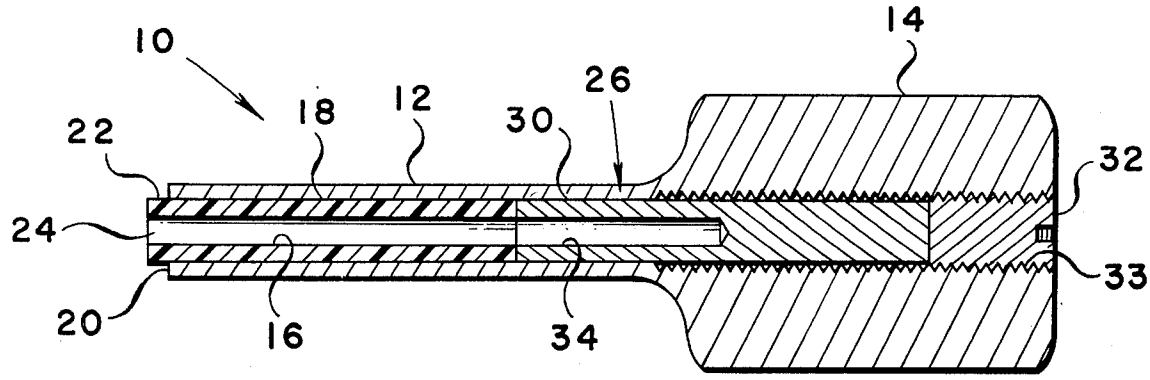
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[57] **ABSTRACT**

A manually held tool to back up material through which riveting is undergoing and which counteracts the driving force from a rivet or fastener gun. The tool comprises an elongated hollow tubular shank supporting a nylon sleeve frictionally mounted in its bore and protruding slightly beyond the end of the shank. An enlarged handle member is integrally formed at the other end of the tubular shank, with the shank's bore extending therethrough. A pusher assembly is mounted within the handle in the bore for providing stability to the nylon sleeve, as against a riveting force, and to adjustably position the nylon sleeve. The pusher assembly is recessed at its leading end to prevent damage to the fastener when a minimum of nylon cushion protrudes from the shank.

9 Claims, 2 Drawing Figures



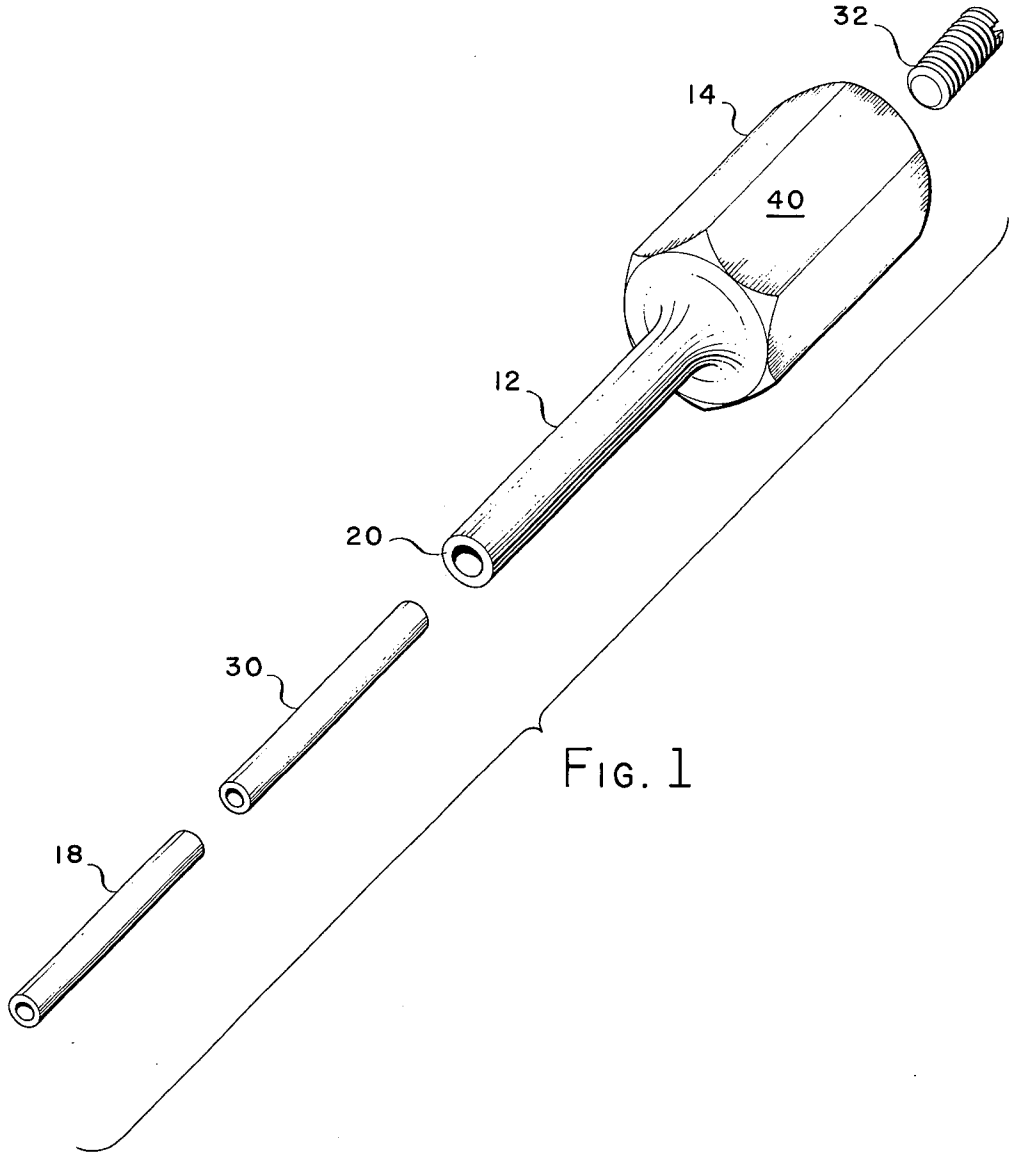
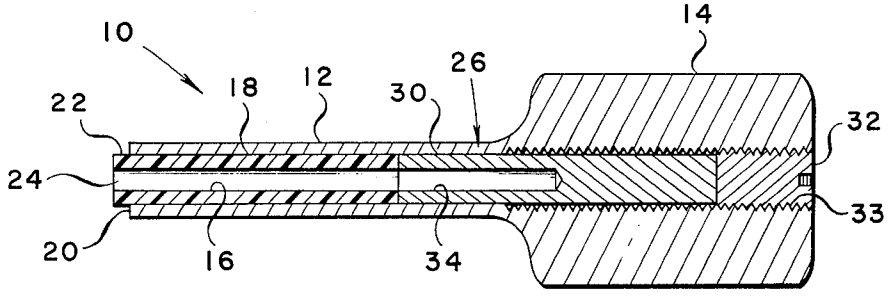


FIG. 1

FIG. 2



BACKUP TOOL

BACKGROUND OF THE INVENTION

1. Field of the Invention

The field of art to which the invention is most likely to pertain is located in a class of devices generally relating to a rivet set, holder or tool. Class **72**, Metal Deforming, U.S. Patent Office Classification, may be the applicable general area of art in which the claimed subject matter of the type involved here may be classified.

2. The Prior Art

Examples of prior art devices in the arts to which this invention most likely pertains are U.S. Pat. Nos. **378,341; 1,450,414; 1,462,293; 2,105,391; 2,388,895;** and **2,581,659.**

3. Problems in the Prior Art

Various types of rivets and other fasteners are used in increasing volume in industries demanding secured plate or other structural assemblies. They are shot in with (rivet) guns and the components these articles fasten must be backed up effectively, during assembly, without damage to part or structural surfaces. For this purpose, special nylon-tipped back up bars were developed. Dozens, and perhaps hundreds, of these bars are often utilized by a single company. In use, these back up bars have become mutilated and worn (the nylon material portions, i.e.) in relatively short time. Thus, reconditioning of these tools is a constant time-consuming and costly effort.

In the past, the repair or reconditioning work generally comprised drilling out and discarding the worn-tip-nylon sleeve member, disc grinding and sanding the affected bar tool end, boring and finishing to length a new tipped nylon sleeve, and re-assembling the complete bar. The average labor time required has been **0.5** hour per bar. Thus, an excessive amount of out-of-service use for back-up bars, in terms of time and cost, has developed in order to recondition this type of tool for re-utilization. Without such reconditioning, damage would continue to the rivet assemblies to which the back-up bar would be applied.

Furthermore, as evident from the above old procedure, a waste of nylon sleeve material had always resulted because of the fact that a substantial amount of the nylon sleeve would remain within the confines of the back-up tool. It would never be used, as it was always necessary to drill out this remaining substantial nylon portion in the reconditioning process for the tool.

This invention eliminates such wastage, expense and excessive reconditioning time. The improved tool materially reduces the time and cost of reconditioning and provides local maintenance in the using department or tool crib, by obviating attendant handling, transportation and clerical work, for at least **90** percent of repairs. It has been estimated that this type of tool in the prior art has been out of service at least **10** percent of its useable life awaiting repairs. Such non-use is eliminated by this invention, while more frequent tip renewal will keep the tool in better condition.

It should be noted here that this invention is directed to a tool whose primary purpose is to back up or support the material being secured together rather than directed to the fastener itself.

SUMMARY OF THE INVENTION

This invention relates to back-up tools utilized during riveting procedures, and particularly relates to the counterpart or back-up tool or device for the material being riveted or fastened together.

An object of this invention is to provide an improved back-up tool which supports an assembly and protects a fastener end.

Another object of the invention is to support thin structure while preventing local deformation to the rivetable structural assembly which is being driven with interference fasteners or the like.

Another object of this invention is to obviate a reconditioning procedure for such a tool and which in the past required an excessive out-of-service time.

Still another object of this invention is to maintain an optimum condition for tools of this nature.

A further object of this invention is to provide an ease of modification to existing tools to conform to the subject matter of this invention.

These and other objects and advantages will become apparent upon a full and complete reading of the following description, the appended claims thereto, and the drawing comprising one sheet.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is an exploded perspective view of elements constituting the subject matter of this invention.

FIG. **2** is a cross-sectional view of an assembled tool constituting the subject matter of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing in which reference characters therein correspond to like numerals following hereinafter, FIGS. **1** and **2** illustrate a tool or device **10** which incorporates the invention. The device or tool **10** is generally referred to as a "back-up bar" which is manually held by an operator on one side of a rivetable structural assembly or the like which is being secured together by means of a rivet or fastener applied by a gun being operated by a workman on the other side of such assembly. It should become readily apparent that the general purpose of this type of tool is to support the thin structure of such plate assemblies, to prevent local deformations that would otherwise occur when driving, say, interference fasteners or the like with a gun into such plate assemblies, and to protect the end of the pin or rivet which passes through such assemblies.

The tool **10** comprises an elongated rigid hollow member, stem or shank **12** on the one end of which a handle **14** is mounted for suitable grasping by an operator. A bore **16** (FIG. **2**) extends longitudinally throughout the tool **10**, i.e., throughout the length of the shank **12** and handle **14.** A nylon or resilient sleeve **18** is securely mounted in the shank **12** so as to provide a projecting tip portion **22** on the opposite end **20** of the shank **12.** Such securement is preferably provided by means of a frictional fit; that is, the nylon insert's lateral or diametrical dimension is greater than that of the bore **16.** The nylon insert **18** is hollow as shown at **24** and includes a length which preferably extends substantially the length of the shank **12,** as shown in FIG. **2.**

A pusher assembly **26** is mounted in the bore **16,** behind the hollow nylon insert **18,** for propelling or translating such insert to maintain the latter's tip projection. The assembly **26** comprises a rigid shaft member **30,** preferably steel, against which a threaded screw mem-

ber 32 bears. The threaded periphery of the member 32 cooperates with corresponding threads 33 incorporated substantially within the portion of the bore 16 disposed within the handle 14. The shaft member 30 preferably includes an axially-oriented cavity 34 sufficiently deep for purposes described hereinafter.

The pusher assembly 26 is provided to adjustably position the hollow nylon insert 18 so as to provide for a continuing protrusion of its tip 22 beyond the end 20, and for the life or complete consumation of the material constituting the sleeve 18.

In operation, the back up bar or tool 10 is hand held in a similar manner as a bucking bar for rivets. The projecting tip 22 of the insert 18 is firmly held to one side of the plate assembly (not shown) about the hole through which a rivet, fastener or the like is to be installed from the other side of such plate assembly. The handle 14 is grasped by an operator to firmly hold the device 10 in position. As the rivet or the like comes through the hole, it inserts itself into or is caught by the hollow insert 18 until such installation is completed. The tool 10 is then removed with ease from its position about the plate assembly hole and the rivet or fastener protruding therefrom.

Over a number of operations for the tool 10, the protruding tip 22 slowly wears down, and thus must be replaced in order to provide a continuous useful tip so as to prevent damage by the rigid member 12 upon the rivet or its supporting plate assembly. The screw member 32 is rotated to propel or translate the shaft element 30 so as to force out or push a length portion of the hollow insert 18 beyond the end 20 of the shank 12. A trimming of the new projecting tip may be in order, and a slight readjustment of position of the insert 18 made. Such positioning or adjustment may be continued throughout the entire length of the nylon insert, even up to and past its last 5/16 inch remaining portion.

Preferably, the tool 10 is made from steel and has its shank 12 necked down, from the dimensions of the handle 14, to a circular configuration. The handle 14 is hexagonally-configured in its cross-sectional area in order to provide a supporting surface 40 when in nonuse. I.e., it may be readily set upon a table without rolling. The shank 12 is preferably slightly longer than the length of and in longitudinally alignment with the handle 14 itself, the illustration of which is manifest in FIG. 2. The pusher assembly 26 should be of a length sufficient to push insert 18 completely out of the end 20 of the shank 12. The axial relief or cavity 34 in the member 30 provides protection to a pin, rivet, or fastener or the like which is being driven through a pre-drilled hole in the work area of the plate assembly or the like to which the device 10 is applied. Such cavity 34 is sufficiently deep so as to take the length of such pin, etc., driven through the assembly. An important advantage by inclusion of this cavity 34 is that the fastener, which is being driven, will not bottom-out when the nylon tube insert 18 is almost used up. Also, the shank 12 is preferably tubular or cylindrical as is the nylon insert 18.

It should now be evident that the body of the tool 10 is relatively heavy to provide the inertia required to counteract the driving force of the rivet gun (i.e., preventing a bounce off of tool from plate). It is hex-shaped to prevent it from rolling when laid down. Its tubular shank supports the nylon sleeve and provides entrance into narrow places where it has been necked down in size from that of the handle. The pusher assembly provides stability and absorbs the rotation of the crew member as the nylon sleeve is advanced. The shaft 30 is recessed at its leading end to insure that even with a minimum of nylon cushion, the rivet or fastener will not be damaged.

Also, it should be apparent that the tool 10 is readily adaptable to (automatic) machine operation.

The assembly of the tool 10 should be evident from the above description; however, briefly in summary, the insert 18 is frictionally forced into the bore 16, the shaft 30 slid into the bore 16 to behind the insert 18, and the screw member 32 threaded to threads 33 to retain the shaft 30 and to act as the means to push and adjust the length of the insert 18 past the end of the bore 16.

The advantage of reduced time and costs becomes very apparent when the time to adjust an insert member 18 in the bore 16 (minutes), multiplied by the 12–16 sections of a given length of insert member which can be used before introducing a new insert, is compared to the 0.5 hour it has taken in regard to reconditioning the old tool.

Pursuant to the requirements of the patent statutes, the principle of this invention has been explained and exemplified in a manner so that it can be readily practiced by those skilled in the art to which it pertains, or with which it is most nearly connected, such exemplification including what is presently considered to represent the best embodiment of the invention. However, it should be clearly understood that the above description and illustrations are not intended to unduly limit the scope of the appended claims, but that therefrom the invention may be practiced otherwise than as specifically described and exemplified herein, by those skilled in the art, and having the benefit of this disclosure.

Therefore, what we claim as patentably novel is:

1. A tool comprising
   - an elongated rigid body member having ends and an axial bore extending therethrough,
   - a tubular resilient insert mounted in said bore and being slidably secured by press fitting within said bore and having an end portion protruding from said one of said ends, and
   - means mounted in said bore opposite said tubular insert for adjustably fixing the position of said insert relative to said one of said ends.

2. The tool of claim 1 wherein said positioning means comprises a pusher assembly.

3. The tool of claim 2 wherein said pusher assembly comprises a bar member of substantially the same diameter as said tubular insert and having an axially-oriented relief, and means for propelling said bar member.

4. The tool of claim 3 wherein said propelling means comprises a screw member mounted in said bore being threaded for cooperation with said screw member to the extent required to propel said hollow insert past said one of said ends, access to said propelling means being through the other of said ends.

5. A tool comprising
   - an elongated rigid body member having opposite ends and having a longitudinal bore of substantially constant diameter extending between said ends,
   - a hollow insert mounted in said bore, being frictionally secured to said body member, and having an

end portion protruding from one of said opposite ends,

a pusher assembly having a bar member with an axially-oriented relief adjacent said hollow insert, and means for propelling said pusher assembly against said insert, said bar member and said propelling means mounted in said bore in tandem coaxial relation with and for adjustably positioning said insert relative to said one of said opposite ends in fixed relation.

6. The tool of claim **5** wherein said propelling means comprises a screw member mounted in said bore, said bore being threaded for cooperation with said screw member to the extent required to propel said insert past said one of said opposite ends.

7. A tool comprising

a shank having an end,

an enlarged handle mounted on said shank,

a longitudinal bore extending through said shank and handle,

a tubular flexible insert mounted in said bore for movement only in response to the application of force thereto and having an end portion projecting from said shank's end,

a pusher assembly mounted in said bore and including a bar member and a propelling means in tandem coaxial relation with and for adjustably fixing the position of said insert relative to said shank's end.

8. The tool of claim **7** wherein said pusher assembly includes a relief in said bar member for acceptance of a fastener or the like.

9. The tool of claim **7** wherein said hollow insert is of a dimension greater than that of said bore thereby providing such securement.

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