

[54] METHOD OF ONE-SIDED RIVETING TOOL
FOR ITS PERFORMANCE

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72/114

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85/82, 83; 29/243.52, 509

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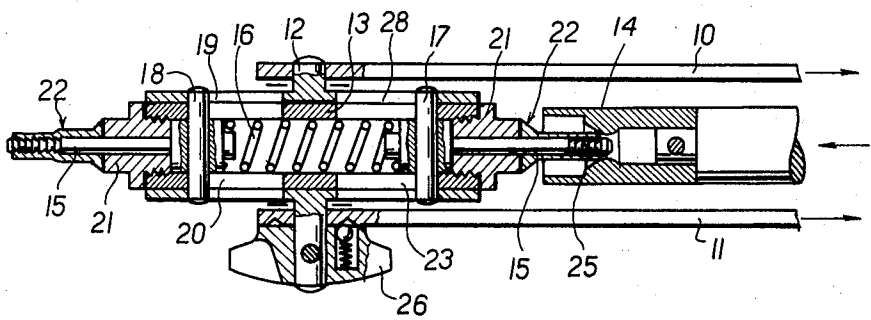
Attorney, Agent, or Firm—Murray Schaffer

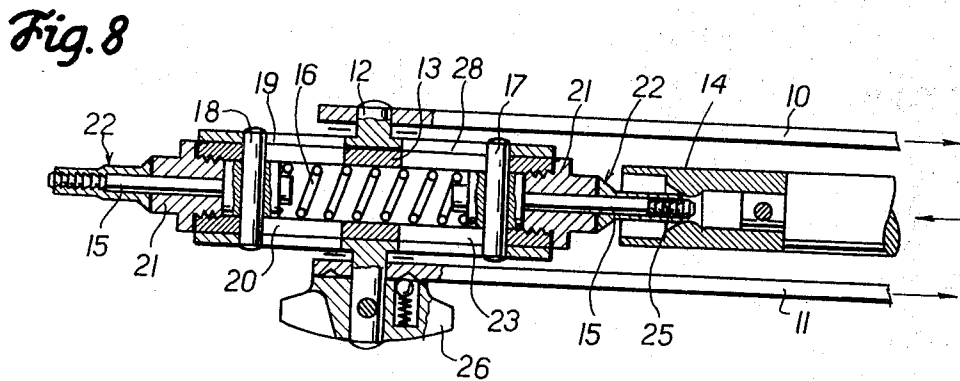
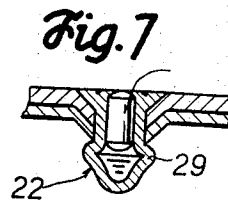
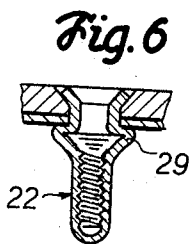
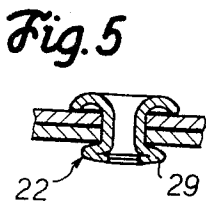
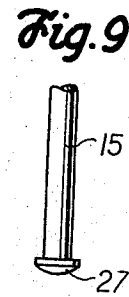
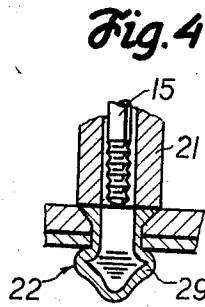
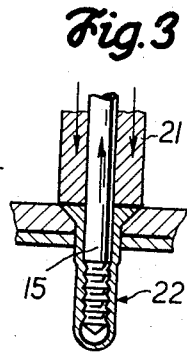
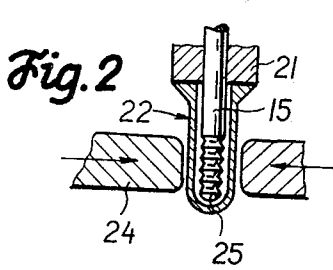
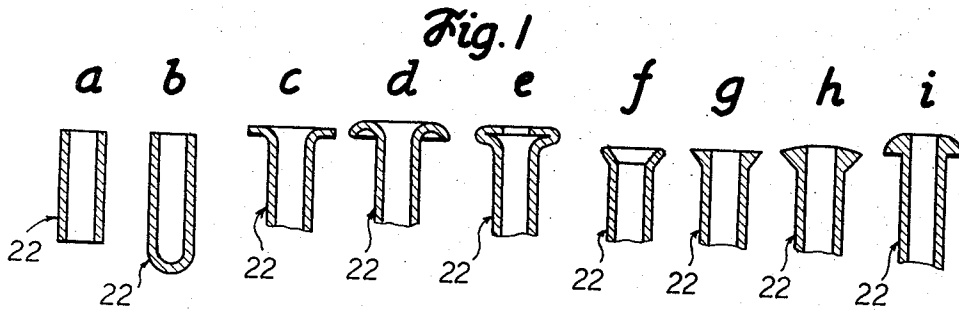
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ABSTRACT

One-sided riveting with hollow rivets is accomplished by first anchoring a hollow rivet on a mandrel with an uneven surface by action of lateral forces, inserting the thus anchored rivet into a prepared opening, with a subsequent pulling of the mandrel while the top of the rivet rests against a rest, thus creating a head of the rivet on the turned off side.

9 Claims, 9 Drawing Figures





METHOD OF ONE-SIDED RIVETING TOOL FOR ITS PERFORMANCE

BACKGROUND OF THE INVENTION

This invention relates to one-sided riveting with hollow rivets, where the deforming force acts in a direction opposite to the direction in which the rivet is inserted into its opening. The invention equally relates to a riveting tool for performing this method of riveting.

Different one-sided riveting methods are actually known based on a mechanical deformation of the shank of a rivet to a rivet head by means of extending pull or tearing mandrels or on the principle of deforming the shank due to expansion of gases in case of explosion or due to a slower chemical reaction of material situated in the shank of the rivet. Known riveting methods of this kind have a number of drawbacks, as for instance increased manufacturing costs of special rivets, which are more complicated than common rivets. Another drawback is that the riveting itself is cumbersome and the checking of the riveted joint is sometimes rather difficult.

SUMMARY OF THE INVENTION.

It is an object of this invention to provide a method and an arrangement for one-sided riveting, which would not require specially shaped rivets.

It is another object of this invention to enable an easy and effective one-sided riveting with a simple tool.

It is a further object of this invention to provide riveted joints with closed or open rivets.

Other objects and advantages of this invention will be apparent from the following description.

According to this invention a hollow rivet is first anchored on a mandrel of a riveting tool having a uneven surface by the action of lateral forces, the thus anchored rivet is inserted into the respective opening whereas the mandrel is pulled while the top of the rivet rests against a rest, whereby a rivet head is formed on the turned-off side. The acting surface of the mandrel has at least one recess or extension or a thread. The corresponding riveting tool has at least one mandrel supported rotatably around an axis perpendicular to the axis of the mandrel, advantageously however two oppositely arranged mandrels are provided situated in a rotatable body of a riveting head with an insert slidable in this body, the insert closed at both ends by rests, the mandrel slidably guided in the rest, the mandrel provided with a dog for taking along the mandrel in the body of the riveting head, guiding grooves being provided for the dog in the body of the riveting head and in the insert symmetrically with respect to the longitudinal axis of the mandrel.

An advantage of the one sided riveting according to this invention is primarily, that for this riveting tubular rivets with different heads can be used or simple hollow rivets with a closed end of the shank, or finally simple tubes in the shape of a smooth bushing or rivets if the shape of a simple cartridge box with a dome shaped or flat bottom. Both heads of similar rivets are formed in the course of a single operation.

An advantage is also that for a closed riveted joint simple hollow rivets are used without any additional accessories of the rivets. The riveting according to this invention enables also to form rivet nuts in a closed or

open shape. The checking of the riveted joint is also simple and quick by measuring the longitudinal deformation of the rivet. The corresponding riveting tool is thereby simple in design and easy to handle.

DESCRIPTION OF DRAWING.

The riveting according to this invention is described on hand of the attached drawing, where

FIG. 1 shows in longitudinal cross section different types of rivets suitable for the new method of riveting,

FIG. 2 is a longitudinal cross section of a hollow rivet on a mandrel of the riveting tool and the action of lateral forces on the rivet,

FIG. 3 a longitudinal cross section of a rivet anchored on the mandrel and inserted into the hole of the joint to be riveted,

FIG. 4 a longitudinal cross section of the rivet after the mandrel has been pulled out after finished riveted joint,

FIG. 5 a longitudinal cross section of a riveted joint when using a rivet according to FIG. 1a of 1d,

FIG. 6 a longitudinal cross section of a riveted joint with a thread with a rivet nut,

FIG. 7 a longitudinal cross section of a riveted joint with an inserted core for strengthening the joint,

FIG. 8 a longitudinal cross section of riveting tool and

FIG. 9 a view of a mandrel of the riveting tool provided at its end with an extension for anchoring.

DESCRIPTION OF PREFERRED EMBODIMENT.

The riveting tool for riveting according to this invention as shown in FIG. 8 comprises two arms 10, 11 forming a fork of the riveting tool. The body 12 of the riveting head is rotatably supported by these arms 10, 11. The body 12 of the riveting head has the shape of a sleeve provided on its external circumference with bolts for its rotatable supporting. An insert 13 is slidably arranged within the body 12 of the riveting head. Rests 21 are provided at both extremities of the insert 13. A mandrel 15 is slidably arranged within each insert 13. The mandrel 15 has on its functional surface recesses for instance in the shape of a grooves or of a thread (FIG. 2) or has an anchoring extension 27. Dogs 18 and 17 are provided at the other ends of the mandrels 15 inside the insert 13 for taking along the mandrels 15, the longitudinal axis of these dogs 18 and 17 being perpendicular to the longitudinal axis of the mandrels 15. The mandrels 15 are mutually pressed one from the other by a pressure spring 16. The free ends of the dogs 17 and 18 are slidable in guiding grooves 23, 28, 19, 20, which guiding grooves are symmetrically arranged with respect to the longitudinal axis of the mandrel 15.

The one-sided riveting according to this invention proceeds for instance so that a rivet 22 (FIG. 2) is placed on a free mandrel 15 extending from the riveting tool by some feeding mechanism not shown on the drawing. The body 12 of the riveting head with the rivet 22 is thereafter turned for instance by means of a manual level 26 against the anchoring device 14, which performs the anchoring of the rivet 22 on the mandrel 15. This anchoring is accomplished by a shifting of both arms 10, 11 to the right, taking along the body 12 of the riveting head which in turn takes along the dogs 18, 17 and the insert 13 with the rest 21 and the rivet 22 into the anchoring device 14, where an external lateral

force is acting on the shank of the rivet 22 for instance by jaws 24 arranged in the anchoring device 14, deforming the shank of the rivet 22 so that its material is pressed into recesses of the mandrel 15. In the course of the following return of the arms 10, 11 into their original position the mandrel 15 with the rivet 22 anchored thereon is pulled out of the anchoring device 14. The rivet 22 anchored on the mandrel 15 is thereafter after turning of the body 12 of the riveting head brought to the riveting place, where the mandrel 15 with the rivet 22 is inserted either manually or automatically by a not shown arrangement into the respective opening. The arms 10, 11 are then moved to the right towards the anchoring device 14 and after the right rest 21 comes in contact with parts of the anchoring device 14 the body 12 of the riveting head starts to be taken along with the arms 10, 11, taking along also the dog 18, which starts to pull out the mandrel 15 from the anchored shank of the rivet 22, whereby the shank of the rivet 22 is deformed so as to form on the not accessible side of the riveting joint a closing head 29 (FIG. 4). In the course of pulling out of the mandrel 15 from the anchored rivet 22, the rest 21 on the left side of the riveting tool remains in contact with the external head of the rivet 22. After the mandrel 15 has been fully pulled out of the shank of the rivet 22 the riveting joint is finished, the tool is removed and the arms 10, 11 return into their starting position. In the course of deforming the shank of the rivet 22 in the riveting joint, the anchoring of a further rivet proceeds at the opposite side of the body 12 of the riveting head in the already described manner.

The same result can be achieved if the arms 10, 11 and the body 12 of the riveting head remain stable and the anchoring device 14 is moved to the left.

The closing rivet head 29 can be different according to the chosen arrangement of the functioning part of the mandrel, a thread can be for instance formed inside the rivet (see FIG. 6). The riveting joint can be furthermore closed or also reinforced by introduction of a core 10.

If a rivet nut (FIG. 6) has to be formed, the riveting process is the same as described, solely the last phase of the process differs in that after the closing rivet head 29 is finished, the mandrel 15 is from the finished rivet nut unthreaded, in order not to damage the thread of

the rivet nut.

I claim:

1. The method of blind riveting hollow rivets, comprising in applying to a mandrel, having an uneven surface in part, a hollow rivet, applying lateral forces on the shank of said rivet in order to anchor said rivet on said mandrel, inserting the mandrel with the thus anchored rivet into the respective opening of a riveting joint, pulling the mandrel in a direction opposite to the direction in which it has been inserted while the top of the rivet rests against a stable rest, deforming the distant part of the rivet to form the distant rivet head and removing the mandrel from said rivet.

2. A method as defined in claim 1 wherein the rivet is anchored on the mandrel in a separate operation prior to the actual riveting.

3. A method as defined in claim 1 wherein the rivet is anchored on the mandrel in an associated operation during the riveting of a previously anchored rivet.

4. A blind riveting tool comprising a riveting head supported by a pair of arms forming a fork, said riveting head including a body having at least one insert arranged slidably therein, and a rest closing each end of said insert, a mandrel slidably supported in each rest and a spring disposed between the rests urging the mandrels in opposite directions from each other, the sliding movement of the mandrels being defined by dogs guided in grooves provided in said body and said insert.

5. The tool according to claim 4 wherein said body is mounted within said fork to be rotatable about an axis transverse to the direction of movement of the mandrels.

6. The tool according to claim 4 wherein at least one of said mandrels is formed with a part of its functioning surface uneven.

7. The tool according to claim 4 wherein a part of the functioning surface of at least one of the mandrels is formed with recesses.

8. The tool according to claim 4 wherein part of the functioning surface of at least one of the mandrels is formed with an axial extension.

9. The tool according to claim 4 wherein a part of the functioning surface of at least one of the mandrels is formed with a thread.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,838,499 Dated October 1, 1974

Inventor(s) Jozef Fulier

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

The inventor name should read -- Jozef Fulier --.

Signed and sealed this 3rd day of December 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents