

COMMISSIONER'S DECISION

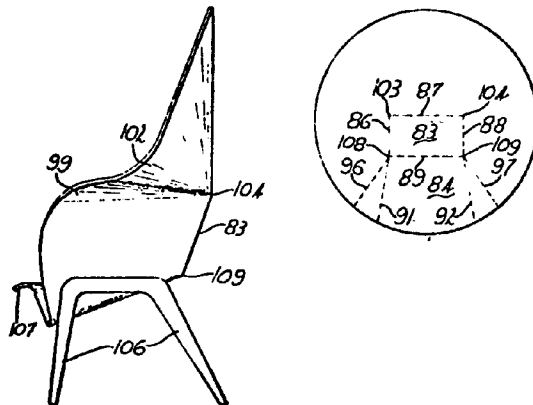
Obviousness: Chair Structure

Chairs were constructed essentially of sheet material by bending on ruled surfaces which are developable. The broad claims were refused in view of the cited art.

Rejection: Affirmed.

This decision deals with a request for review by the Commissioner of Patents of the Examiner's Final Action dated July 29, 1976, on application 142,751 (Class 155-61.2). The application was filed on May 23, 1972, in the name of John A. Speidel, and is entitled "Seat And Back Structure For Chairs." The Patent Appeal Board conducted a hearing on September 22, 1976, at which Mr. J. Baker represented the applicant.

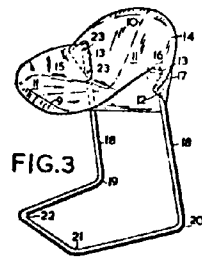
The application relates to seating furniture such as chairs, settees or the like. More particularly they are of a type constructed essentially of sheet material by bending on ruled surfaces which are developable. Such surfaces are either: a) planer surfaces; or b) single curved surfaces, namely cylindrical, conical and convolute. Figures 14 and 15, shown below, illustrate the embodiment of the invention covered by refused claims 1 to 3.



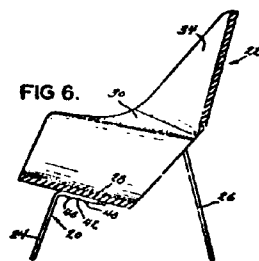
In the Final Action the examiner refused claims 1 to 3 as being directed to unpatentable subject matter in view of the following United States patents:

3,069,204	Dec. 18, 1962	Vesterholt
2,541,835	Feb. 13, 1951	Saarinen

Vesterholt discloses a seat back and arm structure for a chair formed from a unitary sheet of bendable material. The material is bent along straight lines which have at least one of their ends terminating within the confines of the sheet. That invention is illustrated by the following drawing (Figure 3).



The Saarinen patent discloses a chair structure which emphasizes the advantage of cutting out the apex of the cone after the chair seat has been formed, as illustrated in Figure 6 shown below:



The examiner agreed that the chair defined in claims 1, 2 and 3 was novel, but he was concerned that what the applicant had done differently from the prior art was not the result of an inventive step. He goes on to say that one way to determine the presence of inventive ingenuity is to look for a new or

unobvious result; one that gives unsuspected advantages over the prior art. He was not satisfied that this was so in the refused claims. In that action he also stated (in part):

Applicant states on page 8 of his disclosure:

"It will be further noted that with respect to all the modifications of my invention only the very simplest of bending and folding mechanisms are required..."

Such could also be said for the chair of Vesterholt et al which states

"In spite of the fact that the bendings ... are performed solely as single curved bendings of the plate material, they give the seat as well the back a double curved surface ... due solely to the stresses in the material produced by the bending".

The amount of these double curvatures shown on the drawings is small, but is said to give the advantages of increasing the strength and comfort of the seat. Applicant, by avoiding double curvature would also avoid these advantages.

Applicant states in his June 7, 1976 reply

"... in order to form the Vesterholt chair at all, one must have a pair of mating, matching dies"

Such is contrary to the teachings of the patent to Vesterholt. Furthermore, single curvatures are known in the art and taught by the patent to Saarinen which states:

This feature facilitates ...the upholstering of such a chair which can be done without the use of gussets.

Upholstering, in the form of a circular cushion 38 glued to the plate material of the seat is also taught in the patent to Vesterholt et al.

In response to the Final Action the applicant stressed the point that the chair body is made from a single piece of sheet material which is developable to a unitary flat pattern without the necessity of joining edges of the material or without the necessity of slitting the material. He also discusses the cited art and the advantages of his chair over that art. That response reads (in part):

...

The Vesterholt et al reference implies that it produces a chair with substantially single curved surfaces but

says at column 1, lines 29 through 36: "the objects of this invention may be accomplished, in general, by performing one, two or more foldings of the plate blank for obtaining the shape desired, each folding comprising a bending of the plate blank along at least two intersecting lines, from the perimeter to the point of intersection of said lines so that the bendings are consecutively performed in opposite directions." (emphasis added). The applicant respectfully submits that in order to form a chair which is fully developable, it is necessary to bend along at least four bend lines, not along at least two bends as is taught in Vesterholt. In support of this the applicant attaches a paper written by the inventor entitled "Characteristics of Structures That Are Fully Developable Without Slitting Therein Rule Lines of the Surfaces of the Structures Converge Within the Confines of the Structures", which sets out, in detail the requirements of bending shapes which are fully developable.

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The applicant respectfully submits that the Vesterholt reference teaches away from the present invention and, in fact is in error in certain areas. The applicant respectfully submits that the fold which joins the back of the chair according to Vesterholt with the seat of the chair according to Vesterholt must be of a double curved nature. Reference should be made to Figure 3 of the drawings of Vesterholt. In addition, with respect to Figure 1 if the last mentioned bend was a simple single curve bend resulting in a developable pattern then a line should join the points of intersection of the lines 5 and 6 and of the lines 3 and 4.

...

Looking specifically at claim 1 of the subject application, there is provided a chair having a seat, back and connecting sections, wherein the seat, back and connecting sections are developable to a unitary flat pattern. This statement excludes all chairs containing double curved surfaces wherein the sheet material must be stretched in order to form the chair. The claim goes on to require that the seat, back and connecting portions be ruled surfaces in which ruled lines thereof must meet upon the surfaces of the chair and wherein the ruled lines which meet upon the surface of the chair also meet on the pattern. This excludes the situation where the material of the chair is slit to form the chair structure.

The claim goes on to state that the ruled lines of the ruled surfaces which meet at other than a straight line extend from edge to edge of the surface and pattern respectively. In other words if a ruled line is a straight line, that straight line cannot extend from one edge of the pattern to the other edge of the pattern. This limitation distinguishes the present invention from chairs which are fully developable but which have fold lines extending from one edge of the pattern to another edge of the pattern. One example of such a chair is attached to this response and identified as Exhibit "B". It should be noted that in order to obtain strength the back and arms of this chair must be joined at CC and DD respectively. By virtue of limitation (D) such chairs are excluded from the claimed coverage.

...

It should be realized that advantages are derived in developing a chair which is totally comprised of single curved surfaces which are fully developable. As mentioned above, one of the advantages lies in the ease in covering the material sheet once formed into the chair structure. Since the chair structure is a fully developable structure, no gusseting or stretching of the covering material is necessary. As a result the covering material can be placed on the sheet material prior to forming the chair. The sheet material and the covering structure can then be simultaneously formed into the chair structure.

The second great advantage lies in ease of manufacture. It takes far less force to bend a piece of sheet material in a developable manner since no stretching of the material is required. The examiner states that he believes Vesterholt when Vesterholt discusses the ease in manufacturing his chair. However, the degree of force is relative. It may be easy to fabricate the chair according to Vesterholt with respect to forces required. However, it is even easier to manufacture the chair according to the present invention, since the forces for forming the developable chair are even less than the forces required in Vesterholt, which as clearly stated above does not provide a fully developable chair but provides a chair having double curved surfaces. These double curved surfaces require a stretching of the material in formation and therefore require a higher degree of force than that force necessary to provide the chair according to the present invention.

The question to be considered is whether or not claims 1 to 3 are directed to matter which can be considered to be a patentable advance in the art.

Claim 1 reads as follows:

In a chair,

(a) seat, back and connecting sections,

(b) the entire seat, back and connecting sections being developable to a unitary flat pattern,

(c) said seat, back and connecting sections being ruled surfaces in which rule lines thereof meet upon the surface of the chair, said rule lines which meet upon the surface of the chair also meeting on the pattern,

(d) said rule lines of the ruled surfaces meeting at other than a straight line extending from edge to edge of the surface and pattern, respectively, and

(e) the seat, back and connecting sections being self sustaining and load carrying.

At the hearing Mr. Baker capably discussed the points he thought were pertinent in an effort to distinguish the alleged invention over the cited art. He also stressed what he thought were certain inconsistencies in Vesterholt's specification. In interpreting a patent specification we are mindful that there should be neither a benign nor a strict interpretation; it must be read and construed as a whole. For example, as a general rule, the drawings are to be taken as illustrations only (see Lovell Mfg. Co. v Beatty Bros. Ltd. (1962), 23 Fox Pat. C. 112 at 141). They are not to be regarded as working drawings (see Raleigh Cycle Co. Ltd. v Miller & Co. Ltd. (1948) R.P.C. 141 to 150). It is clear to us however, that Vesterholt teaches the construction of a chair seat by folding a unitary plate of material.

At the hearing he also stressed other points as follows: a) the ease of fabrication of the chair due to the fact that no stretching or crumpling is required; and b) the ease of application of the upholstery material without slitting, stretching or tearing.

On the first point however, "no stretching or tearing," we bring the applicant's attention to his disclosure, page 7, lines 18 ff., which reads:

"By the expression 'without stretching, crumpling or tearing,' I do not imply the elimination of that which occurs transversely across a bend in material of necessity having thickness, known to those versed in the art as 'crowding' of the material."

Mr. Baker also presented numerous models at the hearing, including a plaster casting which was said to be a correct mathematical model of the structure claimed in claim 1. In our view however, the mathematical definition of the shape of the chair is a theoretical question and is not considered of primary importance with regard to the utility or the inventiveness of the chair.

We note that Vesterholt's chair is formed by simple bendings, such as by a press brake, precisely as the applicant has done. The amount of force

required is merely a matter of degree. A chair seat, using a paper model, folded as taught in Figure 1 of Vesterholt, could have a seat and back of conoid shape, either a circular or paraholic conoid with a straight line inner end and a curved line outer end. Now whether this is allowed to form a conoid which is a warped surface and non-developable or whether it is constrained to form plane surfaces and cone segments, as in the present application, is merely a matter of choice for a designer and is not related to patentable merit.

The force required for bending is well within the capabilities of existing machinery for bending of sheet metal. In order for material to be permanently deformed it must be stretched beyond its yield point and plastic deformation must occur. This induces secondary stresses in the rest of the material. No plate material is infinitely thin, therefore the resulting secondary deformations and departure from the ideal mathematical shape are merely a matter of degree. Vesterholt states that these resulting deformations are advantageous to increase the strength of the seat and make it more comfortable to sit in. We have no reason to doubt these statements, nor for that matter to grant particular significance to them. It is also clear that when the outer edges of Vesterholt's chairs are bent down additional deformations occur in the seat and back due to residual bending stresses induced in the material. This effect however, is well known.

This brings us to another point stressed at the hearing, "... the ease of application of the upholstery material." In Figure 7 of Vesterholt a chair is shown upholstered with a cushion of foam plastic covered with plastic or fabric material. Attention is also directed to column 3, lines 61 ff., of Vesterholt which reads: "Figure 8 shows a cutaway of the cushion and 39 designates a plate of foam plastics while 40 designates a cover of a plastic or fabric material. The upholstery may also be a plate of foam plastics,

e.g. a foam rubber plate, which is e.g. glued to the plate material of the seat." It is clear that this cushion is circular in shape and is pressed into the shape of the seat, a procedure which may be carried out either during, or after the seat is formed, to thereby conform to the shape of the seat.

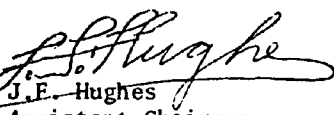
In the circumstance it is clear that in Vesterholt the straight lines (3, 4, 5 and 6 of Figure 1) are simple bendings. Furthermore, Vesterholt teaches only single curved bendings. The compound curves referred to, in our view, are nothing more than what is known as "spring back." We must also remember that the drawings, as previously mentioned, must be considered as illustrative only.

In summary, it is clear that Vesterholt, when taken as a whole, teaches the construction of a chair seat by folding a unitary plate of material. The first portion (a, b and c) of claim 1 clearly reads on Vesterholt. Part d) of claim 1 reads: "said rule lines of the ruled surfaces meeting at other than a straight line...." The lines in Vesterholt clearly meet at a point, thus it meets the limitation of "meeting at other than a straight line." In view of all of the above considerations it is our view that claim 1 should be refused.

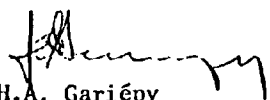
Claims 2 and 3, which depend on claim 1, refer to design variations which are not considered patentable over refused claim 1.

An affidavit from Mr. R.J. Hurka was presented at the hearing, but it adds nothing to the solution of the problem of inventiveness which is before us. All it really indicates is that Mr. Hurka found the chairs "to be completely comfortable and satisfactory."

We are satisfied that claims 1, 2 and 3 are not directed to a patentable advance in the art. We therefore recommend that these claims be refused.


J.F. Hughes
Assistant Chairman
Patent Appeal Board

I concur with the finding of the Patent Appeal Board. Accordingly, I refuse to allow claims 1, 2 and 3. The applicant has six months within which to appeal this decision under the provisions of Section 44 of the Patent Act.


J.H.A. Gariépy
Commissioner of Patents

Agent for Applicant
A.E. MacRae & Co.
Box 806, Station B
Ottawa, Ontario