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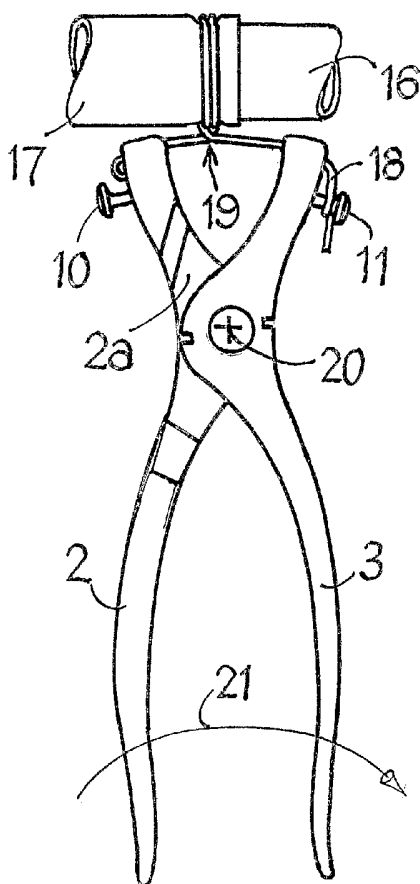
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- (71) Applicant and
- (72) Inventor: **GRIESHABER, CORNELIUS JOHANNES** [ZA/ZA]; **WELTEVREDE PLAAS, 0555 ELLISRAS** (ZA).
- (74) Agent: **HAHN & HAHN INC. WHEELER, C.J., DUNLOP, AJS; WILLIAMS, VW; LUTEREK, JF; MICHAEL, C; VENTER, PRC; BERND; 222 RICHARD STREET, HATFIELD, 0083 PRETORIA** (ZA).
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- Published:**
— with international search report

[Continued on next page]

(54) Title: WIRE TYING IMPLEMENT



(57) Abstract: An implement (1) for binding wire about a tube on a pipe, or other object, having a pair of pivoted handles (2, 3) and jaws, each jaw (5, 6) an integral extension of a handle and each jaw located on the same side of the pivot (4) as the respective handle; the jaws (5, 6) open as the handles are squeezed. Binding posts (10, 11), allow the securing of wire to the jaws after passing the wire around the tube and grooves (8, 9) at the ends of the jaws hold the wire at the ends of the jaws; after tensioning the wire around the tube by squeezing the handles the implement is twisted to secure the tensioned wire. Side cutters (14, 15) on the implement allow cutting off the ends of the wire for a neat finish.



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

FIELD OF INVENTION

This invention lies in the field of wire tying hand tools or implements, for tying or binding wire around typically a pipe where it is connected to a pipe fitting, but also around any other thing required, for example, binding a gaiter onto a pipe or tube, binding a rod or bar to strengthen it circumferentially, binding together two or more items and no doubt as many other applications as human ingenuity may devise.

10 BACKGROUND

US PATENT 2,623,424, Ackerman describes a tool for tightening a noose formed with wire around a tube to be tightened onto a nipple, the implement is limited to this usage and has no means of cutting off redundant wire ends after use. US patent 3,865,155 Spath describes a wire tying hand tool to tighten and secure a wire loop around an article, the tool has a handle that is turned to effect an action rather like a jacking action to tension the loop and then a separate handle is turned to secure the wire by twisting. Other tools for more specialized applications are known, e.g. to baling wire (US6,668,870), to block rows (JP11309536), to concrete reinforcing (US4,362,192), to connecting crossing bars (US3,593,759, US3,310,076, US 3,169,559 and EP0388350) and binding wires (GB243336).

As compared, for example, with a pair of pliers, these implements are complicated, waste wire, are almost impossible to use in confined spaces and

do not have a facility to cut off redundant wire after securing. Use of some implements leads too easily to breaking the wire due to the user not being well aware of the force exerted by the implement. Water, fuel and gas leaks at connections are among the problems for which a suitable and convenient tool
5 for applying a wire binding is not available.

THE INVENTION

An implement for wire binding in accordance with this invention comprises a
10 pair of handles that are pivotally connected with a jaw extending from each handle beyond the pivot, characterized in that each jaw is on the same side of a longitudinal centre line of the implement as the handle from which the jaw extends, and a groove and one selected from a tie-post and a hole, or both a tie post and hole, are located at the end of each jaw.

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A preferred embodiment has all three, the groove, hole and tie post at the end of each jaw, allowing some alternatives for the user.

Thus in contrast to the familiar pliers the jaws do not cross over at the pivot so
20 as to close as the handles are squeezed closed; instead the jaws open as the handles are squeezed.

It is most advantageous, even desirable, almost essential that the groove is carefully chamfered at the ends of the grooves so as to avoid sharp edges

and corners. These would be inclined to cause premature breaking of wire when the wire is being tensioned by the implement.

Preferably the implement is given a groove in each handle of the implement
5 near the pivotal connection, which overlap when the handles are opened and execute a scissors-type cutting action when the handles are closed towards each other.

THE DRAWINGS

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The invention is described by way of example of a preferred embodiment shown with reference to the drawings, in which : -

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Figure 1 is a view of the implement with its jaws closed,

Figure 2 is a side view of the implement,

20

Figure 3 is a view of the jaw region of the implement showing a start position in its use,

Figure 4 is a view of the jaw region of the implement showing an alternative start position in its use, and

Figure 5 is a view of the implement showing a wire bound around a tube, with
25 jaws closed, wire secured, preparatory to tensioning the wire.

Figure 6 is a view of the implement with its jaws opened having tensioned a wire around a tube and starting to twist a wire,

5 THE PREFERRED EMBODIMENTS

As shown in figures 1 and 2, the implement 1 for wire binding comprises a pair of handles 2, 3 that are pivotally connected by a pivot pin 4 with a jaw 5, 6 extending integrally from each handle 2, 3 respectively beyond the pivot. Each jaw 5, 6 is on the same side of a longitudinal centre line 7 of the implement as the handle 2, 3 respectively from which the jaw extends. As will be seen in figure 1, the reference to a "longitudinal centre line" is more strictly speaking a reference to a longitudinally oriented plane which is coincident with the axis 20 of the pivot pin; for convenience the quoted phrase will be used in this specification. A groove 8, 9 is located at the end of each jaw 5, 6 respectively, the edges of the grooves are rounded off or chamfered. A tie-post 10, 11 is located at the end of each jaw and a hole 12, 13 also located at the end of each jaw. Grooves 14, 15 are located in the handles near the pivot to serve as wire cutters. Each half of the implement 2, 3 is identical to the other, each having a thinned part 2a, 3a where they are pivotally connected with each other.

The use of the implement may be described with reference to figures 3 to 6, in which successive steps of the method of use are shown.

As a first step, as shown in figure 3 or as an alternative in figure 4, a wire 18 is either inserted through the hole 13 (figure 3) and bent over sharply towards the other jaw; the wire passes through the groove 9. Alternatively the wire is wound around the post 11 and again bent over sharply towards the other jaw, passing through the jaw 9 (figure 4). The wire may be a length drawn off a reel of wire, but need not be severed from the reel at this stage. A pipe 16 with a tube or hose 17 which is to be secured and sealed to it is placed against the jaws of the implement, the pipe oriented with its longitudinal axis parallel to the axis of the pivot of the implement (figure 5). The wire is then wound around the post 10 to secure it. The handles of the implement are then squeezed closed, which opens the jaws and applies a strong tension to the wire. The leverage provided by the implement allows a very large tension to be developed if desired and it is a specific advantage of the invention that the person using the implement can feel the extent of the force applied and observe the effect of the wire digging into the tube or hose and so judge the degree of tension required in the wire to a fine degree, especially with a little experience in use of the implement. The implement is then twisted while maintaining the pressure on the handles and the implement is shown having been twisted through ninety degrees in figure 6, the view itself rotated to show the implement in side view. This shows the jaws open and the wire crossed over at the position 19; the squeezing on the handles should then be eased a bit and the implement withdrawn a small distance and the implement can then be twisted through a few more degrees, e.g. another ninety degrees or more (arrow 21), as may be required to secure the wire. The wire is then detached from the post and hole or post and is cut off neatly using the cutter grooves.

The cut off ends can then be pressed down flush against the tube or hose using the handles. The handles may have a pad area provided to facilitate this step. This completes the binding of the tube or hose to the pipe.

- 5 It is found that the implement can handle a range of wire sizes, for example, one measuring 20 cm in overall length can effectively work with wire from 0,05 mm thickness to 2 mm thickness; other models can work thicker wire. The implement is made of a suitable steel, optionally heat treated, preferably worked off neatly, machined for the grooves, holes, pin and posts fitted and
- 10 corrosion treated, e.g. galvanized.

REFERENCE NUMERALS

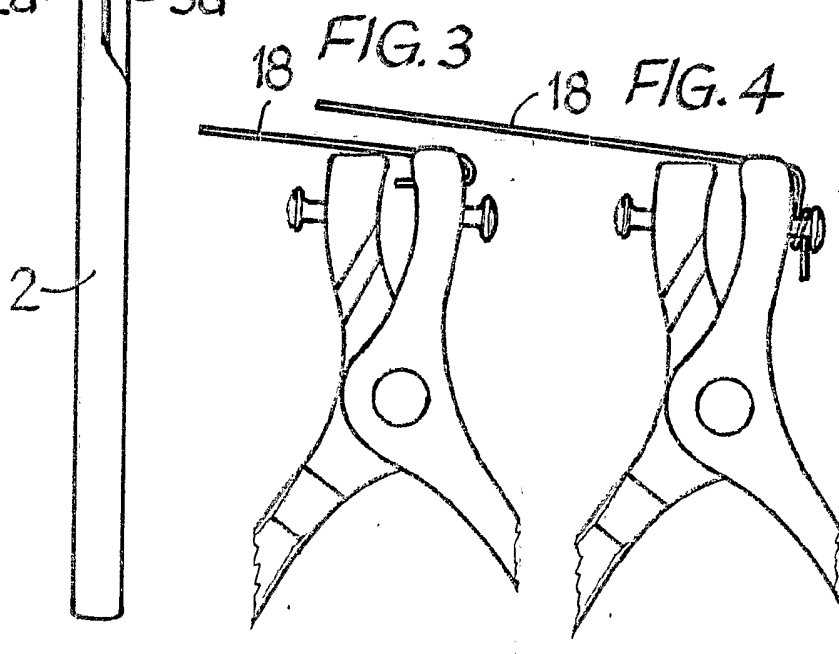
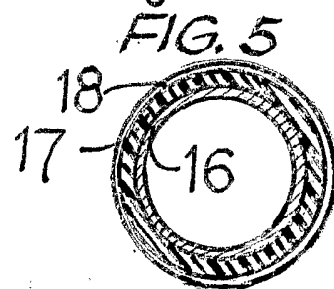
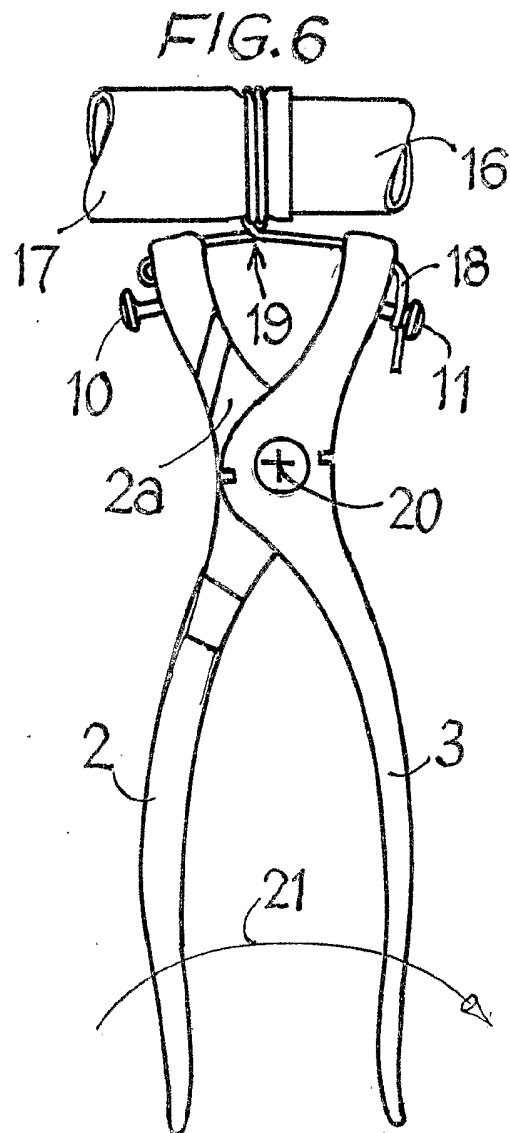
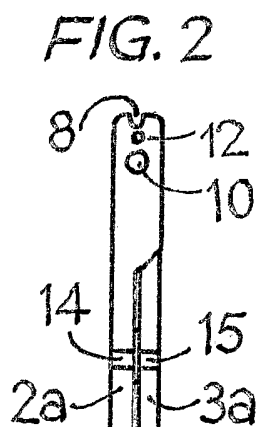
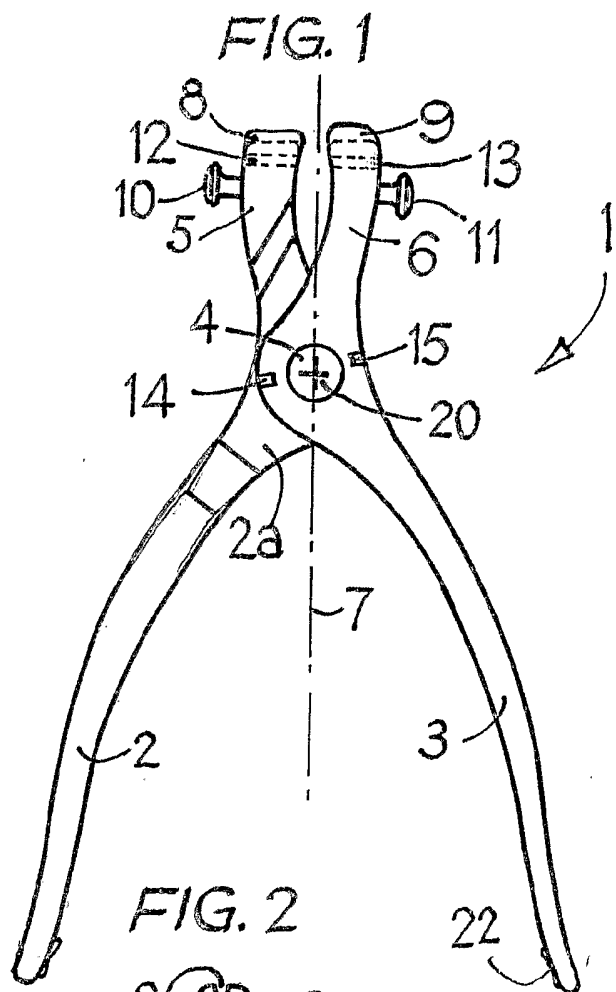
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|----|----|--------------------------|
| | 1 | implement |
| 15 | 2 | left handle |
| | 3 | right handle |
| | 4 | pivot pin |
| | 5 | left jaw |
| | 6 | right jaw |
| 20 | 7 | longitudinal centre line |
| | 8 | groove in left jaw |
| | 9 | groove in right jaw |
| | 10 | left binding post |
| | 11 | right binding post |
| 25 | 12 | left hole |

- 13 right hole
- 14 cutting groove
- 15 cutting groove
- 16 pipe
- 5 17 tube
- 18 binding wire
- 19 cross-over point of wire
- 20 axis of pivot
- 21 arrow showing direction of twisting
- 10 22 pads to press down ends

CLAIMS

1. An implement for wire binding, which comprises a pair of handles that are pivotally connected with a jaw extending from each handle beyond the pivot, characterized in that each jaw is on the same side of a longitudinal centre line of the implement as the handle from which the jaw extends, and a groove and a tie-post are located at the end of each jaw.
2. An implement for wire binding, which comprises a pair of handles that are pivotally connected with a jaw extending from each handle beyond the pivot, characterized in that each jaw is on the same side of a longitudinal centre line of the implement as the handle from which the jaw extends, and a groove and a hole are located at the end of each jaw.
3. An implement for wire binding, which comprises a pair of handles that are pivotally connected with a jaw extending from each handle beyond the pivot, characterized in that each jaw is on the same side of a longitudinal centre line of the implement as the handle from which the jaw extends, and a groove, a tie-post and a hole are located at the end of each jaw.

4. An implement as claimed in any one of claims 1 to 3, in which the groove is carefully chamfered at the ends of the grooves so as to avoid sharp edges and corners.
- 5 5. An implement as claimed in any one of claims 1 to 4, in which the implement is given a groove in each arm of the implement near the pivotal connection, which overlap when the handles are opened and execute a scissors-type cutting action when the handles are closed towards each other.
- 10 6. An implement as claimed in any one of claims 1 to 5, in which the handles are given pads which facilitate pressing ends of the wire down.
- 15 7. An implement as herein described and as illustrated in the drawings.



INTERNATIONAL SEARCH REPORT

tional Application No

PCT/ZA2005/000081

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B25B7/02 B25B25/00 B25B7/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B25B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	BE 894 519 A1 (SCHYNS GERARD) 17 January 1983 (1983-01-17) page 3	1-4, 6
Y	figures 1-4	5
Y	US 5 934 342 A (DANIELSON ET AL) 10 August 1999 (1999-08-10) column 2, line 51 - line 67 figure 1	5
X	DE 100 05 851 C1 (RASMUSSEN GMBH) 5 July 2001 (2001-07-05) figures 1,6	2

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search

28 October 2005

Date of mailing of the international search report

09/11/2005

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Schultz, T

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 7

Present claim 7 relates to a tool defined by reference to the figures and the description of the application. The claim 7 so lacks clarity (Art 6 PCT, Rule 6.2(a) PCT). This lack of clarity in the present case is such as to render a meaningful search over the whole of the claimed scope impossible.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

ational application No.
PCT/ZA2005/000081

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 7
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/ZA2005/000081

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
BE 894519	A1	17-01-1983	NONE
US 5934342	A	10-08-1999	NONE
DE 10005851	C1	05-07-2001	NONE