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**Datasheet for the decision
of 25 September 2007**

Case Number: T 1018/05 - 3.2.06

Application Number: 98121834.0

Publication Number: 0916428

IPC: B21D 41/04

Language of the proceedings: EN

Title of invention:

Method and apparatus for forming an end portion of a
cylindrical member

Patentee:

SANGO CO., LTD.

Opponent:

M&M Mechanika B.V.

Headword:

-

Relevant legal provisions:

EPC Art. 83, 54(2), 54(3), 56, 114(2)

Keyword:

"Sufficiency of disclosure (yes)"

"Novelty (yes)"

"Inventive step (yes)"

"Late filed documents - disregarded because not prima facie
relevant"

Decisions cited:

T 0206/83, T 1040/03, T 0536/88, T 0487/89, T 0129/88

Catchword:

-



Case Number: T 1018/05 - 3.2.06

DECISION
of the Technical Board of Appeal 3.2.06
of 25 September 2007

Appellant: SANGO CO., LTD.
(Patent Proprietor) 3-1, Mutsuno-1-chome
Atsuta-ku
Nagoya
Aichi-ken (JP)

Representative: TBK-Patent
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Respondent: M&M Mechanika B.V.
(Opponent) Dynamostraat 4
NL-3903 LK Veenendaal (NL)

Representative: Aalbers, Arnt Reinier
De Vries & Metman
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 31 May 2005
revoking European Patent No. 0916428 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: P. Alting Van Geusau
Members: G. Pricolo
K. Garnett

Summary of Facts and Submissions

I. The appeal is from the decision of the Opposition Division posted on 31 May 2005 revoking European patent No. 0 916 428, granted in respect of European patent application No. 98 121 834.0.

II. The independent claims 1 and 9 as granted read as follows:

"1. A method for forming an end portion of a cylindrical member (4) by spinning, said method comprising the steps of: supporting at least one roller (28) to be radially moved to and from a main shaft (21); supporting said cylindrical member (4) to position the central axis (Xt) thereof on a plane including the central axis (Xr) of said main shaft; and driving at least one of said cylindrical member (4) and said at least one roller (28) to be rotated relative to each other about a forming target axis (Xe) with said at least one roller (28) radially moved to be in contact with the outer side of one end portion of said cylindrical member (4), to form the one end portion into a reduced diameter portion (4d), characterized in that said forming target axis (Xe) is an oblique axis (Xe) inclined against the central axis (Xt) of said cylindrical member (4), so that said reduced diameter portion (4d) according to has the oblique axis (Xe) as its axis."

[Note: the term "according to" in the last phrase of claim 1 should not be present in the granted patent as published and results from a typographical error as can be inferred from the communication under Rule 51(4) EPC]

"9. An apparatus for forming an end portion of a cylindrical member (4) by spinning, comprising: a main shaft (21) positioned on a plane including the central axis (X_t) of said cylindrical member (4); at least one roller (28) operatively mounted on said main shaft (21) to be radially movable to and from said main shaft (21), and in contact with the end portion of said cylindrical member; first driving means (2) for moving at least one of said cylindrical member (4) and said at least one roller (28) relative to each other, in parallel with said plane including the central axes (X_t , X_r) of said cylindrical member (4) and said main shaft (41), second driving means (3) for moving said at least one roller (28) radially toward the forming target axis, with said at least one roller (28) being in substantial contact with the outer surface of the one end portion of said cylindrical member (4) and rotating said at least one roller (28) about said main shaft (21) relative to said cylindrical member (4); and control means (CT) for controlling said first and second driving means (2, 3) to form the one end portion of said cylindrical member (4) into a reduced diameter portion (4d) characterized in that said first driving means (2) is additionally adapted to rotate at least one of said cylindrical member (4) and said main shaft (21) relative to each other about a vertical axis to the plane including the central axes (X_t , X_r) of said cylindrical member (4) and said main shaft (21), to produce an oblique angle (θ) between the central axes (X_t , X_r) of said cylindrical member (4) and said main shaft (21), and set an oblique reference axis extending from said vertical axis against the central axis (X_t) of said cylindrical member (4), with the oblique angle (θ) formed therewith,

said first driving means (2) moving at least one of said cylindrical member (4) and said main shaft (21) relative to each other to position said main shaft (21) in line with the forming target axis set in parallel with the oblique reference axis, so that said reduced diameter portion (4a) is formed with an oblique axis (Xe)."

III. In the decision under appeal the Opposition Division held that the subject-matter of claims 1 and 9 was novel over the prior art, including documents:

D1 : JP-A-62 167956,

filed with its English translation D1t; and

P1 : EP-A-916 426.

The content of P1 was state of the art under Article 54(3) EPC insofar it was also disclosed in the earlier of the two priority documents of P1, namely document:

P2 : JP-A-09 308240,

filed with its English translation P2t. The Division further held that the subject-matter of claims 1 and 9 involved an inventive step over D1. However, it came to the conclusion that the patent did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. The patent disclosed in detail only the embodiment in which the cylinder was kept stationary and the roller rotated, and in which the forming target axis Xe and

the main axis X_r were set such that they coincided. Claim 1 however covered the possibility that the forming target axis X_e and the main axis X_r did not coincide, and the possibilities that the cylinder was rotated to provide the relative rotation between the roller and the cylinder, with the roller either kept stationary or rotated with the cylinder. Since the realisation of these possibilities would require inventive skill, the invention could not be performed over the whole area claimed without undue burden.

IV. The appellant (patent proprietor) lodged an appeal, received at the EPO on 1 August 2005, against this decision and paid the appeal fee on the same day. The statement setting out the grounds of appeal was received at the EPO on 6 October 2005.

V. In his letter of reply to the grounds of appeal, the respondent (opponent) cited two new documents, namely:

D2 : US-A-1 500 261;

D3 : EP-A-010 057.

VI. In a communication accompanying the summons to oral proceedings pursuant to Article 11(1) of the Rules of Procedure of the Boards of Appeal, the Board expressed a preliminary opinion according to which the skilled person would have no difficulties in putting into practice the possibilities covered by the claims in which the cylinder was rotated. Indeed working tables combining various linear and rotational axes were generally known in the technical field of machine tools and variations from a specific design and adaptations

to a particular use were, generally, matters of normal design procedure.

Furthermore, the Board stated that it would appear that the method of claim 1 of the patent in suit could also be carried out if the axes Xe and Xr did not coincide, as shown in Fig. 6 of the patent in suit. If the maximum radial displacement of the rollers was increased as compared to that shown in Fig. 6, where the lower portion of the cylindrical member was not deformed, then a reduced diameter portion having an oblique axis Xr as its axis could be formed.

VII. Oral proceedings took place on 25 September 2007, at the end of which the decision of the Board was announced.

The appellant (patentee) requested that the decision under appeal be set aside and that the patent be maintained as granted.

The respondent (opponent) requested that the appeal be dismissed.

VIII. The arguments of the appellant in support of its request, insofar as they are relevant to this decision, can be summarized as follows:

In the embodiments described in the patent in suit the roller was rotated about the forming target axis Xe and the cylindrical member was kept stationary. The modifications necessary for performing the alternative embodiments covered by claim 1, in which the cylinder was rotated, did not require inventive skills but were

a matter of normal design procedure for a skilled person. Furthermore, on the basis of the whole disclosure of the patent in suit claim 1 should be understood as excluding the possibility that the forming target axis X_e and the central axis X_r of the main shaft did not coincide. If the central axis X_r was positioned at a distance from the forming axis X_e , as shown in Figure 6 of the patent in suit, then the reduced diameter end portion would not be formed with the forming target axis X_e as its axis. The method defined by claim 1 necessarily required the spinning process to be started and performed in the state shown in Fig. 7 of the patent, in which the axis X_r and X_e coincided.

P1 disclosed a spinning process in which the forming target axis, i.e. the axis of rotation of the rollers, was parallel to the central axis of the cylindrical member. The same applied to the process known from D1, which represented the closest prior art. There was no indication in D1 suggesting the teaching of the patent in suit, i.e., the forming during the spinning process of both the reduced end portion and the inclined axis of the cylindrical member. D2 was not relevant because it disclosed the reduction of the diameter of a protuberance of a workpiece by spinning after the protuberance was formed with an inclined axis. D3 disclosed a method in which a spinning process was carried out on the end portions of a tubular elbow which was not a cylindrical member having a central axis. Accordingly, also D3 was not relevant.

IX. The respondent generally concurred with the arguments of the Opposition Division regarding insufficiency of

disclosure. Its submissions as regards novelty and inventive step can be summarized as follows:

Document D3 disclosed forming a blank into a curved pipe by spinning and then forming two cylindrical end portions with a reduced diameter also by spinning. The process in which the second end portion was formed starting from the curved pipe with the first end portion corresponded to the method according to claim 1 of the patent in suit: the first end portion corresponded to the cylindrical member and the second end portion had an axis inclined at 90° to the central axis thereof. Forming an end portion starting from a curved pipe was contemplated by the patent in suit as shown in Figures 32 to 37.

P1 claimed a method and apparatus for forming eccentric end portions of a cylindrical member. The axis of the resulting eccentric end portion was inclined against the central axis of the cylindrical member and therefore the method of P1 corresponded to that according to claim 1 of the patent in suit. The same considerations applied in respect of D1, which disclosed a method analogous to that of P1.

If the subject-matter of claim 1 was novel over D1, then it lacked an inventive step. As acknowledged in the patent in suit, there was a request from industry to form a reduced diameter end portion having an oblique axis inclined against the central axis of the cylindrical member. The invention thus merely consisted in combining the existing spinning process as known from D1 with a request from industry. The subject-matter of claim 1 was moreover obvious in the light of

D1 and prior art working tables combining various linear and rotational axes, which tables were part of the common general knowledge in this field, as indicated by the Board in its communication accompanying the summons to oral proceedings. Finally, the skilled person starting from D1 would arrive at the claimed subject-matter in view of the disclosure of D2 or D3, both of which related to oblique spinning.

Reasons for the Decision

1. The appeal is admissible.

2. *Sufficiency of disclosure.*
 - 2.1 The Board agrees with the view of the Opposition Division (see point 5 of the decision under appeal), which was not disputed, that independent claim 1 covers three variants of rotating the cylindrical member and the roller relative to each other, namely:
 - (a) the cylinder is fixed and the roller rotates;
 - (b) the cylinder rotates and the roller is fixed;
 - (c) both the cylinder and the roller rotate;

whereby in each case a relative rotation is generated which allows the formation of an end portion having a reduced diameter and an oblique axis as compared to the cylindrical member.

It is not disputed that the embodiments of the invention described in the patent in suit only relate to variant (a). The Opposition Division considered that the performance of the variants (b) and (c) would

require inventive skill and held therefore that the invention could not be performed over the whole area claimed without undue burden.

In accordance with the established case law of the boards of appeal (see e.g. T 206/83, point 5; further see in particular decision T 1040/03 of Board 3.2.01, which concerns a similar case between the same parties involved in this appeal, point 2.2), a detailed disclosure is not necessary if the skilled person, who has common general knowledge at his immediate disposal, is capable of putting the invention into practice without the burden of exercising inventive skill. This principle obviously extends to all variants encompassed by a claim.

In the communication annexed to the summons to oral proceedings the Board expressed the view that working tables combining various linear and rotational axes were generally known in the technical field of machine tools and that variations from a specific design and adaptations to a particular use were matters of normal design procedure. This view was not contested by the parties and therefore the Board sees no reason to reconsider it. Accordingly, the skilled person seeking to put into practice the above-mentioned variants (b) and (c), noting that these variants require the rotation of the cylindrical member about an axis which does not coincide with the central axis thereof, would obviously consider the use of known working tables combining various linear and rotational axes. As is generally known, rotation about these axes can be actuated simultaneously by means of a suitable control. In such case, the adaptation of the working tables to

generate the required movement of the workpiece (cylindrical member) does not require more than an adaptation of the control (such as e.g. entering a particular program to a computerized control) based on geometrical considerations, a task for which normal skills only are necessary. It follows that the skilled person could put into practice the contested variants (b) and (c) without the burden of exercising inventive skill.

- 2.2 The Opposition Division further held that the patent only disclosed how to carry out the first variant (a) for the particular case in which the forming target axis X_e and the main axis X_r have been set such that they coincide and that the invention could not be carried out when these axes were in the position according to Fig. 6, i.e. at a distance from each other.

In the Board's judgment claim 1 is not limited to the embodiment of Fig. 7, where the main shaft is displaced from its starting position shown in Fig. 6 such as to coincide with the axis X_e , which is the oblique axis of the resulting end portion having a symmetrical tapered portion 4b and a cylindrical portion 4c as shown in Fig. 8. The wording of claim 1 neither requires displacing an axis nor obtaining a tapered portion which must be symmetrical about the axis of the reduced end portion. Moreover, the possibility of carrying out the spinning process with the axes X_e and X_r as shown in Fig. 6 is explicitly disclosed in the patent in suit (see paragraph [0024]). It is true that such possibility is described as having disadvantages, namely because of the impacts received by the cylinder, causing vibration and noise, due to the fact that the

roller abuts on only a part of the outer surface of the cylinder for any substantial period of time ("a long period of time"), and the need for a large forming tool if the distance between the axis Xe and the axis Xr is large. In fact, if the method of claim 1 of the patent in suit is carried out with the axis of the main shaft Xr (axis of rotation of the rollers 28) being at a distance from the axis Xe shown in Fig. 6, then at the beginning of spinning the lower portion of the cylindrical member is not deformed and the roller only works the upper portion thereof, whereby a discontinuous working is produced (hammering). However, when the radial displacement of the rollers is increased beyond that shown in Fig. 6, then a reduced diameter portion having an oblique axis Xr as its axis is formed. It is to be noted that if spinning is carried out starting from the position shown in Fig. 6, then the forming target axis is different from the axis Xe shown in Fig. 6: it coincides with the central axis Xr of the main shaft, whereby an asymmetrical tapered portion is obtained (note that according to Rule 29(7) EPC the reference signs in the claim between parentheses relating to the features in the drawings, such as Xe and Xr, are not to be construed as limiting the claim). Such embodiment of the claimed method might not be a preferred one; it is nevertheless an embodiment which can be carried out in practice, independently of how the relative movement between the cylindrical member and the roller(s) is generated (see above point 2.1).

- 2.3 The respondent did not provide any evidence in support of the allegations made about insufficiency, but rather relied on the apparent difficulties encountered when

trying to carry out the method, such as the hammering action on the cylindrical member, especially when a high oblique angle was selected.

It is important in this respect to note that in the Board's view the above-mentioned established principle of the case law (see point 2.1 of this decision), according to which a detailed disclosure of all the variants encompassed by a claim is not necessary if the skilled person, who has common general knowledge at his immediate disposal, is capable of putting them into practice without the burden of exercising inventive skill, is not to be understood as also referring to those variants falling under the literal wording of the claim but which the skilled person would immediately exclude as being clearly outside the scope of practical application of the claimed subject-matter. That is, in cases where the skilled person would construe the claim as not extending to those variants. This is the case, for example, with claims including an open-ended range for a parameter where it is clear for a skilled person that the open-ended range is limited in practice. Such a claim must be seen as seeking to embrace values of the parameter as high as can be attained above a specified minimum level (see e.g. T 487/89, not reported, point 3.5). Values of the parameter not obtainable in practice would not be regarded by the skilled person as being covered by the claims and thus could not justify an objection of insufficiency of disclosure. More generally, in T 129/88 (OJ EPO 1993, 598) the Board, following T 487/89, observed that there may be circumstances in which the scope of a claim, notwithstanding the presence of open-ended features, is restricted by the presence of other features which

impose a practical limit on the claim. See points 2.1.1 and 2.1.4.

In the present case, it would be evident for a skilled person that any inclination of the forming target axis leads, at least when starting the deformation, to a discontinuous deformation action of the rollers because an elliptical surface is initially presented to the rollers. This is independent of the choice of any of the three variants (a) to (c) referred to above and in fact represents *per se* a difficulty in practice, because it imposes certain practical limitations on the method and the apparatus used, in particular as compared to the conventional spinning where a circular surface is presented to the rollers.

The Board accepts the respondent's argument that a literal reading of the claim includes possibilities which are not feasible in practice without using further means not defined in the claim. However, due to the limited number of variables involved in the process (in particular the tube specifications, namely material, wall thickness and diameter; inclination and position of the forming target axis; deformation speed; characteristics of the apparatus used), the skilled person only needs to apply straightforward considerations to understand what are the practical limitations of the claimed method and, as a consequence, to establish the range of application of the claimed method with sufficient certainty.

The literal wording of claim 1 for example encompasses forming a very short, very small diameter end portion having an oblique axis strongly inclined (e.g. with an

inclination angle $>60^\circ$) against the central axis of a cylindrical member having a large diameter. Albeit that this is a theoretical possibility covered by the literal wording of claim 1, the skilled person would recognize that this possibility is not feasible in practice due to practical, unavoidable constraints. In particular, it is evident that the rollers must have certain dimensions in order to apply the required deformation load and that these dimensions imply geometrical limitations for the shape of the end portion to be achieved.

2.4 Claim 9 relates to an apparatus for forming an end portion of a cylindrical member by spinning comprising first driving means for moving at least one of said cylindrical member and said at least one roller relative to each other. For the above-mentioned reasons, the skilled person would have no difficulties in providing suitable driving means for obtaining the required relative movement, independently of whether it is the cylindrical member, the roller, or both that are rotated. Moreover, the claimed apparatus could perform the spinning of an end portion of a cylindrical member independently of any relative displacement of the forming target axis X_e and the main axis X_r , as shown in Fig. 6, such that they coincide.

2.5 It follows that the European patent discloses the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

3. *Novelty*

3.1 Document D1 undisputedly discloses a method and apparatus according to the preamble of claims 1 and 9, respectively. The Board agrees with the technical interpretation of D1 made by Board 3.2.01 in the above-mentioned decision T 1040/03. As stated in points 3 and 3.1 of that decision, it cannot be inferred from Fig. 4 of D1 that the tapered end portion is eccentric. Therefore, the disclosure of D1 can only be seen as related to the conventional spinning method (see par. [0002] of the patent in suit) in which an end portion is formed which is coaxial with the cylindrical member. Accordingly, D1 does not disclose the step and the means for forming a reduced diameter portion of a cylindrical member having an oblique axis inclined against the central axis of the cylindrical member.

3.2 P1 is undisputedly state of the art according to Article 54(3) EPC only in respect of subject-matter disclosed in the first priority application JP308240/97, which is document P2 on file. P1 discloses a method for forming a cylindrical eccentric end portion of a cylindrical member by spinning, see e.g. Fig. 5 of P1 and Fig.6 of P2. Claim 1 of the patent in suit requires that the at least one roller is rotated about a forming target axis (see the preamble of claim 1) and that said forming target axis is inclined against the central axis of the cylindrical member (see characterising portion of claim 1). However, in the method according to P1, the axis of the cylindrical member and the forming target axis about which the rollers rotate are always parallel.

In this respect it is noted that the argument of the respondent according to which the method of P1 corresponds to that according to claim 1 of the patent in suit because in P1 the axis of the resulting eccentric end portion is inclined against the central axis of the cylindrical member, fails because the features of the claimed method must be compared with those of the method disclosed by P1, not the features of the product, and P1 clearly discloses that the eccentric portion is obtained with the axis of rotation of the rollers being parallel and not inclined with respect to the central axis of the cylindrical member.

Furthermore, P1 does not disclose the feature of claim 9 according to which the claimed apparatus comprises means adapted to rotate at least one of said cylindrical member and said main shaft relative to each other to produce an oblique angle between the central axes of said cylindrical member and said main shaft.

3.3 It follows that the findings of the Opposition Division in respect of novelty over D1 and P1 (see points 2 and 3 of the decision under appeal) are correct.

4. *Inventive step*

4.1 The Board also agrees with the finding of the Opposition Division (see point 4 of the decision under appeal) that the subject-matter of claims 1 and 9 involves an inventive step in the light of D1.

4.2 The teaching of D1 is indeed limited to forming a reduced diameter end portion which is coaxial with the main body of the cylinder and there is no indication in

D1 suggesting to the skilled person that the known spinning process could be used not only for forming the reduced diameter end portion of the cylindrical member but also to generate an inclined axis for said end portion when starting from a cylindrical member having a straight axis. This recognition is also not rendered obvious by the mere fact of knowing (from common general knowledge, see point 2.1. above) that working tables combining various linear and rotational axes exist. Nor is it rendered obvious by the request from industry to provide a cylinder with an oblique reduced diameter end portion, as this request per se does not indicate the claimed solution and moreover a different solution for this request already exists in the art (see par. [0005] of the patent in suit: forming separate components by press working and then connecting them by welding or the like).

5. *The additional prior art filed in the appeal proceedings*

5.1 The above conclusions are based on the prior art mentioned in the decision under appeal. With its letter of reply to the grounds of appeal the respondent referred to documents D2 and D3 which were not considered by the Opposition Division. D2 was cited in the search report but does not form part of the opposition or opposition appeal proceedings (see T 536/88). D2 and D3 must therefore be regarded as late-filed.

5.2 It is well established that a late-filed prior art document may be admitted and considered at the Board's discretion (see Case Law of the Boards of Appeal of the

European patent office, 5th edition 2006, VI.F.2). In exercising its discretion the Board will in first place have to consider if the document is prima facie highly relevant in the sense that it is highly likely to prejudice maintenance of the European patent.

- 5.3 In the present case the Board judges that D2 and D3 are not prima facie highly relevant because neither of them relates to a spinning process used not only for forming a reduced diameter end portion of a cylindrical member but also to generate an axis inclined against the central axis of said cylindrical member. According to D2, spinning is performed on a work's protuberance which is already provided with an inclination, and according to D3 spinning is performed on the end portions of a curved pipe.

D2 and D3 are therefore disregarded pursuant to Article 114(2) EPC.

6. It follows that the grounds of opposition do not prejudice the maintenance of the patent unamended.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is maintained as granted.

The Registrar:

The Chairman:

M. Patin

P. Alting Van Geusau