United States Patent

[11] 3,615,982

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[45] Patented **Oct. 26, 1971**

[54] **CORE FOR USE IN THE MANUFACTURE OF FURNITURE AND METHOD OF MANUFACTURE OF CORE**
6 Claims, 18 Drawing Figs.

[52] **U.S. Cl.** **156/90,** 156/212
[51] **Int. Cl.** **B32b 33/00**
[50] **Field of Search** 156/90, 196, 212

[56] **References Cited**

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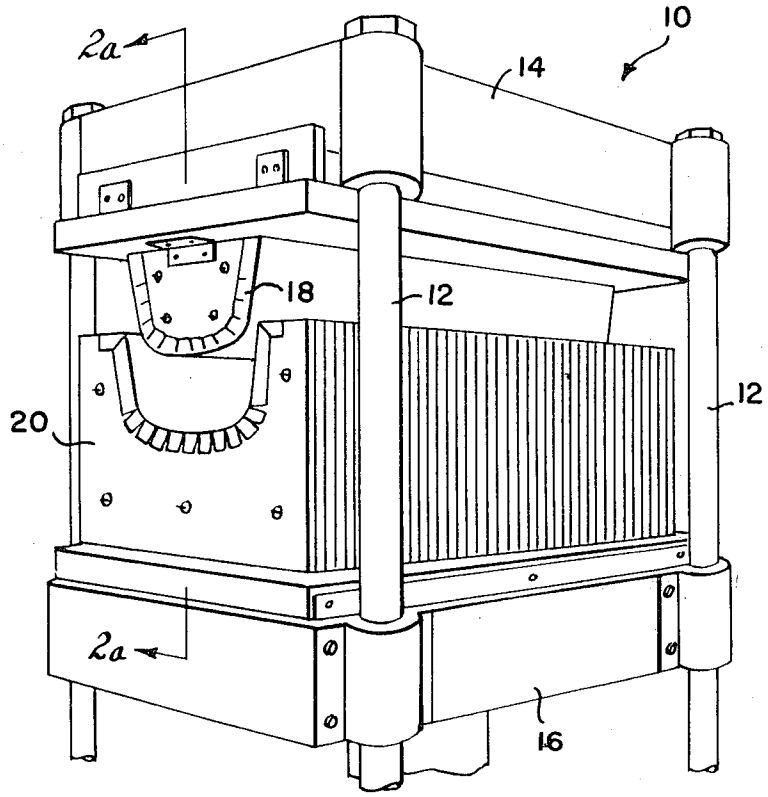
Primary Examiner—Carl D. Quarforth
Assistant Examiner—S. R. Hellman
Attorney—Caesar, Rivise, Bernstein & Cohen

ABSTRACT: A core for use in the manufacture of furniture which comprises a plurality of superimposed thin, flexible sheets which have been adhesively secured together, and then formed into a U-shaped core, with the core being used in the manufacture of furniture, for instance, as the backing portion of a chair.

The core is manufactured by superimposing a plurality of thin, flexible sheets, one upon the other, by high speed equipment, and simultaneously applying adhesive to the sheets as the superimposition process proceeds to form a stack.

The stack is then positioned in matched pressure dies and with the action of pressure the core of the present invention is formed into a U-shape, although many other shapes are contemplated.

Fig. 1.



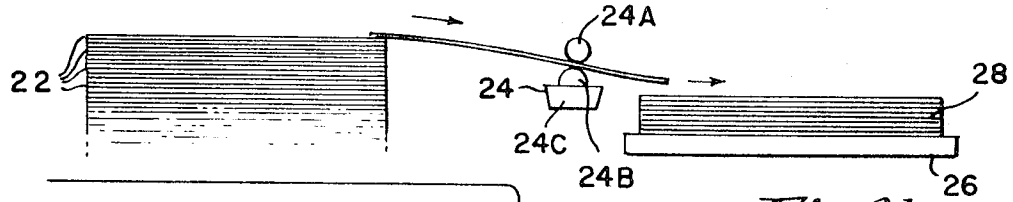


Fig. 2b.

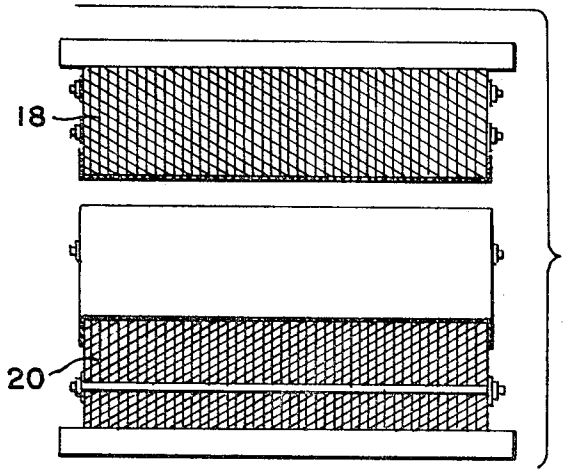


Fig. 2a.

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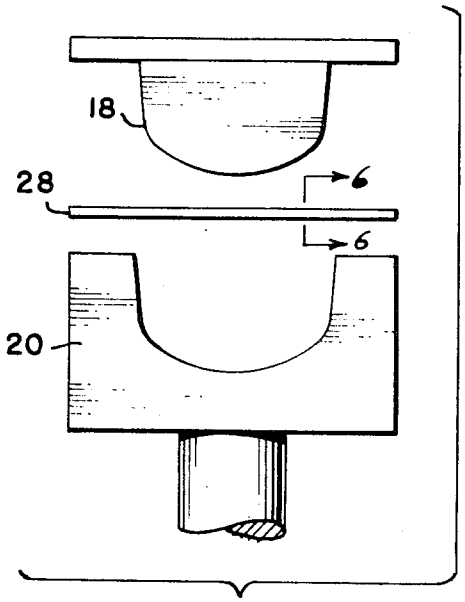


Fig. 3.

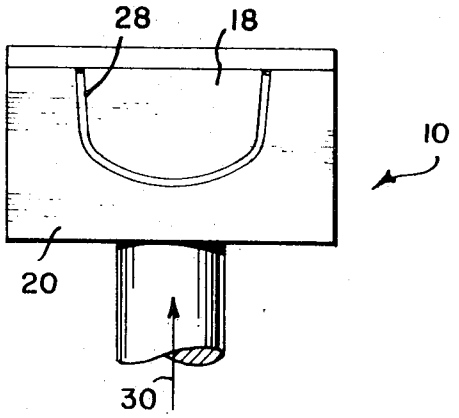


Fig. 4.

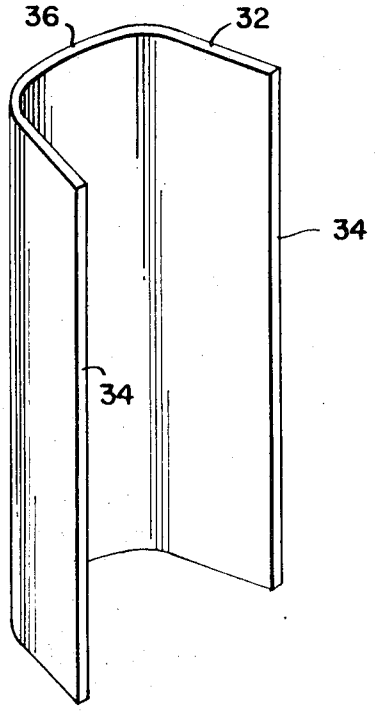


Fig. 5.

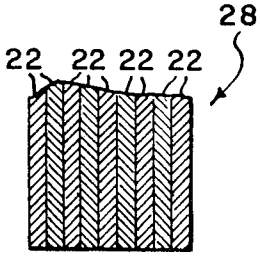


Fig. 6.

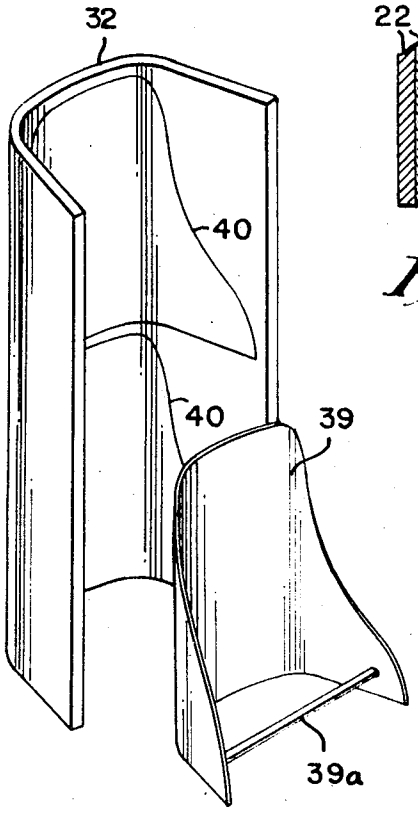


Fig. 7.

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Fig. 8.

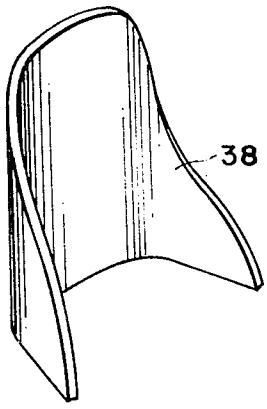


Fig. 9.

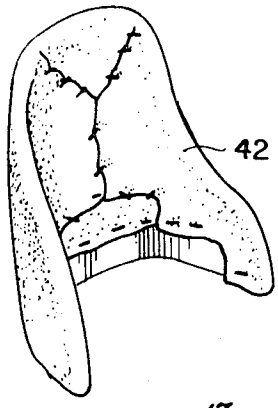
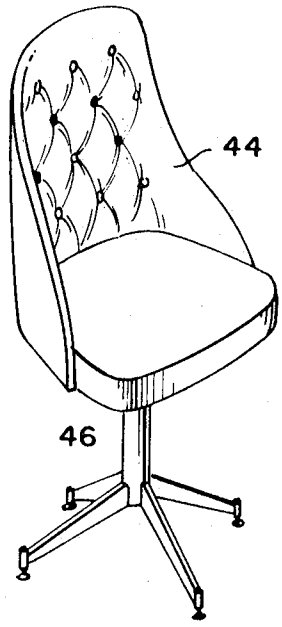


Fig. 10.



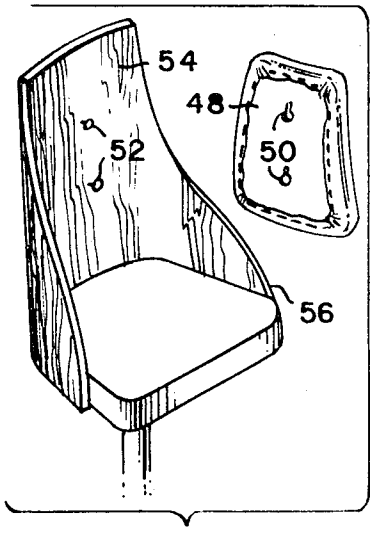


Fig. 11.

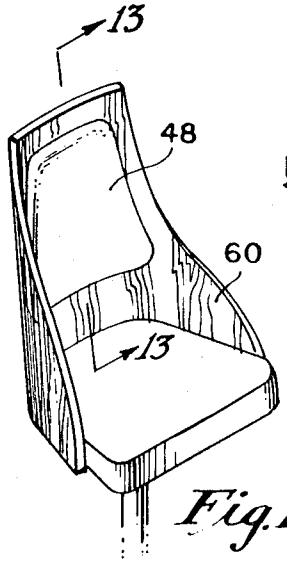


Fig. 12.

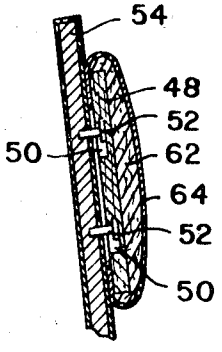


Fig. 13.

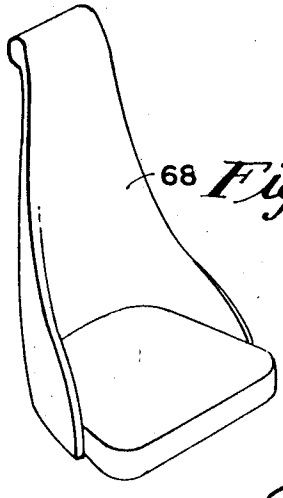


Fig. 15.

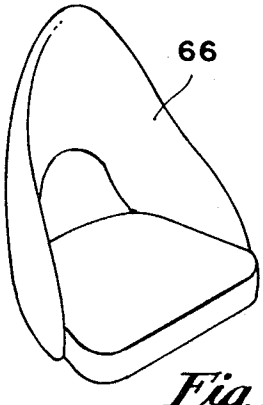


Fig. 14.

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Fig. 16.

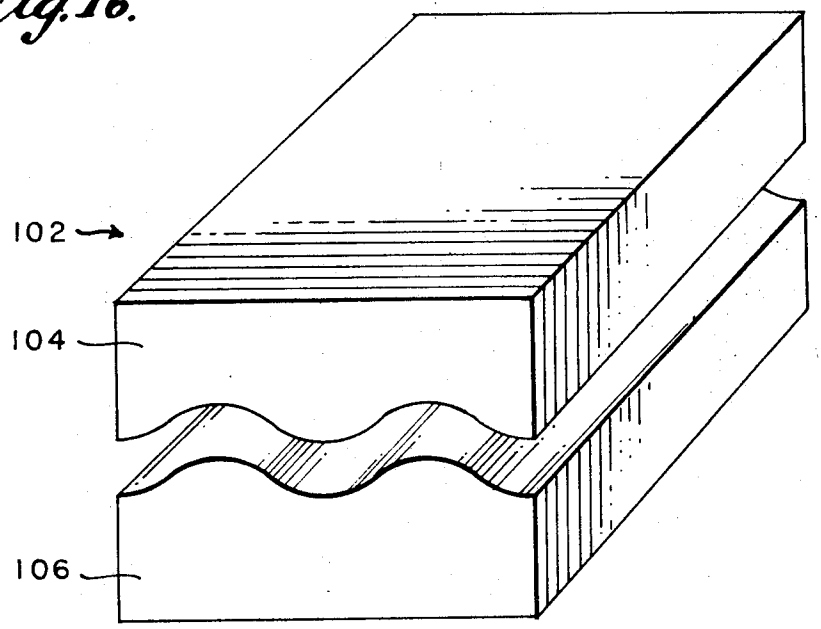
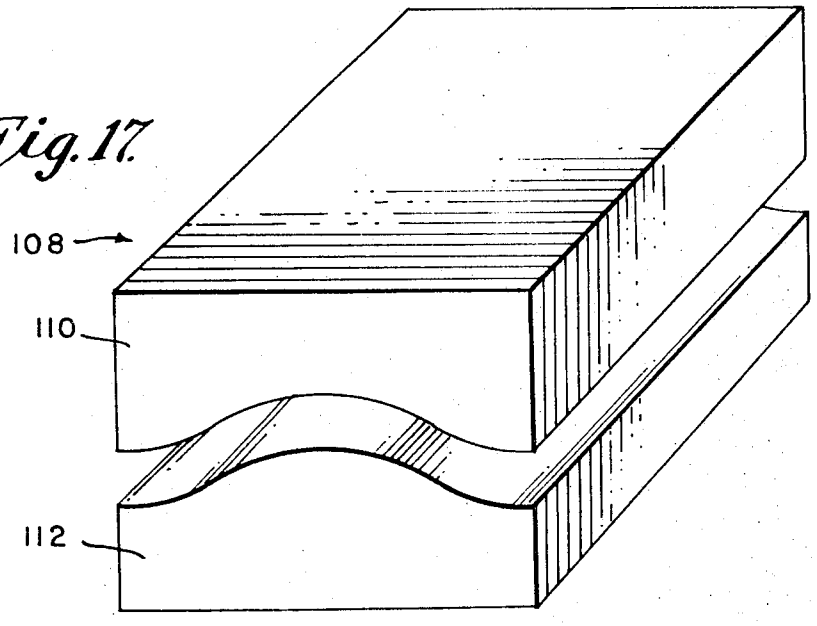


Fig. 17.



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CORE FOR USE IN THE MANUFACTURE OF FURNITURE AND METHOD OF MANUFACTURE OF CORE

This invention relates to a core for use in the manufacture of furniture like chairs, and also to the method of manufacture of the core. The product of the present invention may also be used in making desks or the manufacture of nonfurniture items, for instance, articles in the aircraft or automotive field, like bucket seats, or anywhere else where free form curves are to be produced as in wall separators or in cement forms. Thus, the term "furniture" as used herein is to be given a broader meaning.

In the manufacture of furniture it is the practice to assemble together certain basic components which are then provided with a finished covering or coating in order to complete the steps of manufacture. Many items of furniture are built up from a basic frame or a core member which is an essential feature of the particular article of furniture.

For instance, in the manufacture of certain types of chairs, it is the practice to provide a curved core member which is attached to a seat or bottom, prior to the application of upholstery or other finished material. For a long time the core member was made from plywood, but plywood suffered from a certain lack of flexibility which complicated any process for making a curved core member.

With the steep rise in the price of plywood, this material became even less desirable, and hence the search intensified for a substitute for the plywood.

Although a multilayer chair shell was taught in Yellen U.S. Pat. No. 3,033,732, this item has not won wide acceptance in the trade. The Yellen shell was manufactured by laying up a series of blanks by hand upon a jig. Such a process is not only time consuming but necessitates a considerable amount of adhesive which renders the Yellen process more costly in view of the necessity to allow sufficient time for the adhesive to dry.

It is therefore an object of the present invention to provide a method of manufacture of a core which is not only an effective substitute for plywood, but also can be manufactured quickly and economically.

Still another object of the present invention is to provide a finished core which will not only possess the requisite characteristics of strength and rigidity, at minimum cost, but also which will prove to be resistant to mildew and similar agents of deterioration, for the life of the article of furniture in which the core is used.

The foregoing as well as other objects of the invention are achieved by providing a core which is manufactured from a plurality of properly prepared, superimposed flexible sheets, such as cardboard, which are adhesively secured together by automatic processing equipment to form a stack wherein the adhesive penetrates only for an amount sufficient to gain a good grip. Following this assembly step, the stack thus formed is laid upon matched pressure dies which then form the laminate into a particular shape of core member, such as a U-shape It will be seen that the process of the invention may be carried out rather rapidly since the steps of superimposition and adhesive securement proceed rather rapidly, particularly because of the use of automatic equipment which feeds the flexible pieces one-by-one to achieve a stack of superimposed flexible members that have been adhesively coated during the feeding process, so that the stack is quickly united into a single mass.

With proper application of adhesive and proper surface preparation of the flexible members, the drying time is very short, and there is no escape of adhesive from between the superimposed sheets. Thus, handling of the solidified stack and transporting it to the mold proceeds easily and cleanly. Following the molding process the core may be trimmed to any desired shape.

Other objects and many of the attendant advantages of the invention will become readily apparent by reference to the appended drawings wherein:

FIG. 1 is a perspective view showing an example of matched pressure dies that may be used to shape the stack of superimposed flexible sheets that have been provided in accordance with an earlier step of the process of the present invention;

FIG. 2–A is an enlarged sectional view taken along the lines 2—2 of FIG. 1;

FIG. 2–B is a schematic view showing automatic feeding and adhesive applicator apparatus usable in the practice of the present invention;

FIG. 3 is a side elevational view of the molding apparatus of FIG. 1, with certain portions omitted for the sake of clarity, showing the male and female members of the matched pressure dies, with a superimposed stack of flexible members schematically shown in relation thereto;

FIG. 4 is a view similar to FIG. 3 wherein the female member has advanced upwardly;

FIG. 5 is a perspective view of a core blank produced in accordance with the process of the present invention;

FIG. 6 is a greatly enlarged sectional view taken along the lines 6—6 of FIG. 3, and showing the stack of superimposed flexible sheets prior to the pressure step;

FIG. 7 is a view similar to FIG. 5 but wherein the core blank of FIG. 5 has been cut into two cores which may now be used in the manufacture of furniture;

FIG. 8 is a view similar to FIG. 7 showing one of the cores of the present invention about to be united with other components to produce a chair;

FIG. 9 is a view similar to FIG. 8, but wherein cushioning material has been applied and stapled to the core member of FIG. *: 8;

FIG. 10 is a perspective view of a chair having a backing member which utilizes the intermediate product of FIG. 9 which is subsequently covered with a finished material;

FIG. 11 is a perspective view of another chair which is manufactured with a backing produced by the process of the present invention, and which also includes a detachable backing member that is made using another type of core member that is manufactured in accordance with the process of the present invention;

FIG. 12 is a perspective view of the chair of FIG. 11 wherein the auxiliary backing member has been secured upon the chair;

FIG. 13 is an enlarged sectional view taken along the lines 13—13 of FIG. 12;

FIGS. 14 and 15 are perspective views of other chairs (legs not shown) which include backings that are made from core members produced by the process of the present invention; and

FIGS. 16 and 17 are schematic views showing variations of pressure dies used in the present invention.

Referring now in greater detail to the various figures of the drawing wherein like reference characters refer to like parts there is shown at 10 in FIG. 1 matched pressure dies which are used to produce a core member of the present invention. The apparatus 10 is generally of well known construction, and so only the basic details thereof will be discussed here.

The apparatus 10 comprises the usual posts 12 extending from fixed upper frame 14 and movable lower frame 16, which is movable upwardly as will be discussed hereinafter, as allowed by the posts 12. As can be seen in FIG. 1 a fixed male part 18 extends downwardly toward upwardly movable female part 20. This movement can be observed by comparing FIGS. 3 and 4 as will be discussed hereinafter. If desired the male part can be movable, and the female part fixed.

Further details of the apparatus 10 can also be seen in FIG. 2–A. Since the details of this apparatus are rather conventional, such details will be readily recognizable in FIGS. 1 and 2–A.

As can be seen in FIG. 2–B, automatic feeding and adhesive applicator apparatus is utilized. It will be seen that thin, flexible sheets 22 are fed one-by-one by automatic transport equipment to adhesive applicator 24 which basically involves closely spaced rollers 24–A and 24–B, with the latter roller extending into a well or container 24–C of adhesive. In this way, adhesive is applied only to the lower surface of one of the flexible sheets 22.

It will further be seen from FIG. 2–B that the flexible sheets 22 are then deposited upon a pad 26. Since the adhesive is automatically applied to the lower surface of each of the flexible sheets 22, it follows that the very first or lowermost sheet 22 should be placed automatically or manually upon the pad 26 without the application of adhesive. Then, the next flexible sheet 22 with a coating of adhesive on its lower surface is deposited upon the first flexible sheet, and so on until a stack 28 of flexible members is built up to a desired height. If desired the adhesive can be applied only to the top surface or to both surfaces or portions thereof.

The flexible sheets used in the present invention are preferably of about 1/16 inch to ⅛ inch thick and are of cardboard like Kraft paper or chipboard. It is desired that the cardboard include an antimildew agent such as a cresol, a phenol or formaldehyde in a small, but effective amount of about 1/10 of 1 percent. The adhesive to be used in the practice of the present invention is tacky at ordinary room temperature, and preferably will set in a period of one minute or less at room temperature. An example of an adhesive that has been successfully used in the practive of the present invention is a tackified polyvinyl alcohol adhesive, combined with inert material which has the following properties:

a. white color
b. pH 4.4 to 4.8
c. mesh 325
d. particle shape — thin, flat plate
e. coated with 0.5 percent stearate

The foregoing adhesive also includes a defoamer, and contains polyvinyl acetate and a thermoplastic resin. The various components are dispersed in cold water and heated to 200° F. to complete solution, and then are cooled to 100° F., with the viscosity and pH being adjusted before packaging into drums.

It is quite important that the surface of the flexible sheets used in the present invention be properly prepared. The sheets should be so finished as to have a smooth surface. Furthermore, a sizing coating is to have been applied to such surface in order to lessen but not fully eliminate the absorptive properties of the surface. In this way some penetration of the adhesive occurs, and thus the adhesive, when set, is an effective bonding agent. However, penetration of large amounts of the adhesive or saturation of adhesive in the flexible sheets is avoided. Thus with the present invention the stack dries or sets rather quickly, usually in less than one minute.

It will be seen that the stack 28 of FIG. 2–B is formed rather easily, and is simply handled. With proper application of adhesive and proper surface preparation as detailed hereinabove, there is no mess. The operator simply lifts the stack 28 from the pad 26 and places the stack 28 on the female member 20 of the dies 10 as schematically shown in FIG. 3. Of course, automatic transport and handling equipment may be provided to carry the stack 28 from the pad 26 to the female member 20 of FIG. 3. It will be appreciated that the action of the dies causes pressure to force the adhesive further into the flexible members.

It can be seen in FIG. 6 that the stack 28 is comprised of a series of flexible members 22. As shown in FIG. 4 the female member 20 advances upwardly in the direction of arrow 30 in order to produce core blank 32 of FIG. 5. It will be seen that the core blank 32 is U-shaped with legs 34 extending from a base section 36.

Of course, other configurations of the core blank 32 can be manufactured (see FIGS. 16 and 17) depending upon the particular configuration of the members 18 and 20 as determined by the desired configuration of the ultimate core to be produced. Thus, the core blank 32 is only exemplary of the core that can be made in accordance with the process of the present invention.

As can be seen in FIG. 7 a core 38 is simply cut out using template 39, with support bar 39–A, in accordance with a pattern 40 from the core blank 32. Again, the particular configuration of the core 38 can be widely varied depending upon the desired shape of the finished product just as the wide latitude of materials and physical conditions that are inherent in the present invention.

It will be seen that the properties of these materials and conditions can be varied in order to provide a more or less rigid final product or to impart other properties of interest to the final product.

The uses of the core 38 of FIG. 8 can be seen by reference to remaining figures 9 to 15 of the drawing.

In FIG. 9 a cushioning material 42 has been applied and stapled to the core member 38.

In FIG. 10 the intermediate product of FIG. 9 has been subsequently covered with a finished material 44 (with suitable upholstering) and then applied to a pedestal 46 in order to complete the manufacture of a chair.

FIG. 11 shows another chair that is manufactured using a backing 48 that has been produced from a different core which was manufactured in accordance with the present invention. Here the backing member 48 is detachable, and has been provided with a cushioning material and a finished covering. In FIG. 11 the rear portion of the core backing 48 is visible, and is shown to have been provided with openings 50 that fit about fasteners 52 that project from the back 54 of the chair 56 of FIG. 11. It will be seen that the back 54 is made from a core 38 of FIG. 8. The completed chair of FIG. 11 is shown at 60 in FIG. 12, with the details of the backing 48 being visible at FIG. 13 including cushioning material 62 and covering 64.

Also, reference is made to FIGS. 14 and 15 which show other chairs that include backs made from cores produced in accordance with the present invention. It will be seen that FIG. 14 shows a low silhouette chair 66 with a back that is somewhat shorter and wider than would be obtained with the core 38 of FIG. 8. FIG. 15 shows a chair 68 with a tall back.

With reference to FIGS. 16 and 17 there will be seen schematic views showing variations of pressure dies used in the present invention.

FIG. 16 shows dies into which a stack of flexible members may be fed in order to produce a curved wall separator or a core with curves than can be subsequently used as a panel in making other articles as mentioned hereinabove.

It will be seen that the dies 102 of FIG. 16 include upper die part 104 and lower matched part 106. Similarly, in FIG. 17 the dies 108 may be used to produce a core or panel with but a single curve. Here the dies 108 include an upper die 110 and a lower matched die 112.

It is therefore seen that the core of the present invention is composed of a series of thin, mildew resistant sheets superimposed one on the other and so formed to possess sufficient rigidity to be used as a part of a piece of furniture. The core preferably has a U-shape, although this shape is but one of many shapes into which the core can be formed.

The method of the present invention involves applying a coating of adhesive to at least one surface of a series of thin, flexible, uniplanar, mildew resistant sheets. This is followed by superimposing the sheets, one on the other, to form a stack, and then applying pressure to the stack to form the core. Where desired the topmost and bottommost plies can be a decorative face.

It follows that the present invention lends itself handily to abrupt changes in fashion or styling. The present invention is utilized to make a core than can be completed to provide the entire back for a chair or for a detachable portion of the chair back. It follows that core members of practically unlimited shape and sizes can be produced in accordance with the present invention, and then completed to the whim of the designer. The core members of the present invention can be used not only in the manufacture of chairs, but can be used to provide other articles, again limited only by the imagination of the designer.

It can be seen that the attractive features of the present invention are promoted by achieving a proper balance of the penetrating properties of the adhesive and the penetration resisting properties of the flexible members by way of surface preparation. In this way a minimum of adhesive is used, and hence drying time is less than 10 minutes and preferably less than 1 minute.

Such speedy drying time is also achieved because the present invention utilizes adhesives that set very quickly at normal room temperature (70° F.). Also, with the present invention minimal pressure is usually satisfactory in making the core member. While FIG. 1 shows a molding apparatus capable of exerting 200 p.s.i., a pressure of about 60 p.s.i. is preferred, and indeed even 25 p.s.i. has usually been satisfactory.

Without further elaboration, the foregoing will so fully illustrate our invention that others may, by applying current or future knowledge, readily adapt the same for use under various conditions of service.

What is claimed as the invention is:

1. In a method of manufacture of a core to be used in furniture and other articles, wherein said method includes the steps of (a) providing a plurality of flexible, uniplanar mildew resistant cardboard sheets having a thickness of about 1/32 inch to ⅛inch, (b) providing said sheets with a smooth surface, (c) applying a coating of a room temperature setting adhesive to said smooth surface, (d) superimposing said sheets, one on the other to form a stack and (e) applying pressure to said stack by matched dies at normal room temperature, the improvement comprising applying a sizing coating to said smooth surface prior to the application of said adhesive coating in order to create good water holdout properties in said cardboard sheets and thereby limit the quantity of adhesive required as well as lowering the drying time of adhesive in said stack to form a multiplanar core which is sufficiently rigid and stiff to be used as a part of a piece of furniture.

2. The method of claim 1 wherein said pressure is applied to said stack in such a way as to form a U-shaped core.

3. The method of claim 1 wherein said pressure is applied by matched pressure dies, exerting a pressure of 60 p.s.i.

4. The method of claim 1 wherein said steps of adhesive coating and superimposing of said sheets to form a stack are carried out by automatic machinery.

5. The method of claim 1 wherein said adhesive is a tackified polyvinyl alcohol adhesive.

6. The method of claim 1 wherein said sheets are of chipboard paper.

* * * * *