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(54) **Blind riveting tool.**

(57) In a blind-riveting tool, pneumatically-operated collet means (7) for engaging the mandrel (12) of a blind rivet assembly (11) are controlled by a pressure sensor (20) in the housing (22) of the tool to close automatically when a rivet assembly (11) is introduced. The application of the invention to a tool for use with double-headed blind rivets is particularly described.

EP 0 468 717 A1

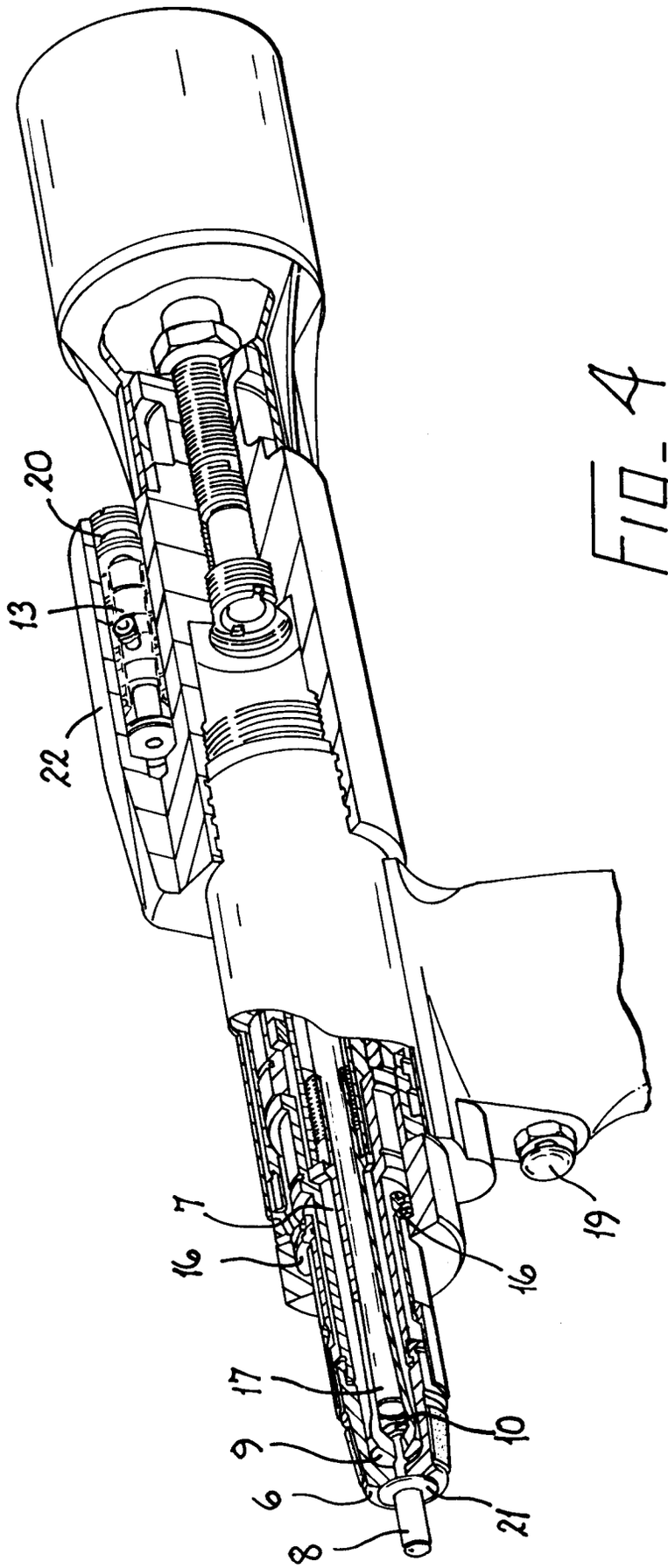

FIG. 4

The present invention relates to a blind riveting tool comprising a housing, an abutment member in the entrance to said housing having a rivet-engaging face at its forward end to engage the mandrel of a rivet in a rivet-setting operation, pneumatic-operated collet means reciprocable within the housing to pull the mandrel stem of the rivet relative to the abutment member in the rivet-setting operation, said collet means being arranged and adapted to open and close about the axis of the mandrel stem to allow in the open position the introduction therebetween of a rivet, and in the closed condition to allow the abutment member to engage the rivet head and the collet means to engage the mandrel, and pneumatic means arranged and adapted to operate said collet means.

A blind riveting tool constructed as referred to above is described, for example, in US patent specification 2400354, the tool being arranged for manual operation and for hand feeding, the annular actuating member being also retracted by hand to allow the riveting assembly engaging parts of the abutment member and mandrel-pulling means to open for introduction of the mandrel of a fresh rivet assembly. Whether the tool be constructed as described in said specificaiton with reference to Figures 1-6 (in which the actuating member is said to be restored to its forward position by a spring) or with reference to Figures 7-13, loading of the tool with a fresh rivet is inconvenient and slow, the operator having only two hands for what is essentially a three-handed operation, to hold the tool, operate the actuating member, and pick up and insert a fresh rivet.

It is an object of the present invention to provide a blind-riveting tool for use with blind-rivet assemblies and which has improved means for receiving and engaging the mandrels of such assemblies.

According to the present invention,a riveting tool comprises a housing, an abutment member in the entrance to said housing having a rivet-engaging face at its forward end to engage the head of a rivet in a rivet-setting operation, pneumatic-operated collet means reciprocable within the housing to pull the mandrel stem of the rivet relative to the abutment member in the rivet setting operation, said collet means being arranged and adapted to open and close about the axis of the mandrel stem to allow in the open position the introduction therebetween of the mandrel of the rivet provided with a mandrel stem, and in the closed position to allow the abutment member to engage the rivet head and the collet means to engage the mandrel, and pneumatic means arranged and adapted to operate said collet means characterised in that a sensor is provided in said housing to monitor the vacuum level in the housing produced by a vacuum generator and to produce a signal if a certain level is exceeded, said signal operating a control valve for the opening and closing operation of said collet means.

In the blind riveting tool of the present invention, the sensor acts to operate said collet means to close around the mandrel stem when a rivet is placed in said entrance, and to cut off the air supply to said pneumatic means operating the opening and closing of the collet means. The collet may then be moved relatively within the housing to draw the mandrel and set the rivet. After a pre-determined period on completion of the rivet-setting operation the control valve operates to return said collet means to the open position and to restore the air supply to said pneumatic means, thus preparing the tool for a subsequent rivet setting operation. Thus with the integrated opening and closing mechanism of a blind riveting tool in accordance with the invention, the collet means closes automatically against the mandrel when the blind rivet is placed in the tool and opens automatically on completion of the rivet-setting operation.

The present invention can be applied in a rivet-setting tool for use with a conventional blind rivet so that the collet means graps the mandrel of a blind rivet assembly so that the mandrel can be drawn through the rivet head to set the rivet.

The present invention is particularly suitable for appplication in a rivet-setting tool for use with a double-headed rivet having a pulling head on the mandrel and the collet means engages the rivet under its pulling head so that the mandrel can be pulled through the rivet heat to set the rivet. In such an application, the collet means opens so as to permit the introduction into the collet means of the pulling head of the double-headed rivet.

A double-headed rivet of the kind referred to is described in European patent 0142960.

A preferred embodiment of the present invention will now be described in greater detail by way of example with reference to the accompanying drawings in which:

Figure 1 shows in part section the head of a rivet-setting tool for the setting of a double-headed rivet in the open position ready to accept a rivet;

Figure 2 shows in part section the head of the rivet-setting tool of Figure 1 in the closed position with a rivet inserted together with the pulling mechanism,

Figure 3 schematically shows the pneumatic circuit for the operation of the rivet-setting tool of Figures 1 and 2, and

Figure 4 shows a perspective view of the blind riveting tool having some parts broken away for the sake of clarity.

The blind riveting tool embodying the present invention is designed for use with double-headed blind rivets having a pulling head on the mandrel. The tool is provided with a housing 4 having an abutment member 5 at its outlet which has a rivet-engaging face 6. Collet 7 is slideably mounted in housing 4 and is moved by pneumatic operating means including closing piston 12 between an open position 7A where jaws

9 of collet 7, which operate in the manner of tongs, open to admit free passage of pulling head 10 of a double headed rivet 11 and a closed position 7B where jaws 9 of collet 7 close to grip mandrel 12 of rivet 11 beneath pulling head 10. An actuating button 19 is also provided on the tool.

Closing piston 16 of the pneumartc operating means is connected into the air line of the tool through control valve 13 which is a five-line, two-way, double action piston valve. Valve 13 also controls the pulling piston 14 of the tool through a sensor 20. This sensor 20 monitors the vacuum level in the housing and if this falls below a certain level, delivers a signal which operates valve 13 to close jaws 9 of collet 7. A pressure transducer is designated by reference 15 in Figure 3.

In operation, insertion of a rivet into abutment 5 (the tool entrance) causes a change of pressure in axial tube 17 in housing 4 which is detected by pressure transformer 15 which then operates valve 13 to move closing piston 16 of the operating means to close the jaws 9 of collet 7 about the mandrel 12 of rivet 11 beneath pulling head 10. The vacuum is produced by the Venturic effect at 13. The compressed air supply to valve 13 is then cut after the reaction of sensor 20.

With the rivet 11 so held in collet 7, the tool may be operated normally to set the rivet by engaging pulling head 10 and pulling mandrel 12 through rivet head 8 by the operation of pulling piston 14. After setting, the mandrel 12 with pulling head 10 is sucked through axial tube 17 into collector 18 (Figure 3).

After a predetermined time for the rivet setting operation, valve 13 is operated automatically to apply compressed air to closing piston 16 which is thus moved to the open position and jaws 9 open so as to be free to accept the pulling head 10 of a further rivet 11.

Claims

1. A blind riveting tool comprising a housing, an abutment member in the entrance to said housing having a rivet-engaging face at its forward end to engage the head of a rivet in a rivet-setting operation, pneumatic-operated collet means reciprocable within the housing to pull the mandrel stem of the rivet relative to the abutment member in the rivet setting operation, said collet means being arranged and adapted to open and close about the axis of the mandrel stem to allow in the open position the introduction therebetween of the mandrel of a rivet provided with a mandrel stem, and in the closed position to allow the abutment member to engage the rivet head and the collet means to engage the mandrel, and a vacuum generator arranged and adapted to operate said collet means characterised in that a sensor (20) is provided in said housing (22) to monitor the vacuum level in the housing (22) produced by a vacuum generator (23) and to produce a signal if a certain level is exceeded, said signal operating a control valve (13) for the opening and closing operation of said collet means (7).

2. A blind-riveting tool according to claim 1 wherein the sensor (20) acts to operate the pneumatic means to close said collet means (7) around the mandrel stem (12) when a rivet is placed in said entrance, end to cut off the compressed air supply to the vacuum generator (23).

3. A blind-riveting tool according to claim 2, wherein on completion of a rivet-setting operation the control valve (13) operates to return said collet means (7) to the open position and to restore the compressed air supply to the vacuum generator (23), thus preparing the tool for a subsequent rivet-setting operation.

4. A blind-riveting tool according to claim 1 or 2, wherein the collet means (7) are provided as gripping jaws (9) which grasp the mandrel (12) itself so that it can be pulled through the rivet head to set the rivet.

5. A blind-riveting tool according to claim 1 or 2, wherein the tool is adapted to set a double-headed rivet (11) having a pulling head (10) on the mandrel (12) and the collet means (7) engages the rivet under its pulling head (10) so that the mandrel (12) can be pulled through the rivet head to set the rivet.

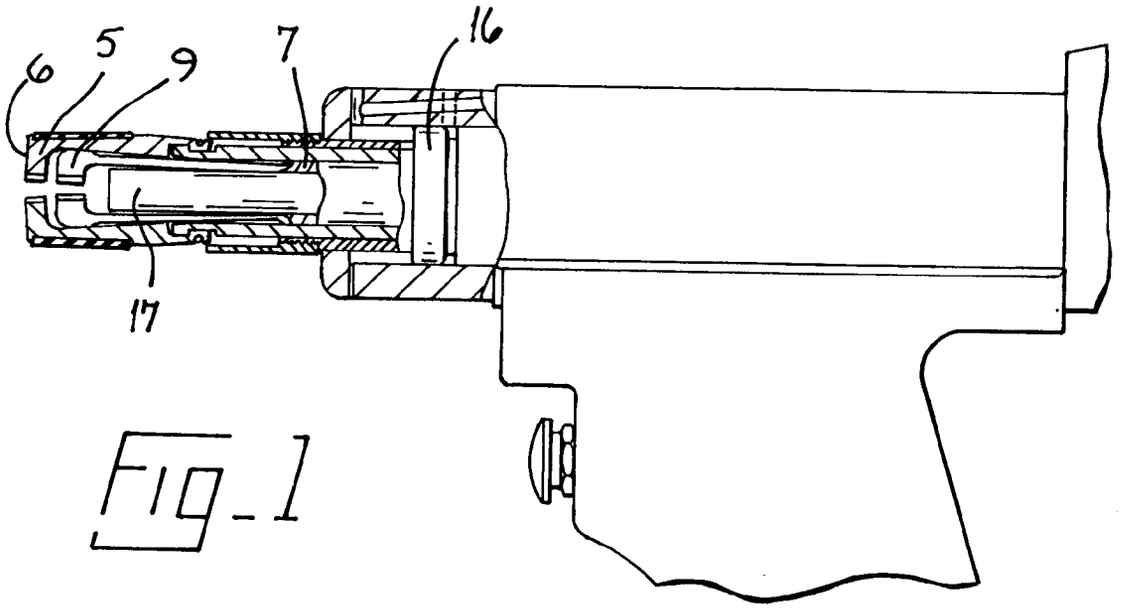

Fig_1

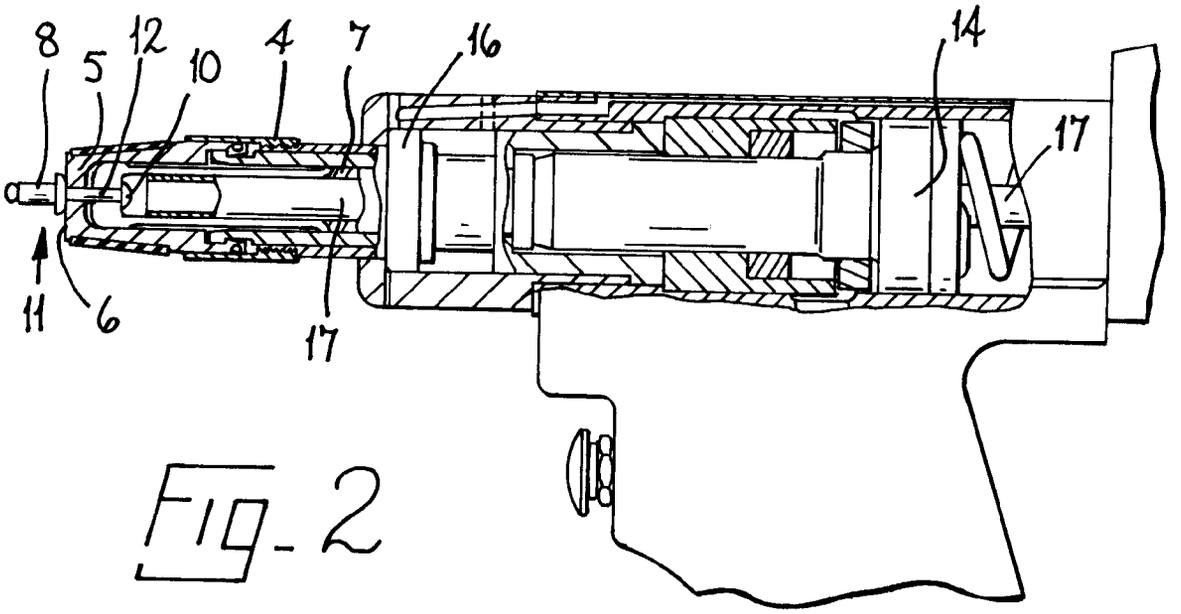

Fig_2

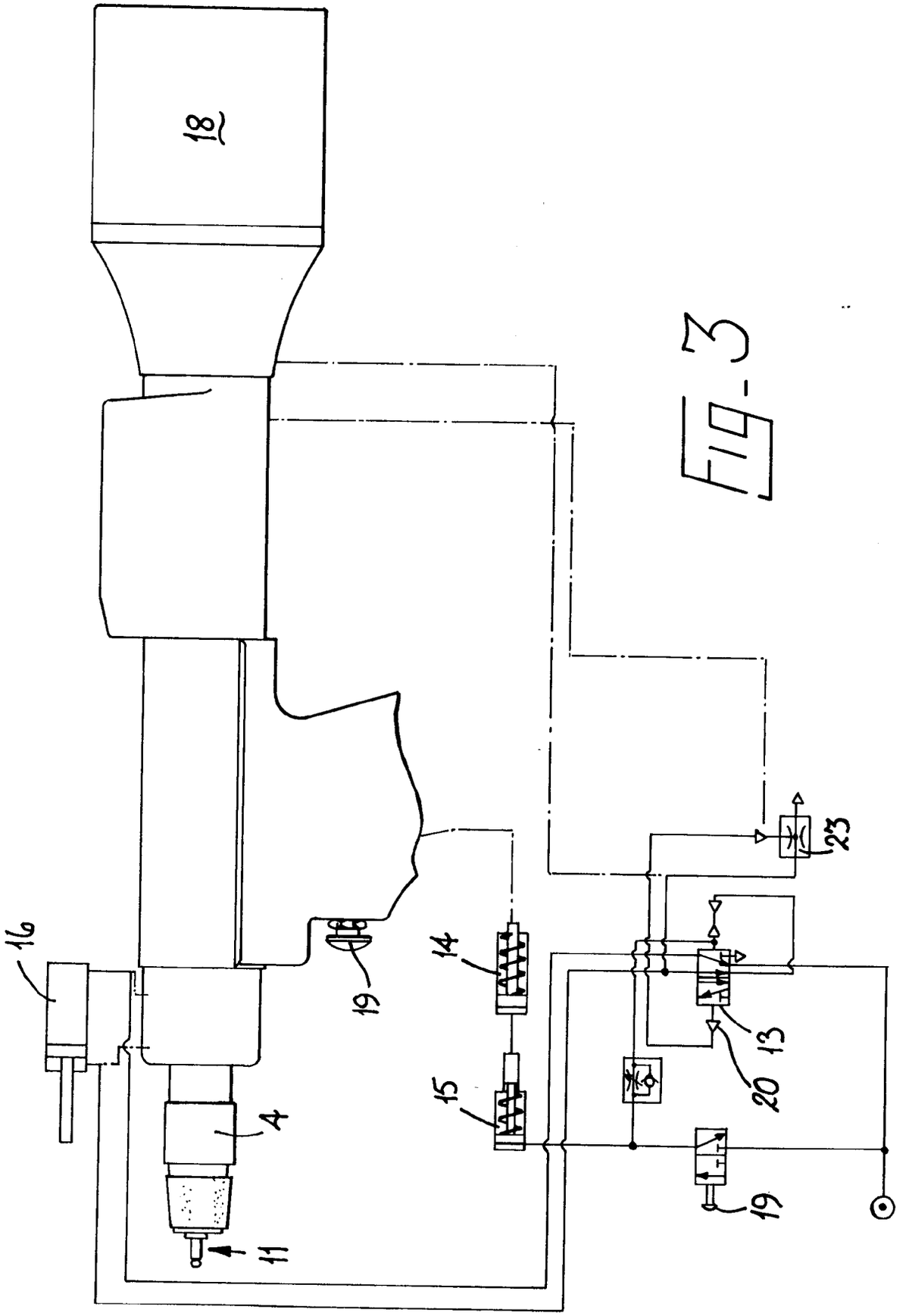

Fig. 3

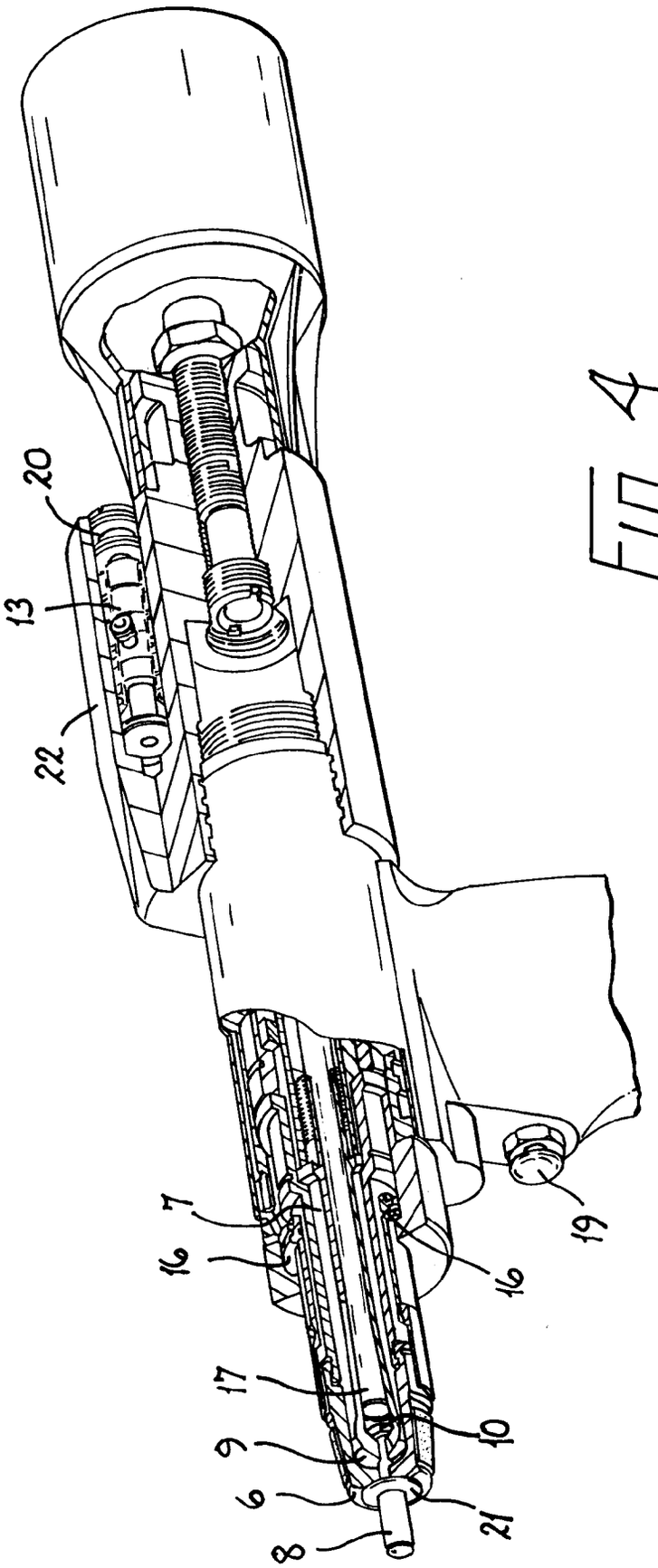

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number

EP 91 30 6630

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appfopriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	GB-A-2 171 947 (TUCKER FASTENERS LTD,(U.K.)) * abstract * * page 3, line 115 - page 4, line 88; figures * ---	1-5	B21J15/06 B21J15/28
Y	GB-A-2 188 860 (AVDEL LTD.) * abstract * * page 2, line 79 - page 3, line 108; figures * ---	1-5	
A	US-A-4 901 431 (GAST) * column 9, line 22 - column 10, line 37 * * column 11, line 14 - column 11, line 35; figures * ---	1-4	
A	US-A-4 130 006 (EBBERT) * column 3, line 3 - column 5, line 14; figures * ---	1-4	
A	US-A-2 344 127 (CHERRY) * page 1, right column, line 43 - line 55; figures * -----	5	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B21J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	04 NOVEMBER 1991	THE K.H.

CATEGORY OF CITED DOCUMENTS

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