Dec. 18, 1962 I. K. VESTERHOLT ETAL 3,069,204

CHAIR HAVING A JOINTLESS SEAT

Filed Feb. 13, 1961 2 Sheets-Sheet 1

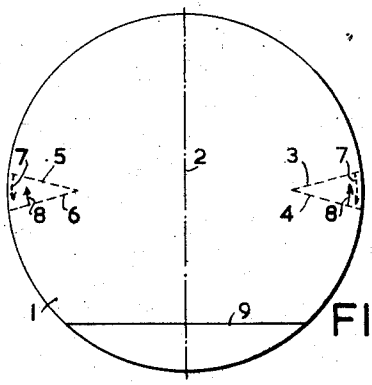


FIG.1

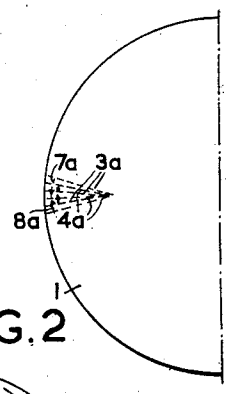


FIG.2

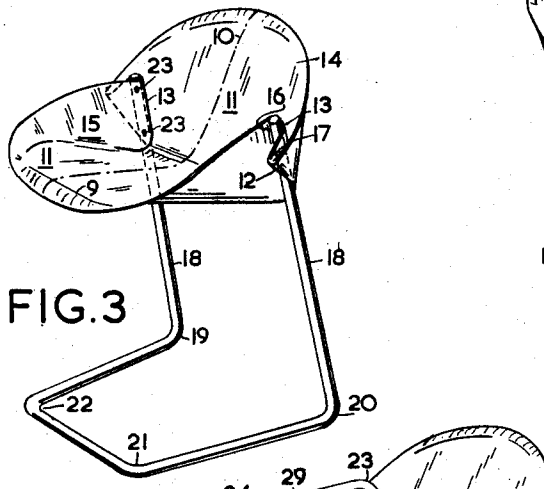


FIG.3

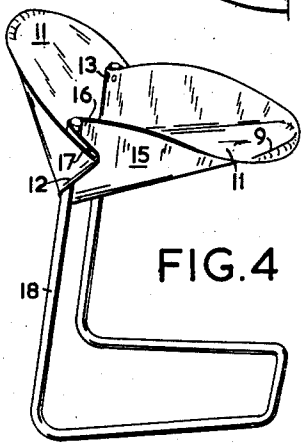


FIG.4

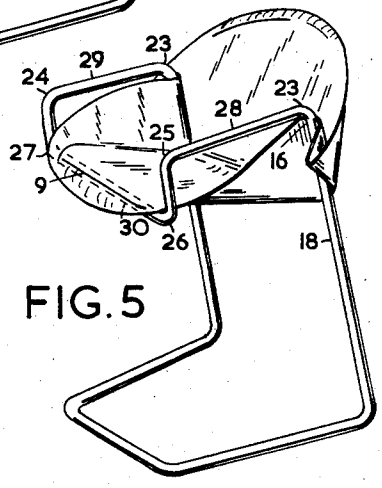


FIG.5

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CHAIR HAVING A JOINTLESS SEAT

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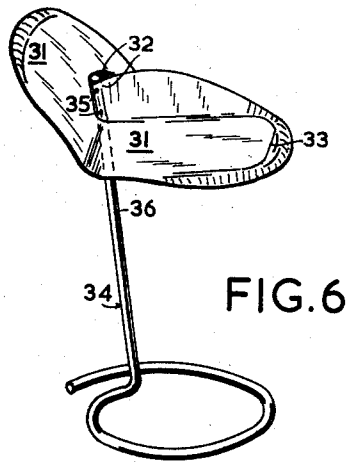


FIG.6

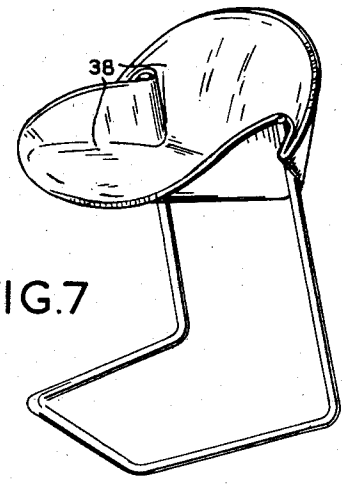


FIG.7

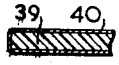


FIG.8

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CHAIR HAVING A JOINTLESS SEAT

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Claims priority, application Denmark Feb. 13, 1960
8 Claims. (Cl. 297—456)

The invention relates to a method for the manufacture of a seat for a piece of furniture for sitting with a back rest connected thereto, from a plate blank, and a chair with a seat manufactured by this method.

One object of the invention is to provide a convenient seat for a piece of furniture for sitting, particularly a chair, from plate material by a simple and cheap method.

Another object of the invention is to provide a chair with such a seat.

A further object of the invention is to provide a seat for a piece of furniture for sitting to which seat supports are easily fixed.

A further object of this invention is to provide a seat having a convenient sitting line.

Still a further object of this invention is to provide a strong seat for a piece of furniture for sitting, which seat is made from a thin plate blank by a simple bending and folding operation.

Other objects of this invention will appear hereinafter.

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.

By this method a seat of a convenient form is obtained in a simple way.

The seat according to the invention is preferably produced by the plate blank being given two folds located symmetrically with respect to an axis of symmetry for the blank.

The invention furthermore relates to a chair with a seat manufactured by the method according to the invention, and the characteristic feature of this chair is that the supports are of tube material or bar material, the central section of which is bent substantially into U-shape in a plane substantially at right angles to the leg portion or portions of the tube or the bar, while said leg portion or portions of the tube or the bar are accommodated in the fold or the folds and screwed on to the seat along one folding line.

The invention will be more easily understood by reference to the following detailed description when taken in connection with the accompanying illustration, in which

FIG. 1 shows a circular plate blank with indicated bending lines for the manufacture of a seat according to the invention.

FIG. 2 shows a part of another circular plate blank with a plurality of bending lines being indicated at the site of folding.

FIG. 3 shows a chair according to the invention in a perspective front view.

FIG. 4 shows a side elevation of the upper part of the chair shown in FIG. 3.

FIG. 5 shows another chair according to the invention in a perspective front view.

FIG. 6 shows a third chair according to the invention in a perspective front view.

FIG. 7 shows the chair according to FIG. 3, said chair being provided with an upholstery.

FIG. 8 shows a cutaway of said upholstery.

In the drawing, **1** indicates a plate blank for the manufacture of the seat according to the invention. The plate blank is in the drawing shown circular, but may also have other shapes. Part of the periphery may for example at opposite sides of a line of symmetry **2** be straight lines of a certain length. More intricate shapes of the periphery of the plate blank may also be taken into consideration.

In FIG. 1 **3–6** indicate bending lines. The lines **3** and **4** are symmetrical with the lines **5** and **6** with regard to the line of symmetry **2**. The plate material is bent along the bending lines into forming folds in the plate material due to which folds the plate material gets the shape desired. If the plate blank in FIG. 1 is bent as shown by bending along the lines **3—6**, so that the bending takes place as indicated by arrows **7** and **8** and is furthermore bent slightly along a line **9** the plate material will assume the shape shown in FIGS. 3 and 4. The dotted arrow **7** in FIG. 1 indicates that the lines **3** and **5** after the bending will lie below the plate material when the latter is still viewed from the same side as in FIG. 1, while the fully drawn arrow **8** indicates that the lines **4** and **6** after the bending will lie above the plate material, when the latter is viewed in the same manner as above.

When the plate material is bent in this simple way, a particularly convenient seat is obtained. Not only does one get a seat with an attractive appearance, but also quite surprisingly a seat with a particularly convenient sitting line **10**. In spite of the fact that the bendings performed by the method according to the invention are performed solely as single-curved bendings of the plate material, they give the seat as well as the back rest a double-curved surface. This double-curved surface contributes in part to increasing the strength of the seat, so that the thickness of material of the plate blank may be comparatively small, in part contributes to making the seat more comfortable to sit in.

The attainment of the double-curved surface is due solely to the stresses in the material produced by the bending and to an elastic deformation produced by these stresses. This deformation may incidentally give the seat better elastic properties than such a continuous deformation as would occur if the double-curved surface were produced by a form pressing proper. A form pressing proper would furthermore require the application of far more complicated tools and machines than those required for performing the simple bendings used according to the invention.

It has been described above that the plate material is given two folds by bending along the lines **3–6**, where the lines **3** and **4** and the lines **5** and **6** are symmetrical with regard to the line of symmetry **2**. Also other embodiments of the invention may be taken into consideration; the plate material may e.g. be given a single fold as exemplified in FIG. 6, or more than two folds. This latter case also includes double or multiple folds at the same place as exemplified in FIG. 2. In this figure **3***a* and **4***a* are bending lines. The bending lines **3***a* will, as indicated by the dotted arrow, after the bending be situated below the original surface of the plate blank, while the bending lines **4***a*, as indicated by the full line arrows **8***a* will be situated above the original surface of the plate blank, when the plate blank is seen as shown in FIG. 2.

In an expedient way of carrying out the method according to the invention, each of the folds is produced by bending around two lines in such a way that the line, which before the bending lies nearest the part of the blank corresponding to the back rest, will be outermost after the bending. Hereby is attained that the back rest gets an expedient curvature.

In another expedient way of carrying out the method

according to the invention the fold or the folds are made in such a way that the said fold or folds can be used for accommodating the supports for the seat. When produced from a tube or a bar with a round cross section, the supports will in this way get a particularly good rest against the seat along the curved surface of the fold, which curved surface may follow the curved surface of the support over a considerable area. Hereby the chair becomes particularly stable.

With reference to FIGURES 3 and 4 showing a chair with a seat produced by the method according to the invention, **11** is the said seat. By the production of each of the folds by bending around the two lines **3**, **4** and **5**, **6** two triangular tongues **12** and **13** are produced. The bending is performed in the way that the line, which before the bending lies nearest the part of the blank corresponding to the back rest, will be located outermost after the bending. In this way the two tongues **12** and **13** will be produced in such a way that the tongue **12** will lie outermost. It will be seen that the outer tongue in this way, together with a part **15** of the plate material, which is bent slightly upwards, will form a suitable arm rest. The tongues **12** and **13** are preferably not bent so much that they are pressed together, but so that suitable openings **16** and **17** are formed between them. In the opening **16**, the innermost plate of which is curved, the supports **18** are inserted and can be secured here e.g. by means of screws or by gluing or welding, e.g. spot welding. The supports shown are made of a rod member which may be tubular and which is bent approximately 90° at **19**, **20**, **21**, and **22**, so that the plane determined by the lines **19**, **22**, and **20**, **21** is substantially at right angles to the vertical parts **18** of the support. The free ends of the latter are led in between the tongues **12** and **13** and secured by means of screws **23**. This support of the seat is very convenient, as it gives a stable and strong connection between support and seat.

In FIG. 5 is shown a modification of the chair shown in FIGS. 3 and 4. In this modification the free ends of the support **18** are extended past the opening **16** and at **23**, **24**, **25**, **26**, **27**, and **28** bend at substantially right angles to form partly arm rests **28** and **29** and partly a support **30** for the front part of the seat, said support **30** extending beneath the seat in the vicinity of the line **9**.

FIG. 6 shows another embodiment of the chair according to the invention. The seat **31** of this chair is produced by providing a plate blank, e.g. as shown in FIG. 1, with a single fold **32** according to the invention. By providing this fold the plate blank, apart from secondary bendings, e.g. along the line **33**, is given the desired shape. In the fold a support **34** is secured e.g. by means of screws **35**, said support e.g. having the form of a substantially vertically extending portion **36** extending into and secured in the fold as described and a substantially triangular or circular portion, the plane of which is substantially at a right angle to the portion **36**.

FIG. 7 shows the chair of FIG. 3 the seat of said chair being provided with upholstery, e.g. as shown in the figure a substantially circular cushion **38**, which is placed in the seat **11** and at the foldings pressed down into the corners **17** of the foldings. FIG. 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.

The plate material may be metallic, e.g. of iron or aluminium, but may also be plastic material, including glass-reinforced plastic. Further the plate material may be perforated.

We have described preferred embodiments of our invention, but it is understood that this disclosure is for the purpose of illustration and that various changes in shape, proportion and arrangement of parts as well as the substitution of equivalent elements for those herein shown and described may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

We claim:

1. A chair having a jointless seat with a back rest integral with said seat, which seat is made from a substantially plane plate blank with an unbroken outer periphery and an uninterrupted surface area within said periphery comprising one fold comprising bendings in said plate blank along a plurality of intersecting lines from the perimeter to the point of intersection of said lines in consecutively opposite directions, which chair further has a support of a rod member, the central part of said rod member being bent into a figure lying substantially in a plane, said plane being at substantially right angles to the substantially vertical part of the support while the vertical part of the support is accommodated in the corresponding fold and screwed on to the seat along one folding line.

2. A chair having a jointless seat with a back rest integral with said seat, which seat is made from a substantially plane plate blank with an unbroken outer periphery and an uninterrupted surface area within said periphery comprising one fold comprising bendings in said plate blank along two intersecting lines from the perimeter to the point of intersection of said lines in opposite directions, which chair further has a support of a rod member, the central part of said rod member being bent into a figure lying substantially in a plane, said plane being at substantially right angles to the substantially vertical part of the support while the vertical part of the support is accommodated in the corresponding fold and screwed on to the seat along one folding line.

3. A chair having a jointless seat with a back rest integral with said seat, which seat is made from a substantially plane plate blank with an unbroken outer periphery and an uninterrupted surface area within said periphery comprising two folds each comprising bendings in said plate blank along a plurality of intersecting lines from the perimeter to the point of intersection of said lines in consecutively opposite directions, which chair further has a support of a rod member, the central part of said rod member being bent into a figure lying substantially in a plane, said plane being at substantially right angles to the substantially vertical part of the support while the vertical part of the support is accommodated in the corresponding fold and screwed on to the seat along one folding line.

4. A chair having a jointless seat with a back rest integral with said seat, which seat is made from a substantially plane plate blank with an unbroken outer periphery and an uninterrupted surface area within said periphery comprising two folds each comprising bends in said plate blank along two intersecting lines from the perimeter to the point of intersection of said lines in opposite directions, which chair further has a support of a rod member, the central part of said rod member being bent into a figure lying substantially in a plane, said plane being at substantially right angles to the substantially vertical part of the support while the vertical part of the support is accommodated in the corresponding fold and screwed on to the seat along one folding line.

5. A chair having a jointless seat with a back rest integral with said seat, which seat is made from a substantially plane plate blank with an unbroken outer periphery and an uninterrupted surface area within said periphery comprising two folds disposed symmetrically with respect to the line of symmetry for said seat, each of these foldings comprising bendings in said plate blank along two intersecting lines from the perimeter to the point of intersection of said lines in opposite directions, where the outer tongue of each fold extends from the back rest portion of the seat, which chair further has a support of a rod member, the central part of said rod member being bent into a figure lying substantially in a plane, said plane being at substantially right angles to the substantially vertical part

of the support while the vertical part of the support is accommodated in the corresponding fold and screwed on to the seat along one folding line.

6. In a chair according to claim 5 the supports extending through the folds and being bent at substantially 90° in a direction away from the back rest adjacent the folds.

7. In a chair according to claim 5 the supports extending through the folds and being bent at substantially 90° in a direction away from the back rest adjacent the fold, and further being bent at substantially 90° in a downward direction and further at substantially 90° underneath the seat.

8. A chair having a jointless seat with a back rest integral with said seat, which seat is made from a substantially plane plate blank with an unbroken outer periphery and an uninterrupted surface area within said periphery comprising a folding comprising bends in said plate blank along a plurality of intersecting lines from the perimeter

to the point of intersection of said lines in consecutively opposite directions, which chair further has a support of a rod member, the central part of said support rod member being bent into a figure lying substantially in a plane being at substantially right angles to the substantially vertical part of the support while the vertical part of said support is accommodated in the corresponding fold and screwed on to the seat along one folding line, said seat being provided with upholstery.

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