(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 295 733**
A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **88201031.7**

(51) Int. Cl.[4]: **B65H 57/12**

(22) Date of filing: **20.05.88**

(30) Priority: **19.06.87 IT 2096087**

(43) Date of publication of application:
21.12.88 Bulletin 88/51

(84) Designated Contracting States:
BE CH DE ES FR GB GR LI

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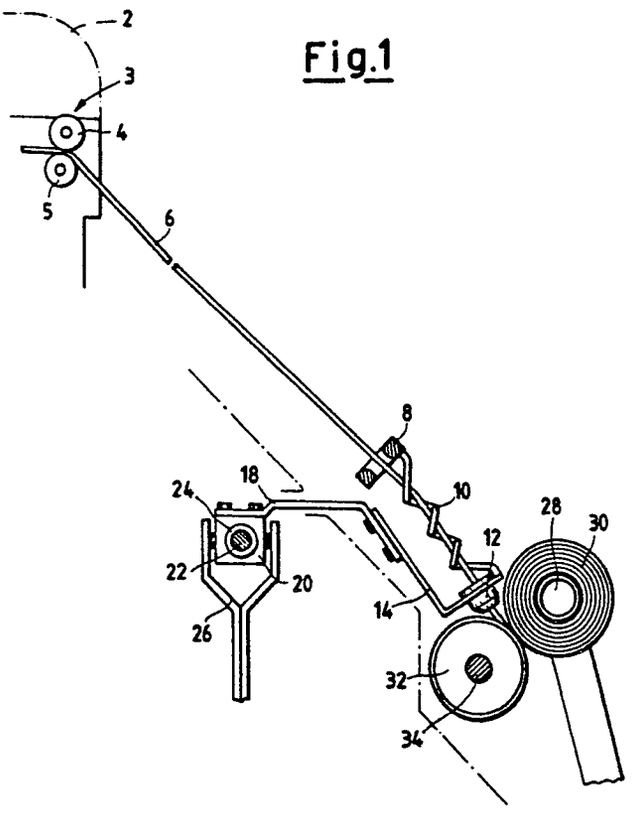
(54) Spiral element for supplying textile fibre slivers with compensation and false twist.

(57) The invention relates to a movable sliver guide element (7) for the winding of cross-wound bobbins on the drawing frames (2), consisting of a spiral (10) with arc-shaped axis helical winding having a positive inner diameter, inside which said sliver (6) is made run and slide, so that it results guided and continuously twisted on itself, in order to be supplied with a high mutual cohesion between the fibres which compose it. In such a way, the movable spiral-shaped sliver guide (7) supplies the same sliver with a torsional strength suitable for elastically compensating for the periodic change of the distance between the stationary outlet point from the outlet calenders (3) of the drawing frame, and the collection point, which reciprocates along the bobbin (30) under way of formation.

Fig.1



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"SPIRAL ELEMENT FOR SUPPLYING TEXTILE FIBRE SLIVERS WITH COMPENSATION AND FALSE TWIST"

The present invention relates to a movable spiral element having an arc-shaped axis suitable for guiding the sliver to the cross-winding for cross-wound bobbin winding on the drawer frames, or derived machines.

In the following disclosure, and in the appended claims, the term "sliver" will be uniformly used in order to indifferently indicate both a roving of textile fibres, or a sliver of textile fibres, or, anyway, an aggregate of textile fibres.

On a drawer frame on which the sliver is collected on bobbins of a traditional type, the bobbin is produced by winding the sliver around an idle roll, driven to revolve by one or more slotted rolls, by means of a false twisting device which gives the sliver roundness and mechanical strength, and maintains the individuality thereof during the subsequent unwinding process.

It is known that the conveyance of the sliver, between the outlet unit of the drawer frame, the "outlet calenders", and the winding system, must take place under a due collection tension, which is essential for a compact bobbin to form.

Furthermore, the winding should be carried out with the fibres of the sliver being kept as condensed as possible, in order that the mutual cohesion between the fibres prevents false drawings from occuring over the length of sliver running from the drawer frame outlet to the surface of the bobbin under way of formation. Often, the sliver leaving the outlet calender is fragile owing to the fact that the textile fibres which constitute it are short, or are often connected with a low mutual cohesion degree.

Furthermore, the sliver is continuously subject to a pendular change in distance between the stationary outlet point from the outlet calender of the drawer frame, to the movable sliver guide driven to reciprocate along the bobbin under way of formation. Changes in the distances during the collection step must give the sliver such tension values, which will not cause modifications to occur in size and quality characteristics of the same sliver between the outlet point from the outlet calender, and the point wherein the winding operation is carried out.

Relatively high changes in tension could even cause the sliver to break. One can easily understand how such a breakage would interrupt the production process, obliging the attending operator to take action.

The labour cost for these emergency operations represents a considerable factor when the production costs are computed.

In order to solve this winding problem, several solutions have been proposed in the past.

US patent 3,670,978 proposes, e.g., to make the sliver run inside a ring constituting an intermediate guide, installed, in a movable way, between the point of outlet from the outlet calender of the drawer frame and the bobbin winding system, in such a way that the total of the respective distances of said ring relatively to the outlet from the outlet calender and to the sliver guide remains always constant. On the same principle, moreover, several systems have already been proposed and implemented, which envisage, e.g., articulated toggle-levers, or the like, capable of realizing the desired kinematic system. However, these solutions suffer all from drawbacks, in that they require that relatively high masses be reciprocated, which cannot be applied to the present machines, operating at high speeds, not only due to the large energy amount to be supplied and to the fast wear occurring in the various parts, but also owing to the fact that vibrations, and consequent fatigue breakages, occur.

The purpose of the present invention is to provide a spiral twisting device for a bobbin winding car for a drawer frame, capable of compensating for said changes in distance, and of compacting the fibres of the sliver with one another, making said sliver strong enough for the cross-winding operation, which does not show the above-mentioned drawbacks affecting the devices known from the prior art.

In order to achieve said purpose, according to the present invention, the present Applicant has studied, tested and developed a twisting and compensating element for compensating for the above said change in distance by means of a spiral element having an arc-shaped axis, constituted by a wire or a tube made from spring-steel, or another wear-resistant material, helically wound with a pitch and with a number of turns which depend on the type and weight of the material to be processed.

Inasmuch as it is simply constituted by a steel wire or tube, the spiral element according to the invention has the very small inertia as necessary in order not to substantially apply a burden to the bobbing-winding car during its reciprocating motion. The spiral gives twists to the sliver, supplying it with such a bond strength and such a compactness between the fibres, as to render it totally elastic and capable of supporting the necessary tension to be applied for performing the cross-winding operation.

More specifically, the spiral performs the task of guiding the sliver to the surface of the bobbin under way of formation, with simultaneously sup-

plying the same sliver with a twist in a predetermined direction running towards the outlet calender. Such a twist, by running along the entry length of the sliver, arrives up to the outlet point from the outlet calender, and is more concentrated along those sliver portions wherein the cross-section surface area is smaller, thus compensating for their lower strength relatively to the other sliver portions, which have a larger cross-section surface-area.

One can easily understand that all the above gives the sliver a uniform strength along its whole length, eliminating those portions characterized by a low twist strength which may easily generate breakages, and therefore cause interruptions of the productive process, with such consequences as above partially mentioned.

Thus, the twist given by means of the spiral element to the sliver, when this latter leaves the outlet calender, keeps advantageously mutually bound the fibres which compose the same sliver, making it possible said sliver to be put under tension, in order to elastically extend it, realizing a perfect compensation for the change in distance, with no risk of formation of false drafts. Thanks to the simple structure and to the low weight of the spiral, the bobbin winding speed can be substantially increased on the machine, and the cost of the same machine is decreased to a considerable extent. The helical windings, by being prearranged along an arc-shaped curve, whose bending centre is opposite to the bending centre of the winding relatively to the line along which the sliver under way of collection runs, contribute to considerably improve the twisting of the sliver and to perfectly round it. In fact, the present Applicant, after several experimental investigations, was able to observe that the arc-shaped axis of the elastic element leads to that constance of the circular shape of the cross-section of the sliver which is being continuously wound, which makes it possible the presence to be eliminated of the so-said "mariages", i.e., the binding of fibres of adjacent sliver turns, which generate faults during the subsequent step of the production process, operating on bobbin unwinding.

These, and still other purposes are all achieved by means of the movable spiral element for giving compensation and false twist to the slivers leaving the drawer frames, or derived machines, for the winding of cross-wound bobbins, characterized in that the centres of the helical windings, the centre of the guide ring on the entry side, and the centre of the internal surface of the condenser sleeve are predisposed along an arc-shaped curve, whose bending centre is opposite side to the bending centre of winding into bobbin relatively to the line along which the sliver under way of collection runs.

According to a form of practical embodiment, the movable spiral element is made from helical windings with a positive inner diameter, and said diameter is substantially constant.

According to a another form of practical embodiment, the condenser sleeve of the movable spiral element has an inner surface of spherical outline converging in the direction of collection, in order to gradually compact the sliver before it is collected on the surface of the bobbin under way of formation.

According to a further form of practical embodiment, the movable spiral element is provided with a number of turns, and with a pitch which depend on the type and on the weight of the material being processed, and has an arc-shaped external shape.

According to a still another form of practical embodiment, the movable spiral element is provided with two ends, with one of said ends being fastened to the movable reciprocating-translation block, and the other end being fastened to the guide/entry ring which guides the sliver to enter into the helical windings.

According to a still further form of practical embodiment, the movable spiral element has elical turns constituted by a small-mass tube in order to show an as-small-as-possible inertia to the high-speed reciprocating movement.

In the following a preferred form of practical embodiment of the element of the present invention is described for solely exemplifying and non-limitative purposes, with the aid of the hereto attached drawing tables, wherein:

Figure 1 shows a schematic side view of a movable spiral-shaped sliver guide element for giving compensation and false twist to textile-fibre slivers according to the invention, in upstream cooperation with the outlet calender unit through which the sliver leaves the drawer frame, and in downstream cooperation with the system of cross-winding for the formation of the cross-wound bobbin on which the sliver is collected.

Figure 2 shows a schematic view of the arc-shaped spiral element together with the cross sections of the entry guide ring, and of the exit condenser sleeve.

In the figures, equal parts, or parts performing equal or equivalent functions are indicated by same reference numerals:

In the figures: 2 is a schematic outline of the drawer frame, or of a derived machine; 3 is the outlet calender unit, which acts as the means for feeding the sliver leaving the drawer frame 2; 4 is the pressure roll of the outlet calender unit, which, together with the roll 5, continuously extract from the drawing area the fibre sliver 6; 6 is the sliver of textile fibres substantially constituted by an aggregate of a more or less large number of textile

fibres of various length; 8 is a ring with a side slot. This latter, not depicted in the diagram,as being per se known, is advantageously provided in order to make it possible the sliver 6 to be entered inside the ring 8. Said ring is given an inner ring surface with a substantially spherical outline in order to correctly guide the sliver into the interior of the spiral 10; 10 is a spiral element with a plurality of helical turns not mutually coaxial, but predisposed along an arc-shaped curve 16 whose bending centre is opposite to the bending centre of the winding of the sliver 6 on the bobbin 30 relatively to the line along which the same sliver 6 runs; 7 is the initial portion of the spiral element 10 wherein the fibres of the entering sliver 6 exert a higher pressure, due to the bent arrangement of the helical turns according to the axis 16, onto the intrados 11 of the inner surface of said spiral element 10, which is characterized by an inner positive diameter; 9 is the end portion of the spiral element 10, wherein the fibres of the exiting sliver 6 exert a higher pressure, due to the circumferential deviation of the sliver 6 under way of collection on the bobbin 30, against the extrados 15 of the inner surface of said spiral element 10; 12 is the condenser sleeve whose inner surface has a spherical outline converging in the direction of collection of the sliver 6 on the bobbin 30; 14 and 18 are connection brackets for creating an integral connection between the condenser sleeve 12 and the reciprocating-translation device 20 guided to move parallelly to the axis of the bobbin 30 under way of formation; 24 is the sleeve sliding along the cylindrical guide bar 22 positioned parallel to the axis 34 of the roll 32 which drives the bobbin under way of formation 30; 26 is the flat structural shape which supports the whole device, provided with reciprocating motion with a transversal stroke substantially equal to the axial length of the desired bobbin 30.

The sliver, or roving, or aggregate of fibres 6 leaving the outlet calender 3 is entered into the guide ring 8 through the side slot, not shown in the figures, as being per se known,and is conveyed,through the spiral 10 and the condenser sleeve 12 in order to be collected on the periphery of the bobbin under way of formation 30 revolving on the winding spindle 28.

In the present disclosure, a preferred form of practical embodiment of the present invention has been disclosed, but other different forms of practical embodiment are possible as well; the shape, the ratios and the size of the parts may be changed; the wire which constitutes the spiral 10 may be of a different suitable material; the anchoring elements 14 and 18 may be given a different shape, or may be mounted in a different way, without thereby departing from the scope of the solution as proposed by the present invention, as claimed in the hereto appended claims.

Claims

1. Movable spiral element for giving compensation and false twist to the slivers leaving the drawer frames for being wound on bobbins by means of a winding car, characterized in that the centres of the helical windings, the centre of the entry guide ring and the centre of the inner surface of the condenser sleeve are predisposed along an arc-shaped curve having its bending centre opposite to the bending centre of winding into bobbin relatively to the trajectory along which the sliver under way of collection runs.

2. Movable spiral element according to claim 1, characterized in that the inner diameter of the helical windings is positive and is substantially constant.

3. Movable spiral element according to claim 1, characterized in that the inner surface of the condenser sleeve has a spherical outline converging in the collection direction.

4. Movable spiral element according to claim 1, characterized in that it is provided with a number of turns, and with a pitch which depend on the type and on the weight of the material to be processed, and with an arc-shaped outer shape.

5. Movable spiral element according to claim 1 and any of following claims, characterized in that it has two ends, with one of said ends being fastened to the movable reciprocating-translation block, and the other end being fastened to the the entry/guide ring which guides the sliver to enter into the helical windings.

6. Movable spiral element according to claim 1 and any of following claims, characterized in that the helical turns are constituted by a small-mass tube in order to show an as-low-as-possible inertia to the high-speed reciprocating movement.

Fig.1

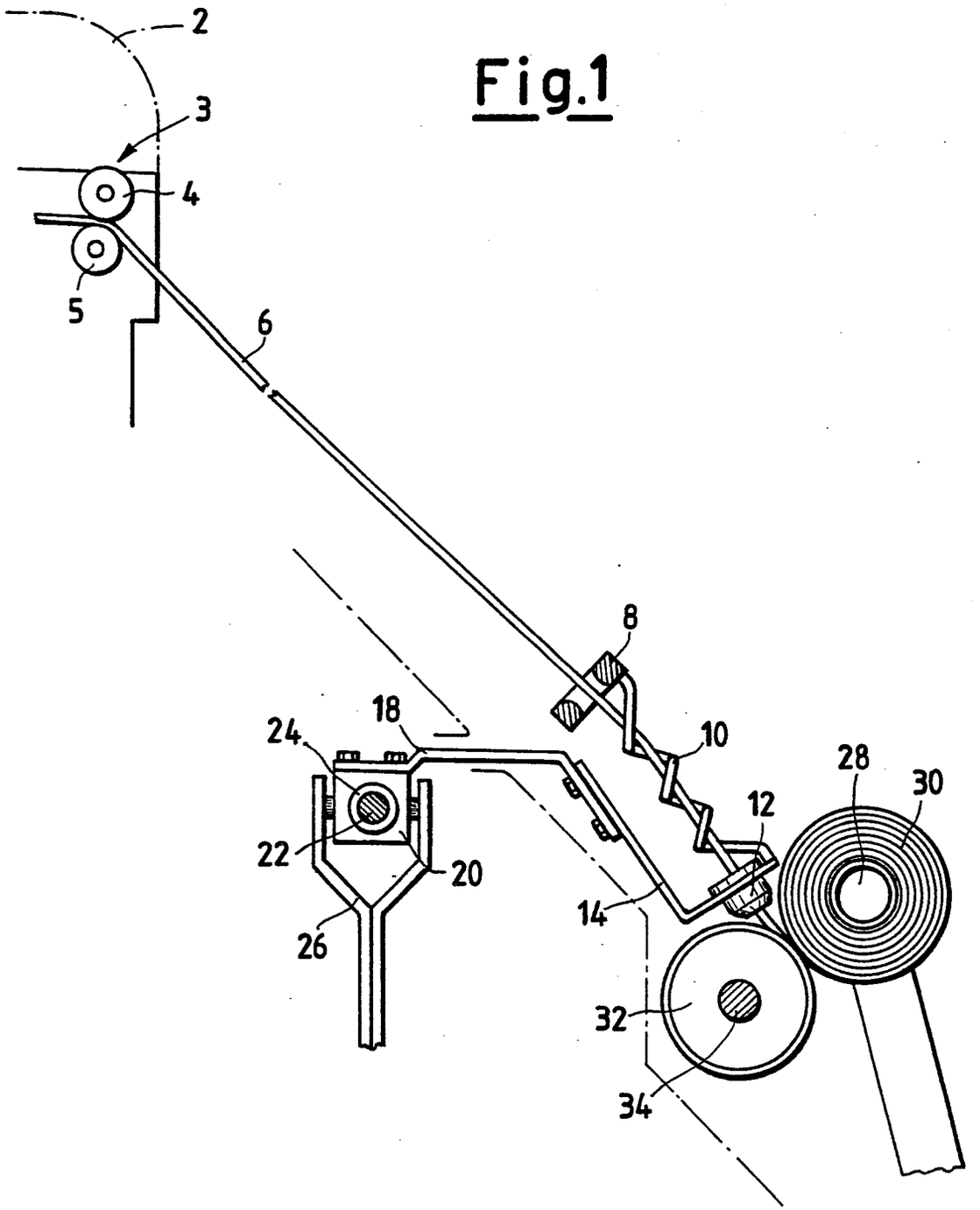
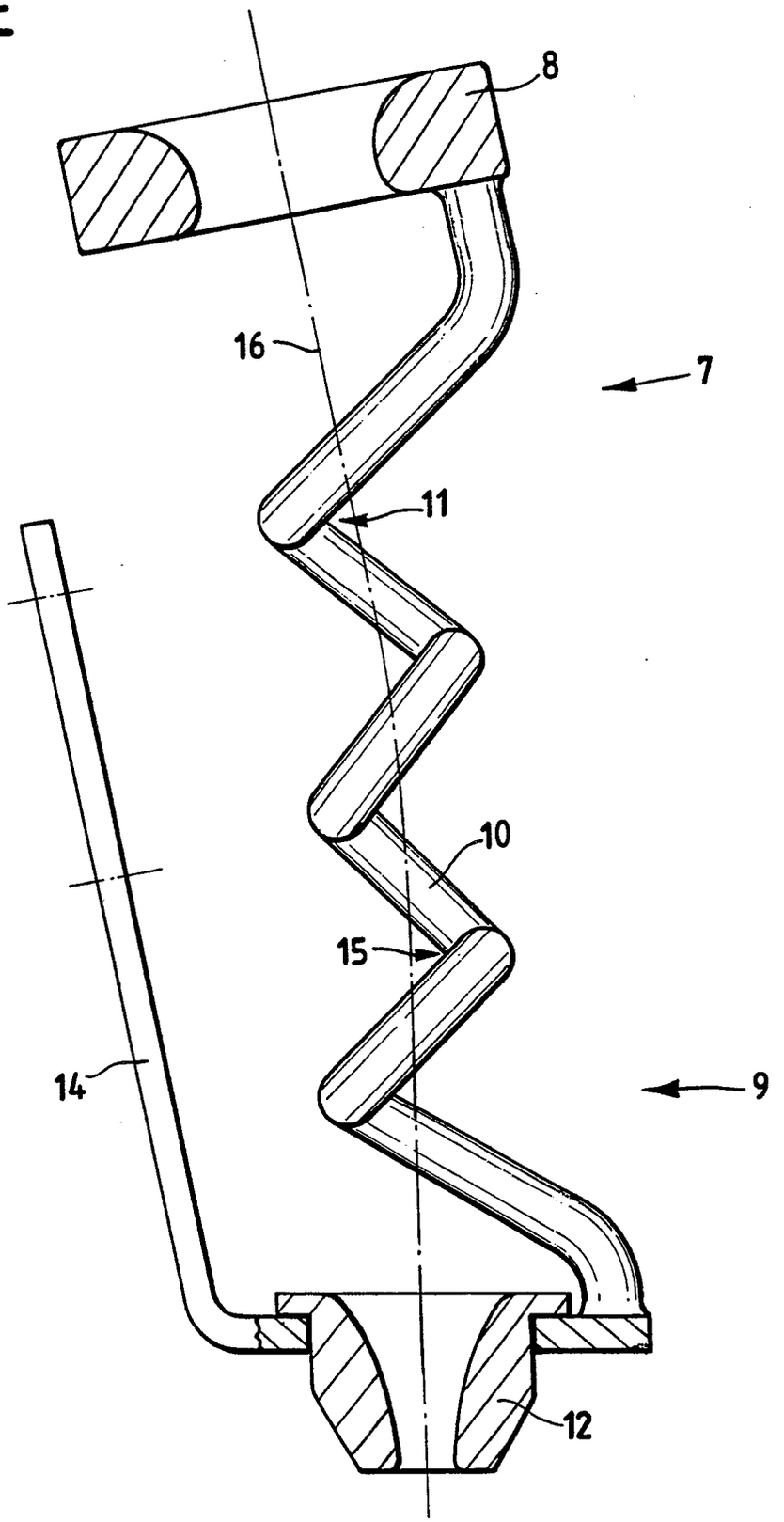


Fig.2



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EUROPEAN SEARCH REPORT

. Application number

EP 88201031.7

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	EP - A1 - 0 070 814 (OFFICINE SAVIO S.P.A.)	1,3,5	B 65 H 57/12
A		2,4	
	* Fig. 4 *		
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A	GB - A - 1 063 181 (M. REITER)	1,2,3, 5	
	* Fig. 1,2,3 *		
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A	GB - A - 2 182 069 (VEB KOMBINAT TEXTIMA)		
	* Fig. 1 *		
	--		
D,A	US - A - 3 670 978 (M. DRAGISICH)	1,3,5	
	* Fig. 1,2 *		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 65 H 57/00
B 65 H 54/00
B 65 H 59/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	14-07-1988	JASICEK

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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E : earlier patent document, but published on, or after the filing date
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