United States Patent

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[54] **TOGGLE TIP EXTENSION RIVET SQUEEZER: YOKE**
4 Claims, 3 Drawing Figs.

[52] U.S. Cl. **72/416,** 29/243 53, 72/452, 173/131
[51] **Int. Cl.** **B21j 15/16**
[50] **Field of Search** 72/412, 414, 415, 416, 450, 452, 453; 29/243.53, 243.54; 173/131

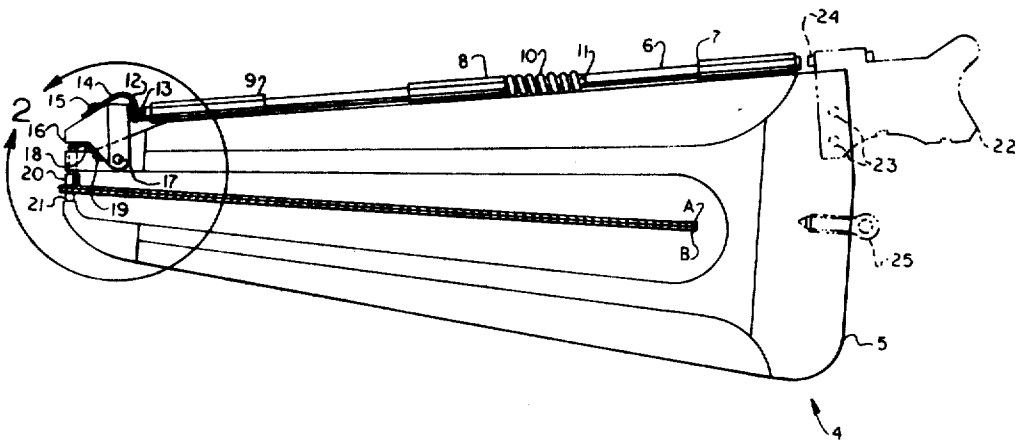
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ABSTRACT: Apparatus for riveting two surfaces together at rivet locations inaccessible to conventional rivet guns includes an air pressure driven elongated guided rod which actuates a bellcrank block operated squeezer adapter for squeezing the rivet.



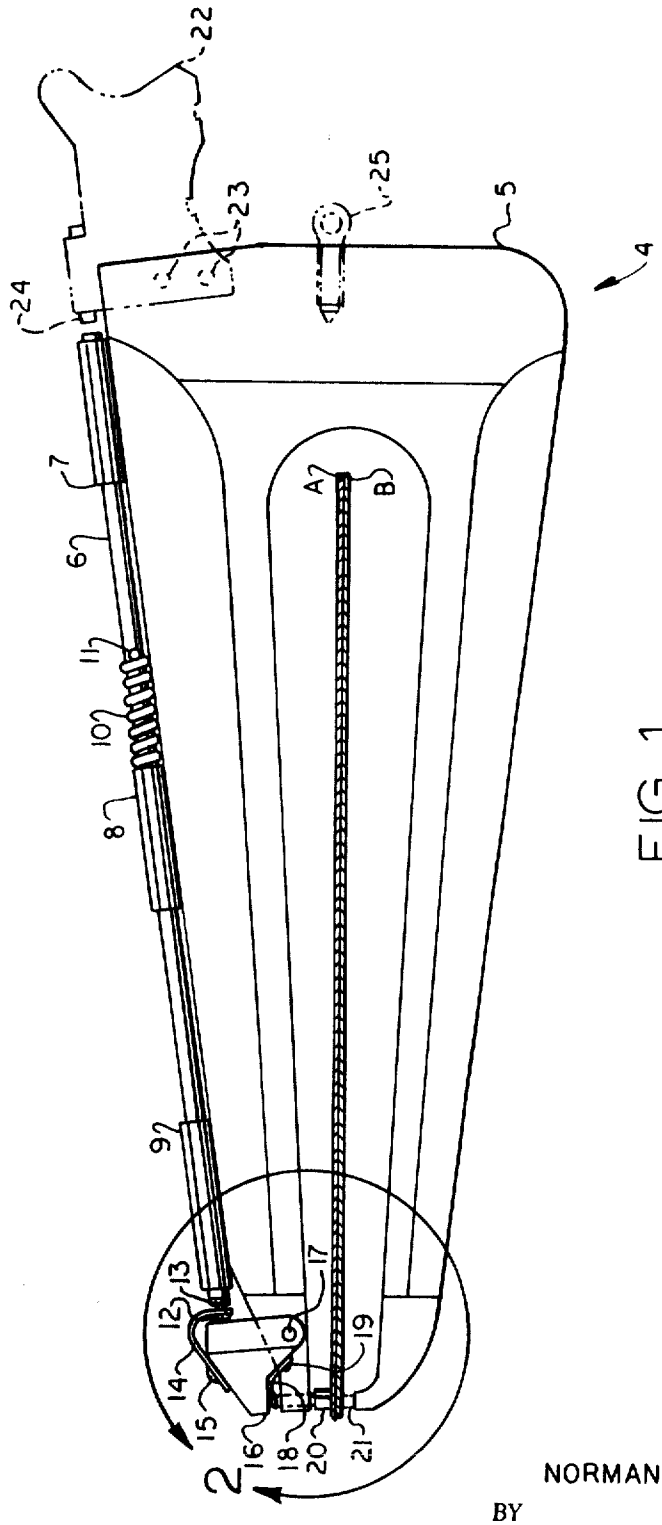


FIG. 1

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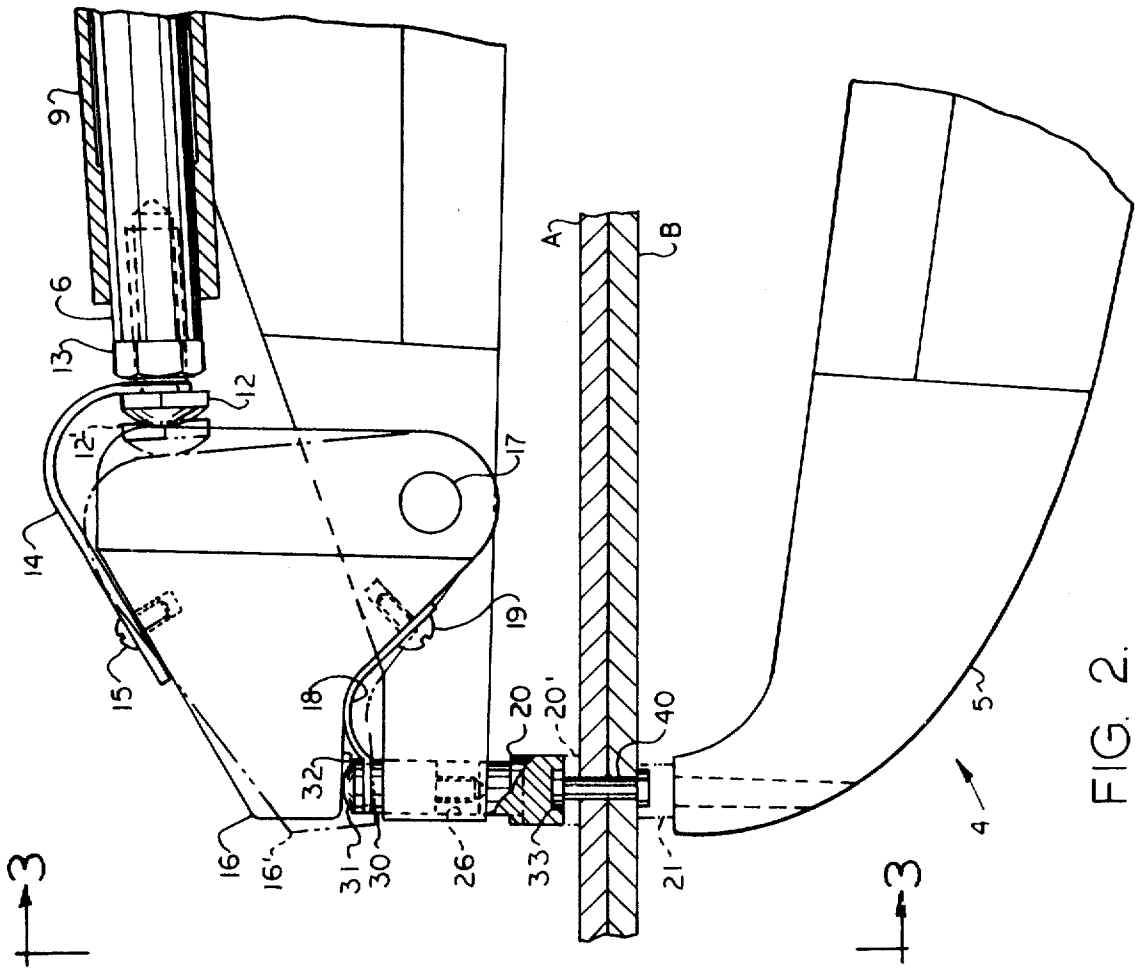


FIG. 2.

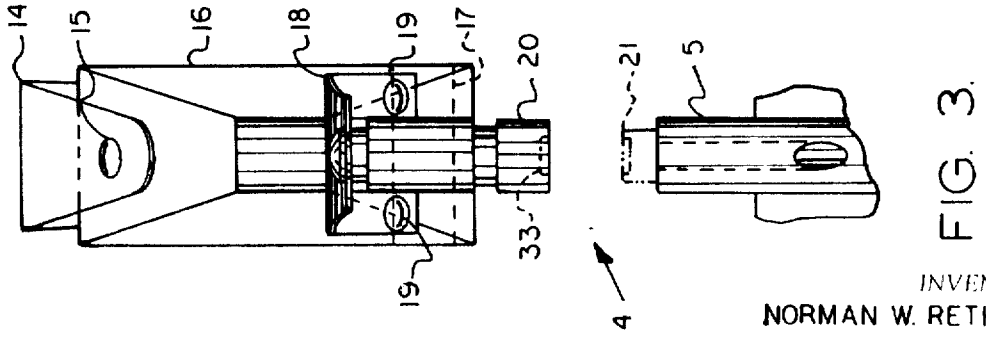


FIG. 3.

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TOGGLE TIP EXTENSION RIVET SQUEEZER: YOKE

BACKGROUND OF THE INVENTION

This invention relates to riveting devices and more particularly to a riveting method and apparatus for performing riveting operations which are not possible by conventional means.

In many arts involving the construction and assembly of sheet metal structures, wherein the final structure must be riveted, getting into small areas to perform the riveting operation becomes an omnipresent problem. In one such art, to wit, the construction of aircraft structures such as certain types of ducting, which have inordinate depth and are out of reach of conventional riveting guns, it is nevertheless imperative that all such duct surfaces be riveted. With the innumerable rivets that go into construction of such aircraft parts it is inevitable that some of the riveting requirements cannot be met using conventional riveting methods and apparatus. Consequently, the riveting of such difficult to reach structures, if at all possible by hand or by inept prior art methods, becomes a most tedious and expensive process.

SUMMARY OF THE INVENTION

In accordance with the present invention a simple method and apparatus permits access to areas deep and normally out of the reach of conventional riveting guns while retaining all of the benefits thereof. It will be understood that the invention is equally applicable to arts other than aircraft construction where access to the rivets to work the same presents a similar problem. Specifically, a deep jaw frame member presents to the rivet for engagement therewith an anvil and a coacting hammer, all disposed in the inaccessible work region. An elongated rod slidably carried by the jaw frame is driven by air pressure to actuate a pivot-operated squeezer whereby the rivet is squeezed or formed between the hammer and anvil.

OBJECTS OF THE INVENTION

Accordingly, an object of this invention is to provide a new and improved method and apparatus for riveting in normally inaccessible work areas.

Another object is to provide such a riveting method and apparatus which is operable by air pressure and retains the advantages of a conventionally operated rivet gun.

The above-noted objects and features of this invention will be better understood from the ensuing detailed description and claims taken in conjunction with the attached drawings wherein:

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a view in elevation showing an extension-type riveter constructed in accordance with a preferred embodiment;

FIG. 2 is a detail view somewhat enlarged, showing the pivoting action of the riveter; and

FIG. 3 is a view of the rivet structure of FIG. 2 as seen along the line 3–3 thereof.

DETAILED DESCRIPTION

It should be noted at this point that the same numerals have been used to indicate the same parts or elements throughout the various figures and the specification.

Referring now to FIG. 1, a preferred embodiment of an extension-type rivet squeezer yoke constructed in accordance with the present invention is shown and generally designated by the reference 4. This yoke generally comprises an elongated jaw frame 5 having the configuration of a "U" and a round rod structure 6 which extends through rod guides 7, 8 and 9 welded to the upper jaw of frame 5.

A coil spring 10 is wrapped around rod 6 and disposed thereon between guide 8 and dowel pin 11 carried by the rod. On one end of rod 6 a bolt 12 is threaded thereinto and held in place thereon by a jam nut 13. Bolt 12 carries a leaf spring 14 which is secured by a screw 15 to a bellcrank block 16. Toggle 16 is mounted for pivotal movement on a pin 17 which is carried by the upper jaw of frame 5. Attached to bellcrank block 16 is a second leaf spring 18 which at one end thereof is secured to bellcrank block 16 by two screws 19, as best seen in FIG. 3. The other end of spring 18 is forked for releasable engagement within the annular recess of an actuator pin 30 whose rounded head 31 is engaged by actuating surface 32 of bellcrank block 16. Pin 30 is slidably mounted in a bore 26 provided in the upper jaw of frame 5 and has the squeezer adapter or die 20 threadedly secured thereto for sliding movement therewith within the bore. Spring 18 serves to hold actuator pin 30 tight up against surface 32 of bellcrank block 16 notwithstanding movement of pin 30 and squeezer adapter 20 within bore 26.

Rivet cup or anvil 21 is suitably secured in place on the lower jaw of frame 5, being disposed thereon directly under squeezer adapter 20. A removable air gun 22 is suitably held in place on frame 5 by two screws 23 and has an actuating rod 24 for engagement with rod 6 to push the same when air pressure is applied to gun 22. It is desirable that said air gun be easily removable from said frame and be of a low pressure type commercially available such for example as that provided by Chicago Pneumatic Company model CP151 operable by air pressure in the range of 90 to 125 p.s.i. An eyebolt 25 threaded into frame 5 provides a means for support thereof when not in use.

OPERATION

In accordance with the method of operation of the riveting tool of this invention rivet cup 21 is placed under rivet 40, which as shown, is disposed in assembled relation with work pieces A and B preparatory to the joining of the same by the riveting operation. Air pressure from air gun 22, upon operation of the same, pushes rod 24 forward which, in turn, pushes rod 6 onward and downward through rod guides 7, 8 and 9. Bolt 12 partakes of this movement and engages bellcrank block 16 to pivot the same as depicted by the dashed lines in FIG. 2. This pivotal movement of the bellcrank block presses pin 30 and causes squeezer adapter 20 to move downward through hole 26 in frame 5, thereby squeezing rivet 40 into the rivet cup 33 and thus causing head ends of rivet 40 to engage the parts A and B respectively to form the joint therebetween. To release, air pressure is relieved and rod 6 is pulled upward and backward by coil spring 10 acting on pin 11 towards air gun 22, thus relieving pressure of bolt 12 on bellcrank block 16. Backward movement of bolt 12 ultimately carries spring 14 with it which being attached to bellcrank block 16, moves the bellcrank block off actuator pin 30 and squeezer adapter 20. Also, while bellcrank block 16 is moving backward, spring 18 moves the actuator pin and squeezer adapter upward, thus ending a complete cycle.

It should be again emphasized that although the invention has been described particularly in relation to the riveting of ducting, its uses are not limited thereto for it would be equally applicable to all other applications where rivets are hard to get at with conventional methods.

It should be apparent therefore that this invention provides a simple yet efficient method and apparatus for riveting in work areas which cannot be reached by conventionally operated means.

What is claimed as new and useful and desired to be secured by Letters Patent is:

1. An extension-type tool for riveting rivets disposed within a work region inaccessible to conventional riveting means, comprising in combination, manipulatable means disposed within said work region for engaging a rivet to form the same when manipulated from a first starting position to a second inward squeezing position, operator-controlled means remotely situated with respect to said work region and including a source of pressure operatively connected to said rivet engaging means for manipulating the same when the operator con-

trolled means is set in operation by the operator, and a spring bias means for returning said manipulatable means to said first position when riveting cycle is complete, wherein a deep jaw U-frame supports at its open end an anvil and die, said anvil and die being disposed on the spaced jaws thereof and within said work region, said die being slidably mounted on the jaw individual thereto for movement toward and away from said anvil, a bellcrank block mounted pivotally on the die jaw and having one end operatively engaged with the die, said source of pressure comprising an air gun mounted on the jaw frame and operatively disposed between the air gun and other end of said block to pivot the same when the air gun is operated.

2. A riveting tool as in claim 1 wherein said air gun is removable from said frame.

3. An air gun as in claim 2 wherein said air gun is a lightweight low-pressure type.

4. A riveting tool as in claim 3 wherein said air gun operates on air pressure in the range of 90 to 125 pounds.