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(12) # EUROPEAN PATENT APPLICATION

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(54) **Strap tensioning tool and buckle.**

(57) A tool is provided to tension a strap around crates or the like, this tool having a pair of spring (22, 23) tensioned gripper members (17,18) which are rotatably supported on a frame (11), this frame having a handle estending therefrom. The gripper members (17,18) in their tensioned position have gripping surfaces (25,26) which abut against the wall surfaces (28,29) of cut-out portions (12,13) formed in the frame. A free end of the strap is fitted between the gripper member (17) closest to the handle and its associated opposing cut-out wall portion (12) while a portion of the strap which wraps around the object to be strapped down is fitted between the other of the gripper portions (18) and the opposing wall (29) of its associated cut-out portion (13). Rocking motion of the tool with the head thereof abutted against the object to be strapped will cause the rotatably mounted gripper members (17,18) to pull against the strap portions inserted therethrough in opposite directions so as to tension the strap around the object.

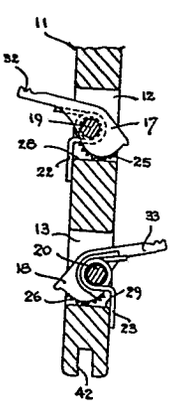

Fig.3

EP 0 043 198 A1

TITLE MODIFIED
see front page

STRAP TENSIONING DEVICE

This invention relates to tie-down devices for strapping down cargo such as crates, boxes and the like, and more particularly to a buckle and a tool which operates therewith for tensioning such a strap.

Various types of buckles have been developed for use in connecting together the ends of a cargo tie-down strap and tightening the strap around a crate, box or other object to be tied down. Such buckles are described in the specifications of U.S. Patent Nos. 2,490,862 and 2,538,641, issued December 13, 1949, and December 16, 1951, to E.C. Elsner. In using such buckles, the strap is generally tightened by hand pulling on one of its free ends. It has been found that in many situations it is difficult or impossible, except for a person of extraordinary strength, to pull hard enough on the ends of such a buckle properly to tension the strap to ensure that the cargo or the like to be tied down is adequately retained (particularly in situations where heavy objects are involved and the cargo is subjected to considerable vibration and motion).

The present invention overcomes the aforementioned shortcoming by providing a simple and economical buckle which can be used in conjunction with a tensioning tool. This tool is operable to provide very tight tensioning of the strap around the cargo with a minimum effort by the operator in a few moments of operation. Further, the tool can be employed rapidly to release the buckle when the strap is to be untied.

The tensioning tool of the invention has a frame member with a pair of spring-tensioned gripper members which are rotatable supported in cut-out portions of the frame. These two gripper members are mounted and tensioned so that they can rotate in opposite directions against their spring tensions from a resting position with the gripping surfaces thereof retaining a portion of the strap against an opposing surface of the cut-out portion. Extending from the frame portion of the tool is an elongated handle. A free end position of the strap is fitted through one of the gripper members while a portion of

the strap which wraps around the object to be retained is fitted through the other of the gripper members, there being side slots in the frame to facilitate the entrance of these strap portions into their associated gripper members. Handles are provided on each of the gripper members to enable their rotation away from the opposing cut-out portion surfaces to facilitate the insertion of the strap. The strap is passed through a buckle member having a U-shaped portion, the opposite portions of such strap being wound around the legs of this U-shaped portion. The U-shaped portion is retained in slots formed in a base plate member, such that when the strap is tightened the U-shaped portion is drawn against this base plate member by virtue of the tensioning action. The strap is tensioned against the object to be retained by abutting the end of the tensioning tool away from the handle thereof against such object and rocking the tool back and forth with the handle, thereby drawing the free end of the strap and the wrapped around portion of the strap in opposite directions to effect the desired tensioning action. The tool also includes a slot formed on the end thereof which mates with a lip on the buckle such that the tool can be employed to loosen the strap by inserting the slotted end of the tool over a tongue portion of the buckle and rocking the tool upwardly.

Referring now to the drawings :-

Figure 1 is a side elevational view of a preferred embodiment of the tool member of the invention;

Figure 2 is an end elevational view of the preferred embodiment of the tool member;

Figure 3 is a cross-sectional view taken along the plane indicated by 3-3 in Figure 1;

Figure 4 is an end elevational view of the buckle member of the preferred embodiment of the invention;

Figure 5 is a side elevational view of the preferred embodiment of the buckle member;

Figure 6 is a top plan view of the preferred embodiment of the buckle member;

Figure 7 is an exploded end elevational view of the

preferred embodiment of the buckle with a strap installed therein;

Figure 8 is a schematic view illustrating the operation of the buckle and tensioning tool of the invention; and

Figure 9 is a schematic view illustrating the use of the tensioning tool of the invention to release the buckle.

Referring now to Figures 1 to 3, a preferred embodiment of the tensioning tool of the invention is illustrated. This tool member has a frame portion 11 with a pair of rectangular cut-outs 12 and 13 formed therein. A slot 15 and 16 is formed at one of the corners of each of the cut-outs 12 and 13 respectively to permit the passage of a strap therein. Rotatably mounted on the frame in each of the cut-outs by means of a pin 19 and 20 respectively are a pair of gripper members 17 and 18. The gripper members are resiliently urged by means of coil springs 22 and 23 respectively, such that their toothed gripping surfaces 25 and 26 abut against surfaces 28 and 29 of cut-outs 12 and 13, as can best be seen in Figure 3. Gripping surfaces 25 and 26 are curved and gripper members 17 and 18 are mounted and shaped such that the gripping surfaces come to a final resting position in clamping relationship with surfaces 28 and 29 in response to the urging of springs 22 and 23. Handles 32 and 33 are provided on the gripping members to enable their manual movement as indicated by arrows 35 and 36 respectively, downward actuation of these handles bringing the gripping surfaces 25 and 26 away from surfaces 28 and 29 so that the straps can be inserted in the space between the gripping members and the opposing surfaces 28 and 29. The tool has an elongated handle 40 for use in the manipulation thereof which handle extends from frame 11. A slot 42 is formed on the bottom of the frame for use in releasing the buckle as shown in Figure 9.

Referring now to Figures 4 to 6, a preferred embodiment of the buckle member of the invention is illustrated. This buckle member includes a base plate portion 50 having a pair of end plate portions 51 and 52 which extend normally from the base plate. A pair of spaced slots 51a, 51b and 52a, 52b are formed

in each of end portions 51 and 52 respectively. An elongated slot 50a is formed in base plate 50 and a lip portion 50b extends from this plate. Fitted in slots 51a, 51b, 52a, 52b is a U-shaped member 55, the arm portions of this member preferably being gripped by the sides of the slots when they are inserted therein so that they are removably retained to the plate. The U-shaped member 55 may also be permanently retained in the slots by staking or a snap-tight fit. It is also feasible to implement the function of member 55 with a pair of separate arm portions in the form of bars which are fitted in the slots as in the case of the arms of U-shaped member.

Referring now to Figure 7, the opposite end portions 60a and 60b of a strap are looped around the opposite arms of U-shaped member 55 and run through slot 50a formed in base plate 50. The free ends 60c and 60d of the strap are above the portion 60e of the strap which forms a loop running around the object 70 to be tied down. In its operative position, as already noted in connection with Figures 4 to 6, U-shaped member 55 is inserted in slots 50a, 51b, 52a and 52b are preferably retained in these slots, although such retention is not absolutely necessary for the operation of the device in view of the fact that when the strap is tightened, U-shaped member 55 is drawn against the end portions 51 and 52 of the base member.

Referring now to Figure 8, the use of the device of the invention in tightening a strap 60 around an object 70 to be tied down is illustrated. An end portion 60b of the strap is installed between gripped member 17 and the opposing wall of the cut-out in frame 11, while the portion 60e of the strap which is looped around object 70 is installed between gripper member 18 and the opposing wall of the frame cut-out in which this gripper member is mounted. Portions 60a and 60b of the strap are wound around the arms of U-shaped member 55, as shown in Figure 7, and these arms installed in the grooves of end plates 51 and 52. With the end 11a of the tool abutting against the top surface of the object (crate or the like) to be tied down, the tool is rocked back and forth as indicated by

arrows 73. With such rocking motion, gripper member 17 grabs onto the strap and pulls it in the direction indicated by arrow 77 when the tool is moved downwardly away from the buckle, while gripper member 18 simultaneously urges strap portion 60e in the direction indicated by arrow 78 to aid in this tightening action. It thus can be seen that with several rocking movements of the tool the strap can be tightly cinched in place. After the strap has been tightened, the handles 32 and 33 are depressed and the tool removed from the strap.

Referring now to Figure 9, the holding action of the buckle on the strap 60 can be released merely by placing the end slot 42 of the tool over the tongue 50b of the buckle and rocking the tool upwardly as indicated by arrow 80.

While the invention has been described and illustrated in detail, it is to be clearly understood that this is intended by way of illustration and example only and is not to be taken by way of limitation, the spirit and scope of this invention being limited only by the terms of the following claims.

CLAIMS

1. A strap tensioning tool for tensioning a strap around an object comprising

a frame member having a pair of cut-out portions formed therein,

a gripper member rotatably mounted on each of said cut-out portions,

spring means for resiliently urging each of said gripper members rotatably,

said gripper members being urged in opposite directions to final resting positions in clamping relationship with an opposing surface of the associated cut-out portion, and

a handle extending from said frame member for manipulating said tool,

one end portion of said strap away from the object being installed between one of said gripper members and the cut-out surface thereopposite and a portion of the strap towards said object being installed between the other of said gripper members and the cut-out surface thereopposite.

2. A tool according to Claim 1 wherein said cut-out portions are rectangular in shape and have slots formed in one of the corners thereof to permit the insertion of the strap therein.

3. A tool according to Claims 1 or 2 wherein said gripper members have curved toothed gripping surfaces thereon.

4. A tool according to Claims 1 or 3 wherein said gripper members have handles thereon for facilitating the manual rotatable movement thereof.

5. A tool according to any of the preceding claims including in combination a buckle means for retaining the strap in a tensioned condition installed on the strap at a position therealong between said gripper members and the portion of said strap running around the object and the other end portion of the strap.

6. A buckle member for retaining a strap in tension around an object comprising

a base plate portion having an elongated slot formed therein,

a pair of end plate portions extending normally from said base plate portion in opposing relationship, a pair of spaced apart slots formed in each of said end plate portions, and

a pair of arm portions fitted in the slots of said end plate portions,

one end portion of said strap being looped around one of said arm portions, the other end portion of said strap being looped around the other of said arm portions, all of the looped strap portions passing through the elongated slot in said base plate portion.

7. A buckle member according to Claim 6 and further including a lip portion extending from the base portion for use in releasing the retaining action of said buckle.

8. A buckle member according to Claims 6 or 7 wherein said arm portions are the arms of a U-shaped member.

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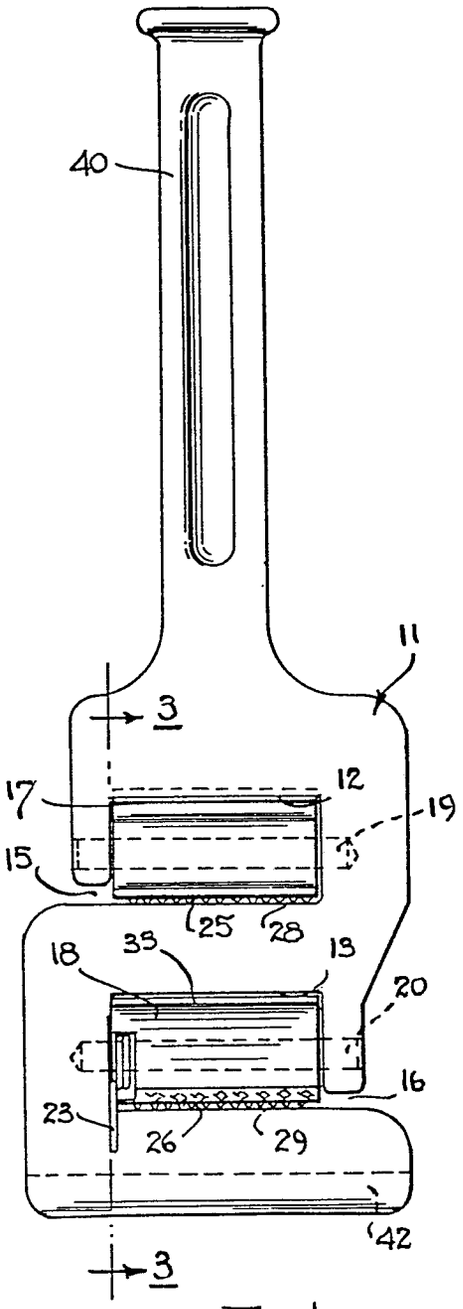

FIG.1

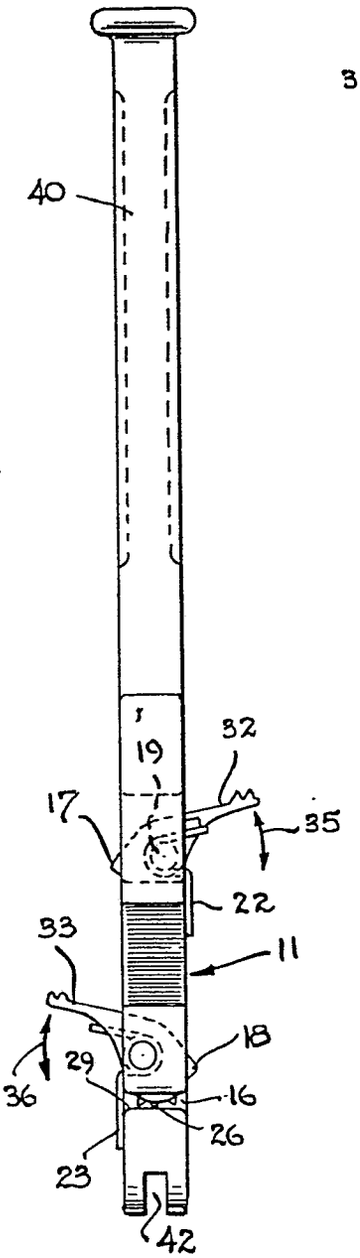

FIG.2

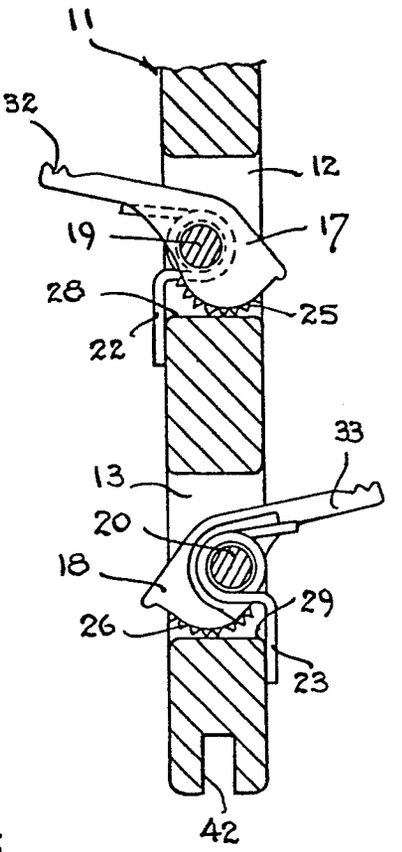

FIG.3

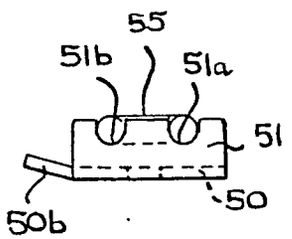

FIG.4

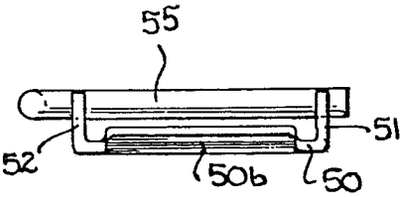

FIG.5

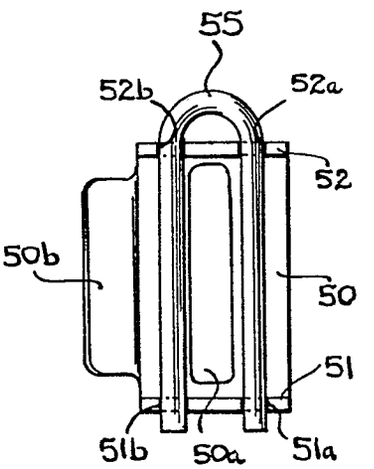

FIG.6

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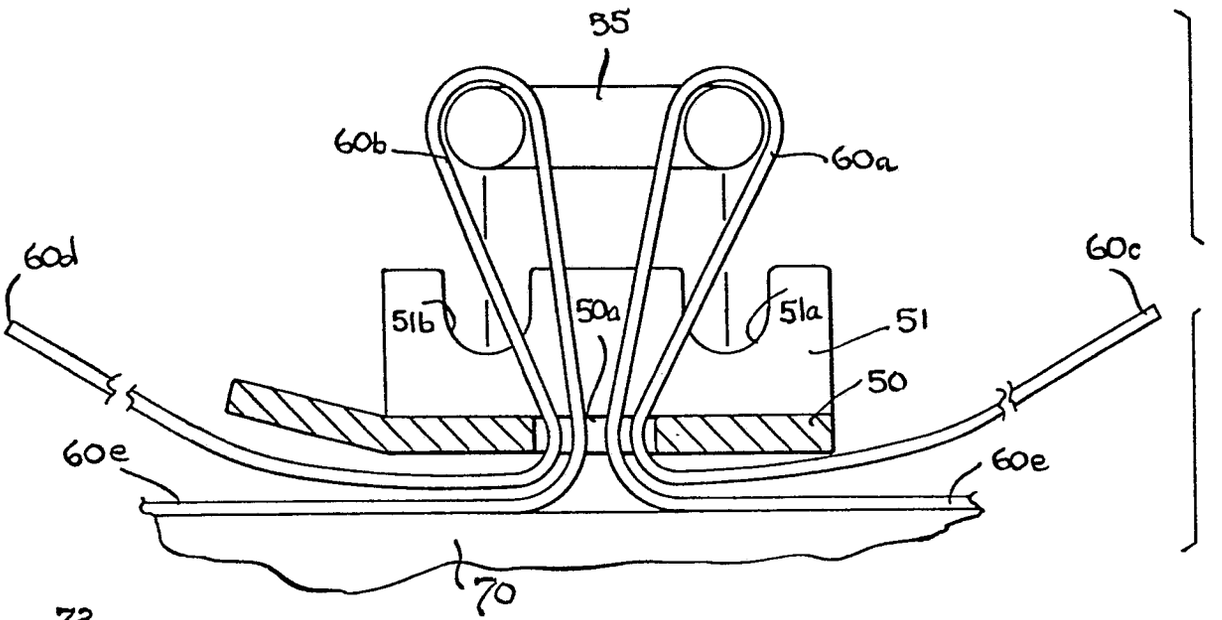

FIG. 7

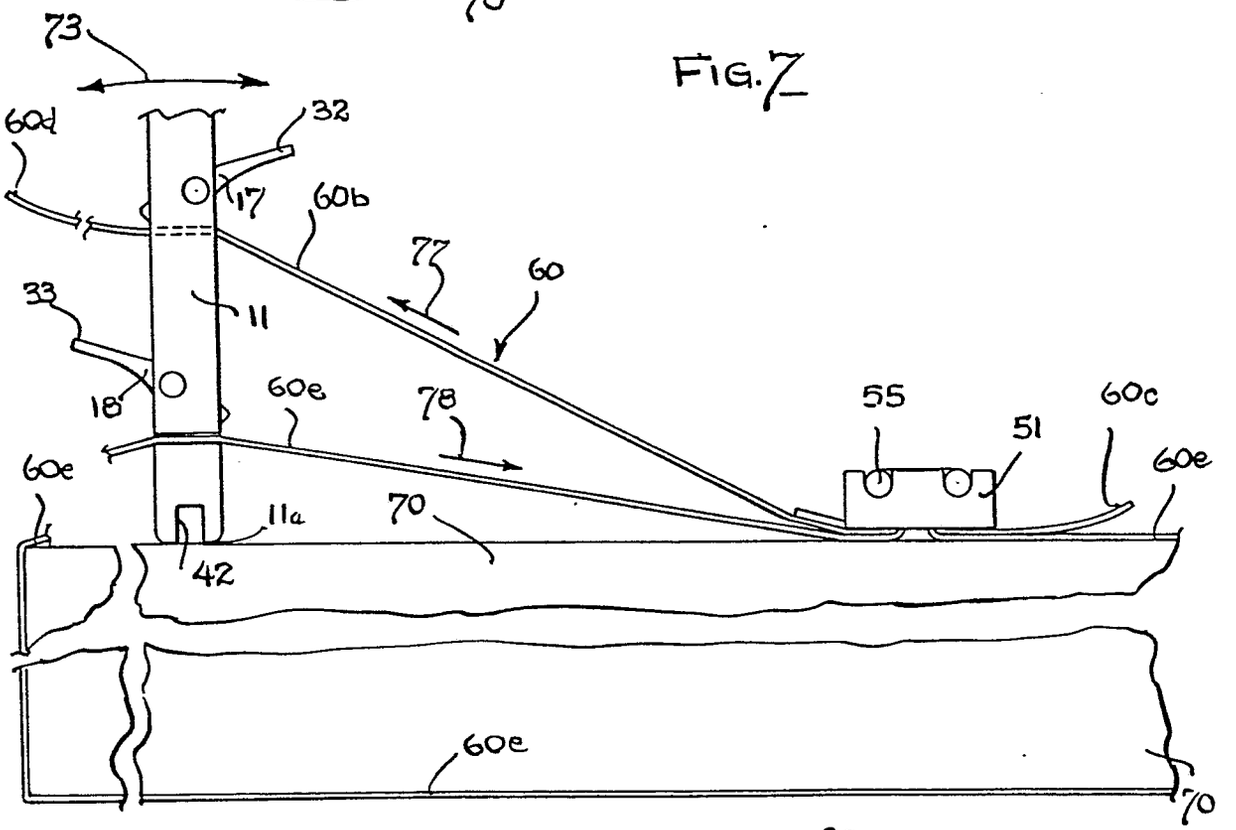

FIG. 8

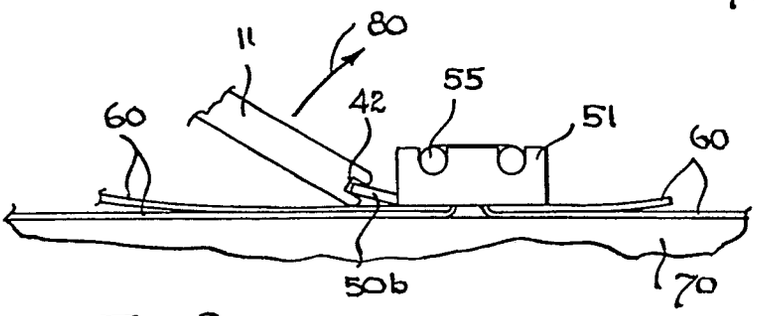

FIG. 9

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EUROPEAN SEARCH REPORT

0043198
Application number

EP 81302593.9

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
A	US - A - 3 206 816 (VILCINS et al.)	6,8
A	GB - A - 2 014 263 (HENDERSON)	1,6
A	US - A - 2 882 934 (GERRARD) * Fig. 3; Pos. 16,19,21,25 *	1,3
D,A	US - A - 2 490 862 (ELSNER)	
A	US - A - 3 574 342 (BERNS) * Fig. 3 *	
	DE - B2 - 1 557 477 (LINDBLAD) * Totality *	3-8

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

B 65 B 13/22
B 25 B 25/00
A 44 B 11/02

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

A 44 B 11/00
B 25 B 25/00
B 60 P 7/00
B 61 D 45/00
B 65 B 13/00
B 65 D 63/00

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&. member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	10-09-1981	MELZER

EPO Form 1503.1 06.78