

Manufacture of frames for windows and the like from
cored plastics profiles.

Technical Field.

5 This invention is concerned with a method of
manufacturing frames for windows and the like, using
cored plastics profiles comprising a core of shape-
retaining material and a cladding of plastics material
extruded therearound. The invention is also concerned
10 with profiles for use in carrying out such method and
with frames for windows or the like made in accordance
with such method.

Background Art.

 Frames for windows and the like have traditionally
15 been made from wood, and the manufacturing process has
often involved fairly complex machining operations both
in providing the frame members with the desired profile
and in forming the corner joints of the frames. These
machining operations result in a considerable wastage of
20 material. Furthermore wooden frames require frequent
painting to avoid rapid deterioration from exposure to
the weather.

 As an alternative to wood, it is also well-known
to manufacture frames for windows and the like from
25 aluminium, which may be extruded to provide suitable
profiles, usually of complex cross-sectional shape, which
may be cut into frame members of the desired length and
assembled by appropriate corner joint arrangements
to provide the required frames. While such frames of
30 aluminium are likely to require less maintenance than
frames made from wood, the aluminium frames result in
a considerably greater transmission of heat unless the
profiles incorporate some form of heat barrier, which
further increases the complexity of the profile.

35 In the interests of ease of manufacture,

avoidance of wastage of materials, economy and providing a virtually maintenance-free product it has been proposed to construct frames for windows and the like from wooden frame members of simple cross section (e.g. rectangular) having cladding portions at least partially enclosing the wooden frame members, which cladding portions are conveniently made by extrusion of plastics material and are shaped to perform the necessary sealing, weather resisting and interconnecting roles of the frame. Such cladding can be pre-coloured to perform any decorative function and is virtually maintenance free. The specification of my United Kingdom patent application No.7924197 (published under No.2026125 on 30th January 1980) relates to the formation of corner joints between frame members and shows, in Figures 3 and 7 of the drawings thereof, a cross-section of a frame member (as just above referred to) having a wooden core with a cladding of plastics material extruded therearound for use in the construction of a window frame. The corner joints as disclosed in said specification are made by injecting plastics material into communicating cavities formed in abutting portions of the frame members, the plastics material being reinforced by metal inserts if desired.

It is an object of the present invention to achieve further economies and ease in the manufacture of frames for windows and the like with substantially no wastage of materials by utilising a single cored extruded plastics profile which is so formed and shaped that, not only can it be manufactured very economically, to very close dimensional tolerances, and with virtually no wastage of material, but, with very simple operations performed thereon, can be used to assemble both an outer, static, frame and an inner, opening, frame of a frame assembly for a window or the like.

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Disclosure of invention.

According to the invention there is provided a method of manufacturing frames for windows or the like from a cored plastics profile comprising a core of shape-retaining material such as, for example, laminated plywood, cement-bonded fibrous material or cement-bonded glass fibres, and a cladding of plastics material, such as, for example, polyvinyl chloride extruded therearound, the profile being of generally rectangular cross sectional shape and having a retaining member for a panel of glass or other suitable material extending along the profile at a locality adjacent one edge of one surface thereof, characterized in that said method comprises the steps of feeding an indefinite length of the profile past sawing means organised to make a series of transverse cuts at 45° across the profile so as to sever therefrom successively frame members of appropriate lengths for assembly alternately into an outer, static, frame and an inner, opening, frame for a window or the like, severing the glass or other panel-retaining members from those frame members which are to be assembled into the outer frame, assembling the alternate frame members to form said inner frame and said outer frame and, after cutting the retaining members severed from the frame members for the outer frame to appropriate lengths, utilizing them as glazing strips in assembling said inner frame with a glass or other panel.

In carrying out a method as set out in the last preceding paragraph the glazing strips are conveniently arranged to abut against an undercut face of a rib of the profile which extends along said surface thereof at a locality spaced from the retaining member, and to be supported by supporting members provided by glazing clips secured to said profile, said glazing clips assisting in

locating a panel in position in the frame.

A profile suitable for use in carrying out a method of manufacturing frames for windows or the like in accordance with the invention conveniently comprises a core of shape-retaining material and a cladding of plastics material extruded therearound, characterized in that the core is of generally rectangular cross sectional shape and in that the cladding provides (a) along one surface of the profile at a locality adjacent one edge of that surface a retaining member for a panel of glass or other suitable material, which retaining member extends inwardly over said surface and is inclined at an angle thereto and (b) along said surface of the profile, at a locality spaced from the retaining member, a rib having an undercut face inclined to said surface at an angle at least substantially corresponding to the angle of inclination of the retaining member, whereby, in the manufacture of inner and outer frames for windows or the like from said profile, the retaining member may be cut from frame members which are to form the outer frame and utilised as glazing strips in the manufacture of the corresponding inner frame, the glazing strips being arranged, after the insertion of glass or other panel, to abut against the undercut face of the rib of the profile and to be supported by supporting members mounted on said surface of the profile.

In the manufacture of a cored extruded plastics profile as set out in the last preceding paragraph the core may comprise any suitable material providing the necessary strength and shape retaining stability. Preferred materials for the core are a good quality laminated plywood or, alternatively, a cement-bonded fibrous material such as cement-bonded chipboard or cement-bonded glass fibres. Furthermore the cladding may be of any suitable plastics material capable of being extruded around the core and of providing adequate

strength to the glass or other panel-retaining member and the desired durability under adverse weather conditions. Preferred materials for the cladding are appropriate grades of polyvinylchloride or poly-carbonates. The profile may conveniently be made by feeding a continuous length of core material through a plastics extruding machine having accurately made dies which impart the desired shape and dimensions to the cladding of the profile. It is preferred to pass the core material, prior to its passage through the plastics extrusion machine, through a coating machine which is organised to coat the faces of the core material with a layer of hot melt adhesive which serves to fill any pores or small cavities in the core material with a view to avoiding difficulties in the plastics extrusion process which might otherwise occur by reason of expansion of gas (air) in the pores or cavities resulting in blemishes in the cladding. Preferably the coating machine comprises scraper or doctor blades arranged to control the thickness of the hot melt coating so that the coated core material is built up to a prescribed accurate dimensional form ready to enter the dies of the plastics extrusion machine.

In the manufacture of frames in accordance with the invention the corners are preferably made by utilizing corner joints which are made by injecting plastics material into communicating cavities formed in abutting portions of the frame members, as claimed in my copending International Patent Application No. PCT/GB81/00096.

From what has been said hereinbefore it will be appreciated that cored extruded plastics profiles in accordance with the invention may readily be constructed in a continuous, indefinite, length by a series of relatively simple machines and that the form

of the profile is such that it can be economically manufactured from readily available materials with substantially no waste. Furthermore, frames for windows and the like can readily be constructed from such profiles by the use of a series of relatively simple machines in such manner that there is virtually no wastage of material. The resulting frames are likely to be strong, of relatively simple construction, durable against deterioration due to atmospheric conditions and to be of low thermal conductivity, particularly when double glazed panels are assembled therein. Such frames are likely to be very economical to manufacture, particularly since it is anticipated that the several machines needed for the manufacture of the profile, and for the manufacture of frames therefrom will be capable of being arranged in a production line, the machines being automatically controlled by a computer.

There will now be given, with reference to the accompanying drawings, a more detailed description of a method, in accordance with the invention, of manufacturing frames for windows or the like using a cored extruded plastics profile, and a method of manufacturing a profile (which will be described in two slightly different forms) suitable for use in manufacturing frames in accordance with said method. It will be understood that the description is given by way of illustration of the invention and not by way of limitation thereof.

Brief description of drawings.

In the accompanying drawings:-

Figure 1 is a diagrammatic representation of how a continuous length of a suitable profile may be cut, by means of a series of 45° cuts, into members of lengths suitable for use in constructing a window frame comprising an outer, static, frame and an inner, opening glass-supporting frame;

Figure 2 is a diagrammatic representation showing how various members indicated in Figure 1 are assembled into such a window frame;

Figures 3 and 4 are transverse sectional views, taken on the line IV - IV in Figure 2, of adjacent portions of the outer frame and inner frame of a window frame in accordance with the invention, in closed position, showing two slightly different forms of profile and ways of attaching a glazing strip.

10 Best mode of carrying out the invention.

In carrying out a method of manufacture of frames for windows or the like in accordance with the invention use is made of a cored plastics profile comprising a core of shape-retaining material and a
15 cladding of plastics material extruded therearound. Examples of profiles which are suitable for use in carrying out such a method are shown in section in Figures 3 and 4 but the invention is not limited to the use of profiles of the exact forms shown.

20 As will be hereinafter explained a single profile is used to provide an inner, opening, frame 40 and an outer, static, frame 42, the profile being formed with a cross-sectional shape as required by the inner frame 40 and comprises (as shown in Figures 3
25 and 4) a generally rectangular core 1 with a cladding 3 of extruded plastics material therearound. The profile can be readily manufactured by a continuous extruding process and cut into lengths to provide frame members for windows and the like in the manner
30 hereinafter described. In the interests of economy, avoidance of waste, and ease of manufacture, the cross sectional shape of the core is kept simple, and is generally rectangular as mentioned above. The core provides the structure with the desired strength
35 while the cladding provides an at least substantially

maintenance-free protective surface and is formed and shaped, as hereinafter described, to perform a panel (e.g. glass) retaining function and other functions such as weather proofing to be mentioned hereinafter.

- 5 As indicated in Figures 3 and 4 the core 1 is of laminated form and preferably comprises a good quality plywood giving a high degree of dimensional stability, freedom from warping, and, by means of multi-tongued joints, a facility for easily joining successive lengths
10 of core material into a continuous length for feeding into the necessary machinery by which the plastics cladding is extruded around the core. However, the core may comprise any suitable material having the necessary structural and dimension-retaining properties outlined hereinbefore.
- 15 Particularly suitable materials are cement-bonded fibrous materials such as cement-bound chipboard or cement-bound glass fibres which, like the plywood, can be produced as sheets of appropriate thickness which sheets may readily be cut into the lengths of the desired width, using
20 multiple sawing machines of known type. The lengths of core material may then be joined together by means of appropriate joints to form a core of indefinite length ready for feeding into the plastics extruding machinery.

- Before the plastics cladding is extruded around
25 the core it is desirable to pass the core through a coating machine which coats all the faces of the core with a layer of hot-melt adhesive material, such layer being indicated by the reference numeral 5 in Figure 3 (the thickness of the hot-melt layer being somewhat
30 exaggerated in that Figure). The layer 5 of hot-melt adhesive material serves to fill any pores, small cavities and the like in the core with a view to avoiding difficulties in the plastics extrusion process which might otherwise occur by reason of expansion of gas (air) in the pores or
35 cavities resulting in blemishes in cladding. By the use

of coating machinery having scraper or doctor blades of the appropriate type the coating process can be so controlled that the coated core is built up to a prescribed accurate dimensional form on leaving the coating machine ready to
5 enter the extrusion machinery by which the plastics cladding is applied. As an example of a suitable hot-melt adhesive for the core-coating process just described may be mentioned hot-melts sold under the Registered Trade Mark Eastobond by Eastman Chemical Products Inc., but it
10 will be understood that other, generally similar, products may be used.

During the cladding process the plastics material is extruded by means of known machinery on to the core together with a further layer of hot-melt adhesive which
15 assists in bonding the cladding material to the core. During the extrusion process the core and cladding are extruded through accurately made dies which impart the desired shape and dimensions to the finished profile.

While any plastics material having the desired
20 characteristics hereinbefore mentioned may be used for the cladding 3, appropriate grades of Polyvinylchloride and polycarbonates may be mentioned as being suitable.

The dies of the plastics cladding extrusion machine are so shaped that the extruded profile, in addition to
25 providing a wall covering the whole of the core, provides also a glass, or other, panel-retaining member 9 along one edge portion (hereinafter referred to as the outer edge portion) of the upper surface of the profile forming the inner frame 40 as viewed in Figures 3 and 4,
30 an inner rib 11 along the other edge portion of said upper surface, and two flanges 15, 17 extending normally to the lower parallel surface of the profile as seen in that Figure. The flanges 15, 17 are adapted to provide a weather-proofing facility as will become clear herein-
35 after. In the form of profile shown in Figure 3 there is also provided an intermediate rib 13 extending along

an intermediate portion of said surface. These several members and flanges extend throughout the length of the profile.

The panel-retaining member 9 is inclined inwardly from the outer edge portion of the upper surface of the profile at an angle conveniently of 45° or substantially so and from its inner end portion. (in the form used in Figure 3) there extends a depending rib 19 terminating in a substantially cylindrical bead 21, the rib 19 extending at least substantially perpendicularly to the upper surface of the cladding. The member 9 at its upper end portion has a small upwardly extending portion terminating in a surface 22 inclined at an angle to the normal to the upper surface of the extrusion as seen in Figure 3, the angle being conveniently 60° (or substantially so) for a purpose hereinafter referred to.

The inner rib 11 is undercut as shown in Figures 3 and 4 to provide a supporting face 23 making an angle to the upper surface of the profile. The intermediate rib 13 (Figure 3) is undercut at both sides at angles to provide inclined surfaces to be gripped by a glazing clip 47 for a purpose hereinafter described.

In carrying out a method of manufacturing window frames in accordance with the invention, a cored plastics profile is cut and assembled in a manner which will now be indicated with particular reference to Figures 1 and 2. An indefinite length of profile is fed past sawing means organised to make a series of transverse saw cuts (indicated at 31, 32, 33, 34, 35, 36, 37, 38 and 39 in Figure 1) at 45° across the profile, so as to sever therefrom successively frame members A, E, B, F, C, G, D, H of appropriate lengths for assembly alternately into an outer, static, frame 42 and an inner, opening,

frame 40 for a window or the like. Thus, the frame members A, B, C, D indicated in Figure 1 may be assembled to provide the inner, opening frame 40 of a window frame as shown in Figure 2. The panel-retaining member 9 is then severed from the frame members E, F, G, H by a saw cut extending parallel and close to the adjacent surface of the cladding as indicated by the dotted line 41 in Figure 3 and these frame members are then assembled to form said outer, static, frame 42 as shown in Figure 2. Preferably the ribs 11 and 13 will have also been removed from those frame members by similar saw cuts to provide a reasonably smooth surface to the outside of the static frame 42 ready for insertion into an aperture in a wall of a building.

In Figure 3 a portion of a sealed double glazed panel is indicated in phantom by the reference numeral 43. It is supported between the retaining member 9, which has a sealing strip 45, conveniently of flexible PVC, attached to the depending rib 19 at the outside of the glass and, at the inside, a glazing strip 9' provided by material of the retaining member 9 which has been severed from the frame members for the outer frame 42 and cut to appropriate length. The glazing strip 9' is arranged to abut against the undercut face 23 of the rib 11 and is retained in position by being supported by supporting members mounted on the upper surface of the profile as seen in Figure 3. The supporting members comprise a series of glazing clips 47 placed at intervals along the intermediate rib 13. The glazing clips 47 are shaped as shown in Figure 3 and are conveniently made of nylon, the length perpendicular to the plane of the drawing of each clip being of the order of 20mm. As shown in Figure 3 each clip comprises a body portion having a pair of depending leg portions having inwardly directed toe

portions with inclined surfaces complementary to the surfaces of the intermediate rib 13 of the profile. The glazing clip also comprises a pair of arm portions extending upwardly from the body portion and provided with a semi-cylindrical recess commensurate with the diameter of the bead 21 of the depending rib 19 of the panel-retaining member 9 of the profile. The dimensions of the glazing clip are such that, by squeezing together the arm portions, the leg portions may be separated and clipped over the intermediate rib 13 of the profile, conveniently at about 200mm intervals therealong. Then, with the glass panel in place, the glazing strip (indicated by reference 9' in Figure 3) is inserted by tucking it under the face 23 of the inner rib 11 and pressing its upper portion downwardly so that the bead 21' of the depending rib 19' is forced into the recesses in the clips in which the bead is then firmly held. When the glazing strip 9' has been so inserted, it is preferable that an upper end portion of the adjacent arm portion of each glazing clip engages the inner side of the glazing strip to help hold the parts firmly in place. Beads of silicone 59 inserted between the glass panel and the retaining member 9 and glazing strip 9' seal the system against the ingress of dirt and moisture. The inclined surface 22 (Figure 3) reduces any risk of contaminating the main face of the portion 9 when trimming the silicone bead.

The window frame assembly adjacent portions of inner and outer frames of which are shown in cross section in Figure 4 is made from a cored extruded plastics profile which is generally similar to that hereinbefore described with reference to Figure 3 but is modified in that the retaining member 9 does not include a depending rib and bead such as the rib 19 and bead 21 of the profile shown in Figure 3.

Neither does the upper surface of the profile shown in Figure 4 include an intermediate rib such as the rib 13 of the profile shown in Figure 3. Furthermore the glazing strips 9' (severed from the outer frame members as hereinbefore described) having been assembled in abutting relationship with the undercut face of the rib 11 of the inner frame members, are supported by supporting members provided by glazing clips 100 of different construction from those hereinbefore described with reference to Figure 3.

Each glazing clip 100 is conveniently formed of extruded plastics material such as polythene or polyethylene or polypropylene or polycarbonate and comprises a base portion 101 of generally rectangular outline, when seen in plan. Upstanding from the base portion 101 is a first glass-abutting portion 103 which is conveniently formed perpendicularly (or substantially so) to the base portion 101 at a locality spaced inwardly from one end portion of the base portion so as to provide a tongue 105. The glazing clip comprises a second glass-abutting portion 107 which extends inwardly at an angle of 45° (or substantially so) from the other end of the base portion 101. An outer, inclined, face 109 of the portion 107 is provided with a layer of pressure-sensitive adhesive for a purpose hereinafter described. An upper end portion 111 (as seen in Figure 4) of the glass-abutting portion 107 is flexible and formed to provide a glass-engaging seal member. A mid portion of the base portion 101 may be provided with inclined, stepped, wedge faces (not shown) which, when the glazing clip is in use, lie adjacent to an edge face of the glass (or similar) panel to be supported by the glazing clip. Wedge members (not shown) having stepped wedge faces complementary to the wedge faces of the glazing clip

may be driven between the edge face of the glass (or other) panel and those faces to support the panel at the desired position with respect to the glazing clip and hence a frame member on which the clip is mounted, conveniently by a screw 5 121 extending through a lug formed on the base portion of the glazing clip.

The glazing clips are secured (at appropriate intervals) along the upper surface of the inner frame so that their tongues 105 extend under the glass retaining member 9, the 10 first glass-abutting portions 103 engage the outer face of the glass panel and the second glass-abutting portions 107 engage the inner face of the panel. The inclined faces 109 provide support for the glazing strip 9' the base portion of which is tucked under the inner rib 11 and the pressure- 15 sensitive adhesive on the faces 109 serves to secure the glazing strip in place. Beads of sealing material 59 serve to seal the joints between the glass panel and the glass-retaining member 9 and glazing strip 9'. Glazing clips of the kind just described are claimed in my copending UK Patent 20 Application No.8100396 (2067641A).

In assembling frame members into frames, joints between adjacent frame members are preferably formed by using plastics material injected into communicating cavities extending into abutting faces of the frame members with metal reinforcements 25 as disclosed in my co-pending International Patent Application No.PCT/GB81/00096; see UK Patent Application No.8202235, (2089459A).

It will be appreciated that when the static and opening frames are arranged with the flanges 15, 17 30 and 15', 17' positioned as indicated in Figures 3 and 4 the opening frame may be top hung or side hung. Alternatively side pivot stay hinges may be used in which case the opening frame is arranged to move bodily outwards as it swings about a virtual transverse pivot 35 so that the window moves towards a substantially horizontal position to facilitate cleaning. In this

case the special stay hinges are housed within the spaces provided between the flanges 15 and 15', the flanges 17 and 17' being slotted where necessary. The adjacent flanges 17 and 17' are provided with sealing strips 61 of flexible PVC which are compressed when the window is closed to provide draught proofing. These sealing strips may be formed and attached to the flange 17 during extrusion of the profile (as in the case of the sealing strip 45 above referred to).

10 If the window frame is to be of the simple transverse pivot hinged type the static frame members may be reversed with the flanges 15' and 17' positioned opposite the flanges 15 and 17 in which case the side frame members are separated to a greater extent to accomodate the pivot hinges and the flanges 17 are arranged to close against stop members formed in part on the static frame and in part on the moving frame in well known manner. The arrangement shown in Figure 4 shows a "side-opening" hinge 157. Also shown in 20 Figure 4 is a sill member 149 fixed to the static frame 42 by means of metal or other brackets 151, the joint between the sill member and the frame being sealed. The passage 155 is provided for drainage purposes.



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Claims :-

1. A method of manufacturing frames for windows or the like from a cored plastics profile comprising a core of shape-retaining material such as, for example, laminated plywood, cement-bonded fibrous material or cement-bonded glass fibres, and a cladding of plastics material, such as, for example, polyvinylchloride extruded therearound, the profile being of generally rectangular cross sectional shape and having a retaining member for a panel of glass or other suitable material extending along the profile at a locality adjacent one edge of one surface thereof, characterized in that said method comprises the steps of feeding an indefinite length of the profile past sawing means organised to make a series of transverse cuts (31, 32, 33, 34, 35, 36, 37, 38, 39) at 45° across the profile so as to sever therefrom successively frame frame members (A,E,B,F,C,G,D,H) of appropriate lengths for assembly alternately into an outer, static, frame (42) and an inner, opening, frame (40) for a window or the like, severing the glass or other panel-retaining members (9) from those frame members (E,F,G,H) which are to be assembled into the outer frame (42), assembling the alternate frame members (A,B,C,D and E,F,G,H) to form said inner frame (40) and said outer frame (42), and, after cutting the retaining members (9) severed from the frame members (E,F,G,H) for the outer frame to appropriate lengths, utilizing them as glazing strips (9') in assembling said inner frame (40) with a glass or other panel.

2. A method in accordance with claim 1 characterized in that the glazing strips (9')



are arranged to abut against an undercut face (23) of a rib (11) of the profile which extends along said surface thereof at a locality spaced from the retaining member, and to be supported by supporting members
5 provided by glazing clips secured to said profile, said glazing clips assisting in locating a panel in position in the frame.

3. A cored plastics profile suitable for use
10 in carrying out a method in accordance with claim 1 or claim 2 comprising a core of shape-retaining material and a cladding of plastics material extruded therearound, characterized in that the core (1) is of generally rectangular cross sectional shape and in
15 that the cladding (3) provides (a) along one surface of the profile at a locality adjacent one edge of that surface a retaining member (9) for a panel of glass or other suitable material, which retaining member (9) extends inwardly over said surface and is
20 inclined at an angle thereto and (b) along said surface of the profile, at a locality spaced from the retaining member, a rib (11) having an undercut face (23) inclined to said surface at an angle at least substantially corresponding to the angle of
25 inclination of the retaining member (9), whereby, in the manufacture of inner and outer frames (40,42) for windows or the like from said profile, the retaining member (9) may be cut from the frame members which are to form the outer frame (42)
30 and utilised as glazing strips (9') in the manufacture of the corresponding inner frame (40), the glazing strips (9') being arranged, after the insertion of a glass or other panel, to abut against the undercut face (23) of the rib (11) of the profile and to be
35 supported by supporting members (47) mounted on said surface of the profile.



4. A frame for a window or the like made
in accordance with a method in accordance with claim 1.

The text of the specification has been reproduced by photocopying the applicants original typescript. It may contain a few amendments which are difficult to read. The original typescript containing these amendments may be inspected on the premises of the Patent Office

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