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D E C I S I O N
of 15 November 1995

Case Number: T 0024/94 - 3.2.2

Application Number: 86301286.0

Publication Number: 0236601

IPC: D21F 1/00

Language of the proceedings: EN

Title of invention:

Automatic seaming machine for fabric belts

Patentee:

ASTEN GROUP INC.

Opponent:

01 F. Oberdorfer GmbH & CO. KG Industriegewebe-Technik
02 NOVATECH GmbH Siebe und Technologie für Papier

Headword:

-

Relevant legal provisions:

EPC Art. 56, 84, 123(3)

Keyword:

"Scope of protection restricted - added features are not necessarily to be taken from the claims as originally filed"
"Clarity (yes) - claimed subject-matter confined to essential features"
"Inventive step (yes, after amendments)"

Decisions cited:

T 0014/83

Catchword:

-



Case Number: T 0024/94 - 3.2.2

D E C I S I O N
of the Technical Board of Appeal 3.2.2
of 15 November 1995

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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 12 November 1993
revoking European patent No. 0 236 601 pursuant to
Article 102(1) EPC.

Composition of the Board:

Chairman: H. J. Seidenschwarz
Members: M. G. Noël
M. Aúz Castro

Summary of Facts and Submissions

- I. By decision of 12 November 1993 the Opposition Division revoked European patent No. 0 236 601 as granted on the grounds that the subject-matter of claim 1 lacked any inventive step vis-à-vis the state of the art represented, in particular, by the following documents:
- (1): EP-A-0 043 441
 - (3): DE-U-8 122 451
 - (4): DE-U-8 122 450
- II. The reasons given by the Opposition Division were as follows: the only distinction between document (1), which represented the closest state of the art, and the subject-matter of claim 1 lay in the embodiment of the separator, a feature known per se from document (4), and in the gripping means provided at the end of the transfer arm, which was felt to be a trivial design feature which could have been arrived at by a person skilled in the art. The subject-matter of claim 1, therefore, clearly resulted from combining documents (1) and (4). Furthermore, the separator described in document (4) could also be combined with the subject-matter of document (3), which disclosed practically all the features of claim 1 - albeit in a more general way than in document (1).
- III. The Appellant (Proprietor of the patent) filed an appeal against the first instance decision on 5 January 1994 paying the appeal fee on the same day. A Statement of Grounds was filed on 21 March 1994 along with new claims according to a main and three auxiliary requests.

The Respondents (Opponents 01 and 02) replied to the Appellant's arguments in letters dated 11 July 1994 and 15 July 1994, respectively.

IV. Oral proceedings were held on 15 November 1995 at the request of all the parties, during which the Appellant abandoned its former requests and submitted a new amended version of claim 1 based on the previous third auxiliary claim.

Claim 1 now in suit reads as follows (the reference letters identifying the features of the characterising part have been added by the Board for convenience, in line with those used during the proceedings):

"1. Apparatus for forming a seam (10) in a length of woven fabric having opposite ends (12, 14) to join together the opposite ends of the fabric by means of a woven seam and to thereby form an endless woven fabric belt, and for use with means for supporting a strip of weft threads (18) in parallel relation and for supporting the opposite ends (12, 14) of the fabric in closely spaced relation on opposite sides of the strip of weft threads, the opposite ends of the fabric each including a fringe (20) of warp threads (24) which are supported such that they can be interweaved with the weft threads (18) supported between the opposite ends to thereby form a woven seam, the apparatus comprising a Jacquard machine (60, 62, 64) for causing the weft threads 18 to form successive shed openings (36), first separating means (28) for separating successive ones of the warp threads (24) from one fringe (20), a first interlace arm (40) for pulling a separated warp thread through a shed opening (36), a first transfer arm (30) for receiving a separated warp thread from the first separating means (28) and delivering it to the first interlace arm (40), said first interlace arm (40)

comprising means (124) at its end (122) for selectively gripping a warp thread and said arm (40) being supported for movement from a first position wherein the end (122) of the interlace arm extends through the shed opening (36) to grip a warp thread delivered by the first transfer arm (30) and a second position wherein the end (122) of the interlace arm is retracted from the shed opening to pull the warp thread through the shed opening, and said first transfer arm (30) having means (108, 110) for gripping a warp thread, the first transfer arm (30) being supported for movement between a first position wherein the transfer arm is able to grip a warp thread from the first separating means (28) and a second position wherein the first transfer arm carries the warp thread to a position wherein the warp thread can be gripped by the end (122) of the first interlace arm (40) when the end of the interlace arm extends through the shed opening (36), the apparatus also comprising second separating means (28), a second transfer arm (30) and a second interlace arm (40), similar to said first separating means, said first transfer arm and said first interlace arm, and operable in a similar manner during the next shed opening (36) to separate the next warp thread (24) from the other fringe (20) and feed it through said next shed opening, characterised in that

(c2) the first and second separating means each comprise a separator (28) which is reciprocally movable between a retracted position and an advanced, warp thread engaging position,

(c3) and which includes means (90, 92) for gripping an individual warp thread (24) of the respective fringe (20) when the separator is in the advanced position so that

- (c4) the selected warp thread is pulled away from the fringe when the separator is retracted, in that
- (e4) the gripping means (108, 110) of each transfer arm (30) is provided at an end (32) of the transfer arm and is capable of selectively gripping a warp thread, and
- (e5) the end (32) of each transfer arm (30) is adjacent the respective separator (28) to grip the selected warp thread therefrom when the transfer arm is in its first position and the separator is in the retracted position, and in that
- (f) the apparatus further comprises first and second extractor arms (44) positioned adjacent the longitudinal edges of the seam (10) being formed, each extractor arm (44) being adapted to move between an extended position wherein the free end of the extractor arm (44) can grip the end of a warp thread (24) which has been pulled through the shed opening (36) by the respective interlace arm (40) and a rearward retracted position wherein the gripped warp thread is pulled against the seam face (46)."

V. The arguments put forward by the parties were as follows:

- (i) On the formal issues, Respondent 01 argued that claim 1 was not clear (Article 84 EPC) and that its subject-matter extended beyond the content of the application as filed (Article 123(2) EPC) since, in feature (f), no mention was made of the extractor being moved upwardly prior to retraction. The

feature was, therefore, incomplete, as the extractor could not work properly. Moreover, the addition of feature (f) to claim 1 was contrary to Article 123(3) EPC since this feature was not originally claimed.

Respondent 02 added that the separator as claimed was not sufficiently described for it to be carried out by a person skilled in the art (Article 100(b) EPC).

The Appellant replied that the amendments to claim 1 were perfectly clear and fairly based on the description of the application as filed, since the movement upwardly of the extractor was not necessary and, hence, not essential. Moreover, a similar movement could be obtained by other means, e.g. by an appropriately formed interlace arm. As to the objection made under Article 123(3) EPC, the features added to claim 1 resulted in a limitation of the scope of protection, in conformity with the provision of that article.

- (ii) On the substantive issues, the Respondents argued that the subject-matter of claim 1 was obvious from combining the teachings of documents (1) and (4) or (3) and (4). Document (1) disclosed practically all the features of contested claim 1, apart from the reciprocal linear movement of the separator and features relating to the extractor. A similar separator was however known from document (4), and document (3) likewise disclosed a separator being displaced or shifted ("Verschiebungsbahn") which implied - albeit in a more general way - reciprocal linear movement. Moreover, document (3) described a stitcher ("Stecher") having the same function and the same kinematics as the extractor used in the

contested patent, i.e. pulling the last thread introduced into the shed opening rearwardly and upwardly to weave in the seam. The mere provision of two extractors moving longitudinally on each side of the seam being formed, instead of a single stitcher moving transversely of the seam, as described in document (3), could not be regarded as an invention.

The Appellant replied that document (1) in no way prompted the skilled person to adopt a reciprocally movable separator as described in document (4) instead of a rotating-disk separator or other types of separators such as those proposed in document (1). Document (3) was drafted in very general terms and did not clearly disclose all the features of contested claim 1. In particular, the stitcher used in document (3) did not perform the same function and was, therefore, not equivalent to the extractors used in the patent. Nor did the skilled person have any reason to want to modify the stitcher of document (3) in the way claimed, since, unlike the seaming machines used both in document (1) and in the contested patent, the machine described in document (3) was not equipped with a Jacquard machine to form various types of shed openings and was therefore designed to function properly with the stitcher there described.

VI. The Appellant requested that the contested decision be set aside and that the patent be maintained on the basis of the following documents, all submitted during oral proceedings: claims 1 to 8; description, columns 1 to 16, Figures 1 to 14.

The Respondents requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. *Formal aspects*

2.1 The preamble of claim 1 in suit comprises features relating to the separator, to the transfer and interlace arms and to their kinematics. The preamble likewise mentions the use of a Jacquard machine to form shed openings between the weft threads, specifying that all means used in the device are duplicated in order to ensure that identical means are used alternately on each side of the seam being formed. All these features are fairly supported by the application as filed.

The characterising portion of claim 1 specifies the features referring to the relative positions and to the movements of the separator and of the transfer arm (features (c2) to (e5)), and comprises features relating to the extractors, their positioning and their movements (feature (f)). These features are also fairly supported by the application as filed; in particular the features relating to the extractors are based on the following passages in the application as filed: page 12, lines 7 to 22, page 24, lines 3 to 16, and page 26, lines 28 to 34.

The amendments made to claim 1 do not therefore extend the subject-matter of the patent beyond the content of the application as filed, and are thus in conformity with Article 123(2) EPC.

- 2.2 Respondent 01 objected that feature (f), relating to the extractors, lacked clarity and broadened the subject-matter of the claim because it lacked the essential element (cf. patent, column 12 lines 12 to 25) conveyed by the word "upwardly", in connection with completion of the movement of the extractors between extended and retracted positions. Otherwise, the extractors were prevented from retracting by the obstacle of the seam.

The Board cannot accept this argument. While it is true that in the described specific embodiment the extractor has first to effect a vertical movement before it can retract, this is neither necessary nor essential to the solution of the technical problem as defined below (cf. point 4.1) underlying the present invention. Moreover, as argued by the Appellant, vertical clearance of the thread before retraction can be obtained by other means, such as a different configuration or an appropriate modification of the interlace arm (cf. column 11, lines 62 to 64). This is the reason why the invention was defined at first in the description in a more general way (cf. column 6, lines 7 to 13), whereby movement of the extractor "upwardly" was deliberately omitted, thus demonstrating the minor importance of this feature compared with other features such as, "rearwardly" and "against the seam face". The Board therefore sees no need to limit the scope of protection. The aim of the first claim is not to provide all the details necessary to carry out the invention (cf. T 14/83, OJ EPO 1984, 105, point 3 of the reasons). It

is sufficient that such information be contained in the description, the role of which is to assist in interpreting the claim, as required by Article 69 EPC, together its Protocol on interpretation.

Accordingly, feature(f) is not only properly based on the description as filed, but it is also clear and complete in the sense that it provides the essential features of the invention, as required by Article 84 in conjunction with Rule 29(3) EPC.

- 2.3 Compared with the version as granted, the amendments made to claim 1 merely relate to transfers of features from the characterising portion to the preamble and to the addition of features taken from the description. The scope of protection has therefore been amended in a restrictive way, in line with the requirements of Article 123(3) EPC.

Contrary to the argument of the Respondent 01, restriction in the scope of protection as required by Article 123(3) EPC does not imply the further condition that added features must be confined to features originally claimed. These features may be supported by the overall application as filed. Indeed, the examination procedure, which is essentially based on a comparison of the subject-matter of claim 1 as filed with the state of the art, may result in the shifting of the invention as redefined towards features not originally claimed but nevertheless contained in the application as filed. The scope of the claims after examination can even be broader than that originally claimed. During opposition proceedings following the grant of the patent, however, any further amendment may only be made in a restrictive sense, generally by

incorporating additional features. Nor is there any reason why these amendments should be restricted to features contained in the original claims, for the same reasons as those outlined for the examination procedure.

- 2.4 Respondent 02 argued that the form and dimensions of the selection needle of the separator were not sufficiently described to be carried out by a person skilled in the art, basing its objection on Article 100(b) EPC. In the Board's view the indications provided in the patent (cf. column 9, lines 13 to 64, Figures 9 and 11) are more than enough to enable a person skilled in the art to select a suitable needle, its hook and associated reciprocally movable mechanism precisely to engage the next successive warp thread of the fringe. Optimising the form and dimensions of the needle and of the hook remains well within the normal competence of the skilled person and can be omitted from the description, particularly as the invention does not relate to such design details.

3. *Novelty*

- 3.1 The invention relates to the fabrication of an endless woven fabric belt, in particular the forming of a woven seam between the opposite ends of the belt. The opposite ends 12, 14 of the fabric are supported in spaced-apart facing relation such that the warp threads 24 of the fabric form fringes 20 extending vertically on each side of a strip 16 consisting only of weft threads 18. The weaving process consists in alternately interweaving successive warp threads 24 of the fringes into the interposed weft threads of the strip to thereby form a woven seam 10.

The apparatus comprises on each side of the seam:

- a separator 28 for gripping and separating the next warp thread 24 from the fringe. To this end the separator performs a reciprocal linear movement between an advanced and a retracted position in relation to the fringe. The gripping means of the separator comprise a selection needle 90 provided with a hook 92;
- a transfer arm 30 for gripping the warp thread from separator 28 and for conveying it to the face of the seam by a combined rotational and translational movement using appropriate means;
- a pivoting interlace arm 40 capable of transverse movement along the entire width of the seam in order to grip the thread 24 at the end of the transfer arm on one side of the seam and to pull it to the other side of the seam through alternate shed openings 36 formed by the weft threads 18 of the interposed strip using a Jacquard machine 64;
- an extractor 44 for gripping the tight thread held by the interlace arm 40 and pulling it rearwardly against the face of the seam being formed. To this end the extractor performs a reciprocal linear movement along the longitudinal edge of the seam, i.e. in the direction of the weft threads 18.

3.2 Document (1), which is regarded by the Board as being the prior art closest to the invention, describes an apparatus for weaving a seam at the ends of an endless belt, having all the features contained in the pre-characterising portion of claim 1 in suit, and particularly: a separator, a transfer arm and an

interlace arm arranged on opposite sides of the seam 13 being formed and moving relative to each other in order to weave alternately in the seam the next thread 12 of the respective fringe 10.

As in the contested patent, the weaving process described in document (1) consists in gripping the next thread 12 of the fringe on one side of the seam and conveying it to the other side of the seam by pulling it parallel to the seam face through shed openings 11 created by a Jacquard machine. To this end the next thread is first separated from the fringe by means of a separator. Document (1) describes several examples of embodiments of equally suitable separators, including rotating-disk (Figures 1 to 9), air-jet (Figures 10 to 12) and needle (Figure 13) separators. Other types of separators, such as liquid-jet or electrostatic separators, are however also possible (cf. page 28, lines 1 to 17).

Referring to the main embodiment using a rotating-disk separator 14 (Figure 7), the thread 12 is progressively separated from the fringe 10 by a series of disks forming a helix, the last of which, disk 19, being used as a gripping means (cf. page 20, lines 12 to 19). The separated thread is then taken up by a mechanism having the function of the transfer arm in the contested patent. This mechanism (cf. Figures 2 and 3) comprises a gripping means 32 associated with other means 33-35 for producing a combined rotational and translational movement in order to convey the thread from the separator towards the shed openings 11, which extend in the plane of the seam, by causing it to follow a curved trajectory (cf. page 20, lines 30 to 33, and page 22, lines 1 to 6). From thence the thread is taken up by a mechanism having the function of the interlace arm in the contested patent. This mechanism (cf. Figure 7)

comprises a gripping means 44' located at the end of an arm 43' performing a reciprocal linear and horizontal movement parallel to the face of the seam being formed by means of a gear (cf. Figure 3). As can be seen in Figures 14 to 17 the end of the gripping means 44' is formed by two angled steel wires 90' and 91' tensioned against the interior of the arm 43'. Using this mechanism it is possible to pull the thread at a predetermined tension, thus preventing the thread from detaching itself from the gripping means 44' until it has been brought into a taut position parallel to the face of the seam (cf. page 29, lines 11 to 19 and page 33, lines 16 to 24).

- 3.3 The subject-matter of claim 1 differs from the apparatus disclosed in document (1) in that the claimed separator is reciprocally movable and by extractor arms to take up the thread from the respective interlace arms.

The reciprocal movement of the separator between an advanced and a retracted position is expressed in different ways in features (c2), (c4) and (e5) of claim 1.

The positioning, the kinematics and the function of the extractor arms are recited in feature (f) of claim 1, according to which "the apparatus further comprises first and second extractor arms (44) positioned adjacent the longitudinal edges of the seam (10) being formed, each extractor arm (44) being adapted to move between an extended position wherein the free end of the extractor arm (44) can grip the end of a warp thread (24) which has been pulled through the shed opening (36) by the respective interlace arm (40) and a rearward retracted position wherein the gripped warp thread is pulled against the seam face (46)".

3.4 Like document (1), document (3) describes most of the elements present in claim 1 in suit. In particular, disposed on each side of the seam 19 being formed are a separator 20a, 20b, a transfer arm 21a, 21b and an interlace arm 22a, 22b with their respective functions and kinematics. As the description in document (3) is very brief and drafted in general terms, there is some doubt about the nature of the movement of the separators ("Verschiebungsbahn", cf. page 5, second entire paragraph).

However, a suitable separator, performing a reciprocal linear movement between an advanced position of engagement with a thread to be separated from a fringe and a retracted position is clearly described in document (4), which was filed on the same date as document (3) and emanates from the same applicant.

Furthermore, because the installation described in document (3) does not comprise a Jacquard machine, a stitcher 23 is provided which is capable of transverse movement across the entire width of the seam being formed in order to arrive at any stitching position. From the interior of the shed openings, the stitcher then grips the thread which has just been pulled transversely by the interlace arm and pulls the same upwards across the weave, from the point of stitching, i.e. perpendicular to and above the plane of the seam, as in hand stitching. After the end of the thread has been tightened and fastened at the stitching position, the excess thread is cut off (cf. page 6, 2nd paragraph). The same operation is repeated with a thread of the opposite fringe to produce a second stitch at the

same stitching position as before (cf. page 7, first entire paragraph). A new stitch is then performed at a transversely different position with a new pair of threads of the opposite fringes, and so on (cf. page 7, second entire paragraph).

Thus, while according to document (3) one stitching device pulls the successive threads vertically above the seam in order to fasten them in different transverse positions, in the device according to feature (f) of claim 1 in suit, two extractors move alternately adjacent the longitudinal edges of the seam in order to pull the end of the warp thread which has just been pulled through the shed opening by the interlace arm, rearwardly, i.e. behind the seam face and parallel to the plane of the weave so as to press the thread against the seam face. Therefore, the device described in document (3) is intended for a stitching process and makes use of a stitching device which lacks any comparison - be it in terms of its movements or of its function - with the extractor arms used in the contested patent. Accordingly, feature (f) is not disclosed in document (3).

3.5 Since none of the documents considered in the proceedings discloses all the features contained in claim 1 in suit, its subject-matter is novel within the meaning of Article 54(1) EPC.

4. *Inventive step*

4.1 The differences mentioned under point 3.3 above vis-a-vis document (1), represent the solution to the technical problem as defined in the contested patent, which is not merely to automate operations in the weaving process previously performed manually, but also to continuously weave an endless belt of improved

quality, in particular by the positioning and orientation of the threads in the seam, "to be sure that the woven filaments are not twisted and such that each knuckle of the seam filaments is properly oriented with respect to the other threads of the fabric" (cf. column 1, lines 24 to 33).

As stated in the description (cf. column 6, lines 10 to 13 and column 12, lines 12 to 22), the extractor essentially provides means "for keeping tension on the warp thread" and "for pulling it rearwardly against the seam face", both functions being rendered by the wording of feature (f).

Also, the Board accepts the Appellant's arguments as outlined in their Statement of Grounds that "the use of first and second extractor means as defined in claim 1 in conjunction with Jacquard shedding has the advantage that the end of the warp thread pulled through each shed opening can be pulled clear of the shed while at the same time pulling and holding the thread against the face of the seam, without any risk of the extractors tangling with the longitudinal weft threads of the shed or the warp threads of the fringes. It also serves to ensure that each warp thread is positively held at all stages during the process of extracting it from the respective fringe and weaving it into the seam, which of course facilitates unravelling the seam by reversal of the machine in order to correct any flaw which may have been produced".

- 4.2 A person skilled in the art looking for a solution to the problem defined above could be prompted to replace the rotating-disk separator used in document (1) by the reciprocally movable separator described in document (4), since a plurality of separators are proposed in document (1), all very different, in terms

of structure, however functionally equivalent. Therefore, in the Board's view, a combination of the embodiments described in documents (1) and (4) is very likely, so that features (c2) to (c4) of claim 1 in suit are suggested.

4.3 However, the last feature (f), which relates to the extractor arms is not disclosed by any of the documents. As was demonstrated in point 3.2 above, the embodiment described in document (1) does not comprise any extractor in the sense of the contested patent, since in document (1) the arm 43' and its gripping means 44' merely hold the thread parallel to the seam face, as does the interlace arm in the contested patent, but do not apply it accurately against the seam face. As to the embodiment described in document (3), it has likewise been shown in point 3.4 that the stitching device used in document (3) has nothing in common with the extractor arms used in the contested patent. Hence, if the skilled person had decided nevertheless to use this stitching element to complete the device disclosed in document (1), he would still not have arrived at the subject-matter of claim 1. The stitcher proposed in document (3) is not suitable for solving the problem addressed by the present patent.

4.4 Since feature (f) is neither disclosed nor suggested by the prior art, its combination with the other features of claim 1 in suit - even though known per se - confers non-obviousness to the subject-matter of claim 1 as a whole pursuant to Article 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent on the basis of claims 1 to 8, the adapted description and 14 drawings, all filed during oral proceedings (see point VI above).

The Registrar:



S. Fabiani

The Chairman:



H. Seidenschwarz

P. Noel.
14.02.96

