June 26, 1962 W. FENGLER 3,040,389

STANDARDIZED FRAME ELEMENT FOR WINDOWS, DOORS AND THE LIKE

Filed Jan. 25, 1960 3 Sheets-Sheet 1

Fig. 1.

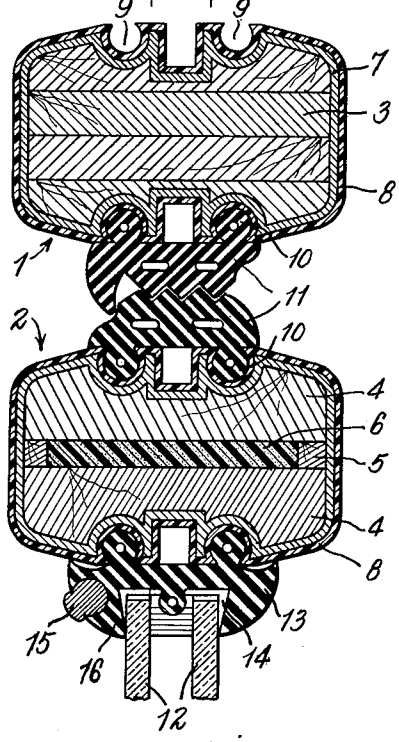


Fig. 2.

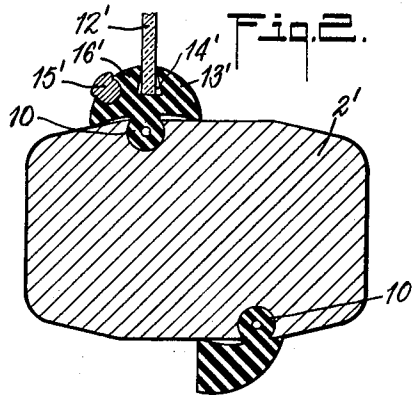


Fig. 3.

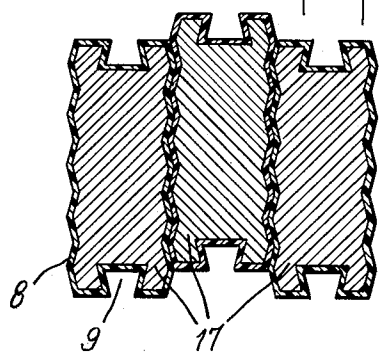


Fig. 4.

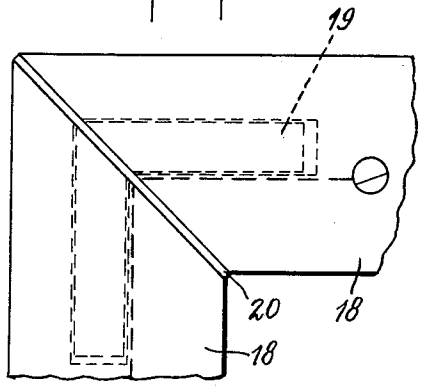
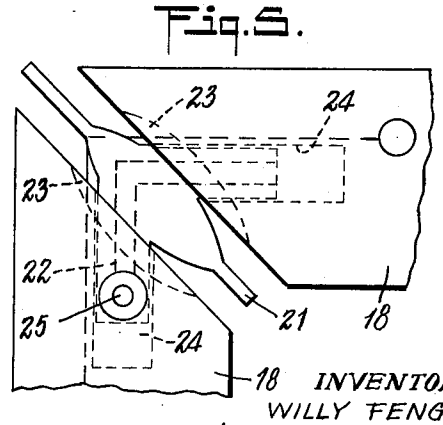


Fig. 5.



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STANDARDIZED FRAME ELEMENT FOR WINDOWS, DOORS AND THE LIKE

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Fig. 6.

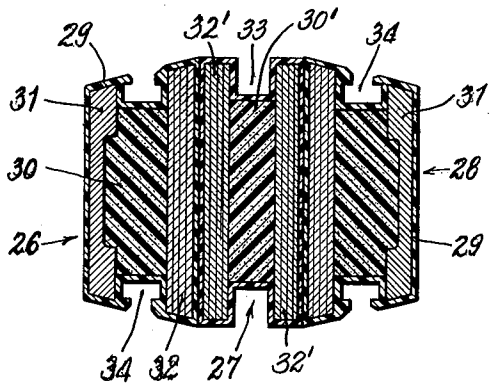
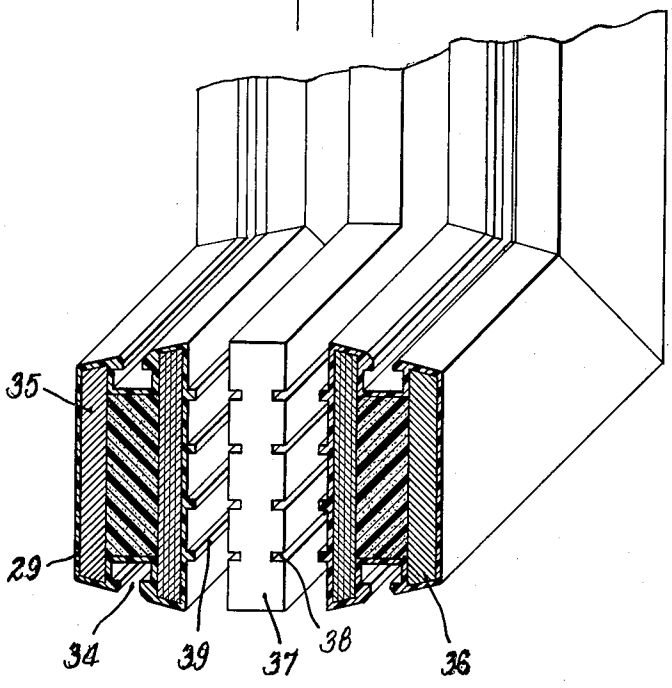


Fig. 7.



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STANDARDIZED FRAME ELEMENT FOR WINDOWS, DOORS AND THE LIKE

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Fig. 8.

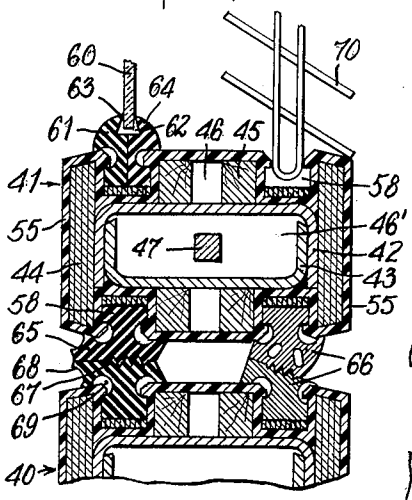


Fig. 12.

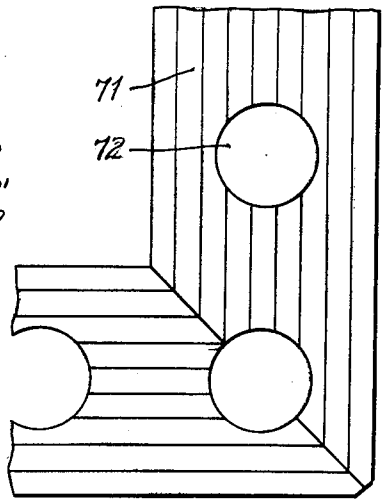


Fig. 10.

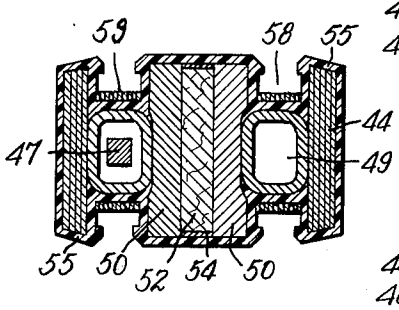


Fig. 9.

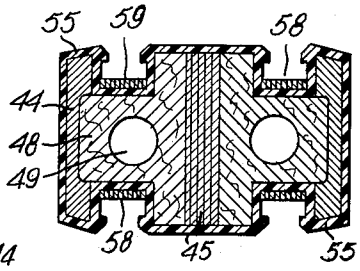
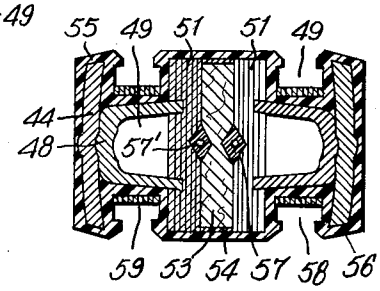


Fig. 11.



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3,040,389

STANDARDIZED FRAME ELEMENT FOR WINDOWS, DOORS AND THE LIKE

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9 Claims. (Cl. 20—11)

The present invention relates to a standardized profiled, elognated element for the manufacture of stationary and movable frames for windows, doors and the like, which comprises a load-carrying inner core and a plastic coating or outer layer surrounding the inner core, and is provided with grooves to receive therein members for sealing and for the attachment of a panel or the like.

Profiled elements are conventionally used for window frames in which the window panes are held by soft rubber members or are pressed on the frame by additional clamping means.

However, the conventional window and door frames of composite material in the form of specially shaped bars or rods have been found too expensive for use in the construction of normal dwelling houses.

The invention aims to avoid the drawbacks of the conventional frames and frame elements and to provide standardized profiled frame elements of bar or rod form and frames made of such elements for windows, doors and the like. These elements together with corner connecting pieces may be used for the production of inner movable as well as of outer stationary frames, wherein the elements are of equal structure and manufactured in series or volume production. This method of manufacture is rendered possible by the formation of the standardized frame element which, according to the invention, comprises an inner core preferably consisting of stratified wood, of structure-forming fibrous material or shavings with adhesive agents added thereto, or of foam-forming plastics or of a combination of such materials. As a cover on the inner core, a plastic coating is used between which and the core a metal foil and/or an elastic insulating layer may be inserted. For securing a pane or a filling member or sealing pieces to such a frame, grooves are provided on both sides of the frame element and, if so desired, symmetrical to each other.

The invention also aims to provide for the manufacture of frame-shaped structural elements, especially for windows, doors, gates, wainscots, frames, furniture, etc. a standardized profiled frame element or bar wherein, depending on the required strength, one standardized element may be used or several of such elements may be combined to form the leg of a frame. Such legs may be connected to each other so as to form a frame if necessary with the aid of corner-connecting pieces.

According to the further invention, stationary outer and movable inner frames of different thickness and dimensions can be fabricated of the same standardized frame elements. Such standardized frame element preferably comprises an inner core, an insulating envelope and an outer coating and may be prefabricated in series in continuous lengths. At the place where the frame elements are to be assembled, they may be cut to the necessary length and connected to each other with or without corner pieces e.g. by doweling, glueing, screwing or welding. When cutting the miters the hitherto inevitable waste will be avoided as owing to the symmetric construction the standardized elements can be used on both sides.

Also according to the invention the standardized frame element may be composed of several formed parts which as well as the corresponding corner connecting pieces may

be covered with plastics in one or several layers on all sides before being assembled.

The inner core of the standardized frame element according to the invention may consist of a solid material such as plywood, compressed material, splints or shavings or fibrous material with the addition of an adhesive agent, metal or the like. Also the core may be made of several formed pieces connected with each other by an intermediate layer of supporting elements which also consist of solid material. At the statically less stressed spots thereof, fillers or spacers may be applied wherein if necessary hollow spaces or recesses may be provided for the reception of corner connecting pieces or of sealing or attachment members.

The mentioned formed pieces may consist of layers of glued wood veneer shaped during the compression process. There may be also provided profiled e.g. U-shaped reinforcing intermediate layers in order to increase the strength of the formed pieces. The reinforcing intermediate layers may consist e.g of plywood wherein the several layers may preferably be arranged diagonally with respect to each other.

Owing to the formation of the standardized frame elements according to the invention, without being bound to certain forms and sizes, space saving transportation becomes possible without the risk of damage in transit whereby substantial costs may be saved which otherwise would raise the total production cost. After the elements have been cut to the required length and connected with the corner pieces by gluing, screwing or the like so as to form the frame during the assembly, the strength of the frame may be still increased by putting a rope, band or wire around it under pre-tension.

After the assembly, the plastic coating of the frame pieces will be welded together at the joints in a well known manner.

The necessary sealing and attaching members engage in the longitudinal grooves provided for this purpose in the standardized elements.

Further objects and details of the invention will be apparent from the description given hereinafter and the accompanying drawing illustrating several embodiments thereof by way of example. In the drawing:

FIG. 1 is a cross-section of a stationary and a movable frame composed of symmetric standardized profiled frame elements with sealing and attachment pieces.

FIG. 2 is a cross-section of another standardized frame element,

FIG. 3 is a cross-section of a frame leg composed of three equally cross-sectioned standardized elements,

FIGS. 4 and 5 illustrate two different forms of corner connections of miter cut standardized frame elements,

FIG. 6 is a cross-section of a standardized frame element comprising three composite pieces each covered with a plastic layer,

FIG. 7 is a perspective view of an exploded sectional portion of a frame constructed of a standardized frame element comprising three modified pieces as compared with FIG. 6,

FIG. 8 is a cross-section of a stationary and a movable frame made of standardized elements with a core of U-shaped pieces,

FIGS. 9 to 11 are cross-sections of modifications of standardized frame elements; and

FIG. 12 is an elevation of a corner connecting piece for a frame according to FIG. 3.

Referring now to the drawing, FIG. 1 shows a section through a window frame comprising a stationary frame part 1 and a movable part 2 each of which parts is formed of standardized profiled elements. The standardized element has a core which may consist of a solid material in the form of a single wooden bar or it may

consist of several layers of wood glued together, or of organic or inorganic fibers of wood shavings jointed by an adhesive agent or of any other suitable vegetable raw material suited for the formation of a structure. Furthermore, foam-forming plastics are useful for the production of the core.

In the standardized element of frame part 1 of FIG. 1 the core consists of four pieces of wood 3. In the movable frame part 2, the core comprises two pieces of wood 4 held apart by spacers 5. In the hollow space 6 therebetween, a plastic hose may be inserted which is filled with a plastic material forming a foam, e.g. by the application of heat, steam, pressure, or physical or even chemical means. However, it is also possible to introduce the foam forming plastic directly into the space 6.

An insulating envelope 7 of cardboard or other suitable material, such as a foam forming matter serves as a bolster between the cores 3 and 4, 5, respectively, and the outer cover or coating 8. A metal foil (not shown) may be inserted between the cores and their envelopes. The connection between the cores and the insulating envelopes may be established e.g. by gluing or pasting. The envelope 7 is provided in order to take up stresses and changes of form which may occur in the cores 3 and 4, 5. It may consist of wood fibers, chemical fibers or other suited raw materials wetted with an adhesive, and preliminarily polymerized, thereupon placed on the core and further polymerized by the application of pressure and/or heat up to a desired degree of hardness. A complete hardening will preferably be avoided.

The outer cover or coating 8 serves as a protection against atmospheric influences and may consist e.g. of a material which is as highly form-retaining as possible, such as an artificial fiberglass reinforced resin. The glass fibers may be sprayed together with the resin and a hardening agent on the insulating envelope and then under application of e.g. pressure and/or heat, may be smoothened and finally hardened. The outer cover 8 may also be produced by first soaking the glass fibers or other suitable matted fibers in resin and then polymerizing them preliminarily. This may be followed by the gluing of the outer cover on the insulating envelope 7 which encompasses the cores 3 or 4, 5, whereupon the outer cover may be hardened e.g. by pressure and/or heat, as far as necessary. By such an arrangement of the insulating layer of an artificial resin, a very high resistance of the standardized frame element to atmospheric effects will be obtained.

The standardized frame element is provided with longitudinal grooves 9 in symmetrical arrangement within which grooves the correspondingly formed beadings 10 of the sealing members 11 and the holding or securing members 13 can be received, as shown in FIGS. 1 and 2. The sealing, holding and securing members are in the form of moldings. The sealing members 11 of rubber or plastic may consist of a more resilient material at the contacting points.

For securing a panel e.g. a window pane 12 to the frame, the attachment or holding members or moldings 13 are provided with recesses 14. A filling piece 15 may be located in a member 13 so that it can be pulled out of the longitudinal groove which it engaged, whereupon the tongue 16 may be bent off so that the pane or panel can be readily inserted or removed.

Whereas in FIG. 1 a double pane 12 is shown, a single pane 12 is provided in the modification of FIG. 2 where the attachment member or molding 13' has a recess 14', a filling piece 15' and a tongue 16' for a purpose similar to that of the parts 13 to 16 in FIG. 1.

FIG. 3 is a section through the leg of a frame formed of three standardized profiled frame elements 17. In this case, the elements 17 are arranged in staggered relationship to each other whereby a still greater strength of the frame may be obtained. The mutual contacting surfaces of the elements 17 are so contoured that they are safely held in their position in respect to each other. This surface contour may have symmetrically arranged beadings, grooves, angular, quadrangular or dovetail formations. The connection of the several standardized elements to a frame leg may be accomplished e.g. by glueing, screwing or doweling with or without the application of pressure and/or heat.

A corner connecting piece 19 serves to assemble a frame, the legs 18 of which are miter cut, as shown in FIG. 4. The corner connecting piece 19 may consist of a material as e.g. plywood, or artificial or natural fibers soaked in plastics and compressed.

In order to increase the tightness of the joint between the abutting leg ends and to ensure a permanent connection, a foil 20 of an artificial material may be inserted. The foil 20 may consist e.g. of a thermo-plastic material into which electric resistance bodies such as wires or metal foils are pressed. In the production of the frame with the foil 20 the resistance bodies will be connected to an electric voltage. The heat created by the electric current causes the foil to flow and effects the connection of the leg ends with each other.

In FIG. 5 another connection of two abutting frame legs 18 is illustrated. The angular corner connecting piece 21 consists of a core 22 which is formed of electrically conductive material with high resistance. This core 22 is enveloped by a glassfiber-reinforced artificial material e.g. a polyester resin. Where the legs intersect, the corner connecting piece 21 is preferably elliptically enlarged. When the diagonally or miter cut frame legs 18 are pressed together, the elliptical enlargement fits into the correspondingly formed recesses 23 of the frame legs. The ends of the core 22 which is formed as an electric resistance heating body in the corner connecting piece, will be connected to an electric voltage. In this manner the core will be heated. The heat is transmitted to the envelope of the corner connecting piece 21 and the artificial resin e.g. contained in the envelope begins to flow. By its hardening a firm permanent connection between the corner connecting piece 21 and the frame legs 18 will be established. In order to render it possible to connect the core 22 with the current conductor, holes 25 are drilled down from the surface at the ends of the recess 24 which receives the corner connecting piece 21. Electric plugs (not shown) may, then, be inserted into the holes 25. Later on the holes 25 will be filled with an artificial resin.

FIG. 6 shows a section through another standardized frame element which is composed of three formed parts 26, 27, 28. The three parts are coated all-over with one or several layers of a plastic 29. The core of the formed parts may consist of fillers or spacers 30 between portions 31 and 32 and a filler or spacer 30' between two portions 32'. Here, too, the connection of the formed parts to each other is accomplished by pasting, glueing, welding and/or doweling with or without the application of pressure and/or heat thereby producing the standardized frame element. The symmetrically arranged grooves 33 and 34 serve for the reception of sealing and holding pieces or tightening, abutting and attachment members or moldings.

FIG. 7 illustrates another embodiment of a standardized frame element consisting of three formed pieces. Between the formed pieces 35 and 36 a spacer piece (not visible) is arranged which has the same cross sectional dimensions as the legs of the corner piece 37. The adjacent surfaces of the pieces are provided with grooves 38 and ribs 39, respectively, which may be formed dovetailed or quadrangular and which interengage when the pieces are assembled. Thereby the strength of the frame will be considerably increased.

FIG. 8 shows a section through a stationary frame 40 and a movable frame 41 in which the core of the standardized frame element comprises two supporting members 42, 43 of a solid material such as plywood, com-

pressed bodies of shavings or fibers with an adhesive added thereto, metal, plastics or the like. The core, furthermore, comprises the formed bodies 44 which consists of a solid material too, and fillers or spacers 45 arranged in the less stressed parts. The core may contain hollow spaces 46 for the reception of corner connecting pieces, sealing or securing members. As described hereinbefore, the core is enveloped by a single or several layer coating 55. The formed pieces 42, 43, preferably positioned opposite each other in a symmetrical arrangement may have U-shaped, angular or similar cross-sections and are solidly connected to the preferably symmetrically arranged supporting members 44 and with the fillers or spacers 45 by glueing, doweling, pasting and/or screwing. The hollow space 46' which is enclosed by the formed pieces 42, 43 may serve to receive therein locking members 47 or similar parts.

In the embodiment according to FIG. 9 the core of the standardized frame element consists of members 48 formed of compressed material. The hollow spaces 49 provided in this embodiment may serve to receive therein corner connecting pieces or locking members.

In the core of the embodiment according to FIG. 10 a filler or spacer 52 is arranged between two formed pieces 50. The filler or spacer 52 is shorter than the pieces 50. The spaces thus created along the longitudinal surfaces of the filler or spacer 52 are filled with band-like inserts 54 of a material such as paper, fabric and the like, which prevent that the outer cover 55 adheres to the longitudinal surfaces of the filler or spacer when the core is being coated. In this manner it is attained that the filler or spacer 52 which in this case is not solidly connected with the adjacent formed pieces 50, can be pulled out in the longitudinal direction after the standardized elements have been miter cut and can be shortened as much as corresponds to twice the length of a leg of the corner connecting piece. After the spacer 52 has been cut to measure it can be provided with a suitable glue or adhesive or both sides and pushed back between the formed pieces 50 so that at its front faces hollow spaces are created in the standardized element into which spaces the legs of the corner connecting pieces engage during the assembly of the frame.

Similarly and for the same purpose as the filler or spacer 52 in FIG. 10, the filler 53 is lengthwise shiftable between the formed pieces 51 of FIG. 11. Between this filler 53 and the pieces 51 there are longitudinal recesses or grooves 57 for the reception of strips of articificial material into which an electrical conductor 57' of high resistance is embedded. After the spacer 53 has been cut to measure as explained with respect to the spacer 52 in FIG. 10, and has been shifted into its final position, the strips of artificial material will be molten by heat created by an electric current so that the formed pieces 51 will be firmly connected by the artificial material to the spacer 53. In the bottom of the longitudinal grooves 58 in the embodiments of the FIGS. 10 and 11, which grooves are destined to be engaged by the sealing or abutment members or moldings, intermediate layers 59 of an elastic material, of a foam-forming plastic or metal springs or the like may be positioned. Thereby the elasticity and yieldingness of the standardized element may be increased.

In order to hold a filling 60 such as a window pane in the movable frame 41 of FIG. 8 a bipartite molding or holding member 61 may be provided with longitudinal recesses 62. The outer part of the holding member bears with its tongue 63 against the outside of the pane or other filling 60 whereas the inner part of the holding member 61 is formed as a filler 64 so that the pane can be readily exchanged.

By the floating suspension of the plane 60 the risk of a break caused by vibrations will be considerably reduced.

The easy and rapid assembly and disassembly of the filling such as pane 60 is another advantage of the invention. In the recesses 58 of the frames made from the standardized element, moldings such as sealing members 65 or abutment members 66 are arranged between the stationary frame 40 and movable frame 41 e.g. of a window pane. The longitudinal tooth-like ribs 67 of the sealing members 65 interengage in the closing position in such a manner that the outer ends 65 of the sealing member lie tightly with their hollow recesses 69 against the frame parts and are sealingly pressed against each other.

Tightening or sealing members of the type described may, of course, be provided in all standardized elements according to the invention. The recesses or grooves 58 of the standardized element may also serve to receive therein e.g. a Venetian blind 70.

It is, furthermore, possible to arrange magnetic bodies within the soft material of the tightening or sealing members or moldings whereby the mutual contact of the elements will be still further improved.

FIG. 12 shows a corner connecting piece 71 for frames of standardized elements according to FIG. 3. For connecting the frame legs which consist of several standardized elements, a sheet metal piece provided with the same surface profile as the mutually engaging surfaces of the elements may be arranged between each two of the latter and may be connected therewith by heat and/or pressure. Thereby the thickness of the connecting piece presses into the plastic coating of the elements so that the elements will lie firmly upon one another throughout their entire length and can be connected with each other.

The recesses 72 in the connecting piece allow a very good connection between the elements lying against one another.

The heating of the connecting piece during the assembly may also be accomplished by the application of high frequency electricity. This is a matter of course and is valid for the other embodiments too.

The connection of the frame legs can be made also in such a manner that hollow spaces are provided in the longitudinal direction of the frame legs, which spaces have the form of a corner connecting piece and into which during the assembly artificial material may be introduced which hardens completely only within the standardized elements after the introduction into the latter.

The form or profile of the lateral surfaces of standardized frame elements according to FIG. 3 may also consist of metal sheets correspondingly shaped and placed thereon. The metal sheets may be connected with the standardized frame element by pasting, glueing, screwing, doweling or the like. Thereby, the metal sheets may extend beyond the core of the standardized element and may be so bent towards each other that between their bends a groove will be formed for the reception of sealing, abutment or holding members.

It will be apparent to those skilled in the art that many modifications and alterations of the structures illustrated and described can be made without departure from the essence and spirit of my invention which for that reason shall not be limited but by the scope of the appended claims.

I claim:

1. A frame for a panelled door, window, and the like comprising a plurality of elongated leg portions, and means for connecting said leg portions in end-to-end relationship, at least one of said leg portions including a plurality of substantially identical elongated structural elements of elongated cross-section, each element having a longitudinal axis, a longer transverse axis, and a shorter transverse axis, said element being formed with a longitudinal groove extending in a plane defined by said longitudinal axis and said longer transverse axis, and two longitudinal faces spaced from said plane in opposite directions along said shorter transverse axis, a plurality

of longitudinally extending substantially identical projections on each of said faces, said projections having respective longitudinal planes of symmetry transverse of the plane of said groove, two adjacent ones of said projections defining therebetween a longitudinally extending recess receiving therein a corresponding projection of another one of said structural elements in conforming engagement.

2. A frame as set forth in claim 1 wherein each of said structural elements includes a core member and an elongated substantially rigid core member and a plastic coating member substantially enclosing said core member.

3. A frame as set forth in claim 1, wherein a longitudinal face of one of said structural elements is contiguously adjacent a longitudinal face of another one of said structural elements, and a plurality of the projections on each of said contiguously adjacent faces are received in corresponding recesses between the projections of the other face, said faces being offset relative to each other in the direction of said longer transverse axis.

4. A frame as set forth in claim 1, further comprising an elongated resilient member in said groove.

5. A frame as set forth in claim 1, wherein a longitudinal face of one of said structural members is adjacent a longitudinal face of another one of said structural members, and a plurality of the projections on each of said adjacent faces are received in corresponding recesses between the projections on the other face, and a conforming sheet member interposed between said recesses and the projections received therein.

6. A frame as set forth in claim 5, said sheet member is formed with an aperture therethrough.

7. A frame as set forth in claim 6, further comprising fastening means in said aperture for securing said adjacent longitudinal faces to each other.

8. A frame for a panelled door, window, and the like, comprising a plurality of elongated leg portions, and connecting means for connecting said leg portions in end-to-end relationship, said leg portions each including a plurality of superimposed elongated structural elements of

substantially identical elongated cross-section, each element having a longitudinal axis, a longer transverse axis, and a shorter transverse axis, said element being formed with a longitudinal groove extending in a plane defined by said longitudinal axis and said longer transverse axis, and two longitudinal faces spaced from said plane in opposite directions along said shorter transverse axis, a plurality of longitudinally extending projections of substantially identical cross-section on each of said faces, said projections having respective longitudinal planes of symmetry transverse of the plane of said groove, two adjacent ones of said projections defining therebetween a longitudinally extending recess receiving therein a corresponding projection of another one of said superimposed structural elements of said leg section in substantially conforming engagement; and said connecting means including a connecting member of sheet-like material conforming to said projections and recesses, each one of two portions of said connecting member being interposed between two superimposed ones of said structural elements in conforming engagement with the recesses of said two structural elements and with the projections thereof respectively received in said recesses.

9. A frame as set forth in claim 8, said connecting means including an elongated resilient member in respective longitudinal grooves of two adjacent ones of said leg portions.

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