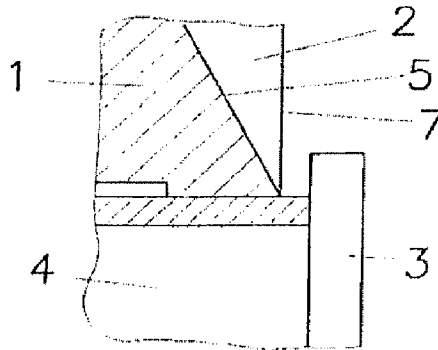




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(54) **Titre : METHODE ET DISPOSITIF DE SOUDAGE DE DEUX TIGES A PROFIL CREUX FAITES DE PLASTIQUE**
(54) **Title: METHOD AND DEVICE FOR WELDING TWO HOLLOW PROFILED RODS MADE OF PLASTIC**



(57) **Abrégé/Abstract:**

A method for welding two hollow profiled rods made of plastic to form a window frame and a device for carrying out said method, wherein the hollow profiled rods to be joined together are heated to a predetermined temperature by inserting a welding plate between connecting surfaces of said profiled rods and pressing said connecting surfaces against the welding plate, forming outer and inner weld beads, wherein the profiled rods are pressed together under pressure after removing the welding plate with a simultaneous increase in the size of the weld beads, wherein, after removing the welding plate, only the outer weld beads formed on a visible surface of a subsequent window frame in an area of the connecting surfaces are pressed slightly inward forming an oblique edge, and then are removed together with the inner weld beads, and then the connecting surfaces of the profiled rods are joined together.

Abstract

A method for welding two hollow profiled rods made of plastic to form a window frame and a device for carrying out said method, wherein the hollow profiled rods to be joined together are heated to a predetermined temperature by inserting a welding plate between connecting surfaces of said profiled rods and pressing said connecting surfaces against the welding plate, forming outer and inner weld beads, wherein the profiled rods are pressed together under pressure after removing the welding plate with a simultaneous increase in the size of the weld beads, wherein, after removing the welding plate, only the outer weld beads formed on a visible surface of a subsequent window frame in an area of the connecting surfaces are pressed slightly inward forming an oblique edge, and then are removed together with the inner weld beads, and then the connecting surfaces of the profiled rods are joined together.

METHOD AND DEVICE FOR WELDING TWO HOLLOW PROFILED RODS MADE OF PLASTIC

Description

[0001] The invention relates to a method for welding two hollow profiled rods made of plastic to form a window frame, in which the profiled rods to be joined together are heated to a predetermined temperature by inserting a welding plate between their connecting surfaces and pressing same against the welding plate, forming a partially exterior weld bead, and then after removing the welding plate, while at the same time increasing the size of the bead, the surfaces are joined together under pressure, as well as relating to a device for carrying out the method.

[0002] To manufacture window frames from profiled rods made of plastic having continuous chambers, welding devices with which one corner, two corners or all four corners of a window frame can be welded together, depending on the design of the manufacturing device. Each welding device here has one welding head for each corner with a heatable welding plate and a chucking unit for each profiled rod. Each chucking unit has an upper and a lower bordering ramp, between which a profiled rod is held.

[0003] For the actual welding and joining operation, the two profiled rods, which are approx. 3 mm longer at each end than the dimensions of the finished window frame, are first aligned with one another and secured in a position in which the two connecting surfaces are held far enough apart from one another that the welding plate heated to the predetermined temperature can be inserted between them. Then the connecting surfaces of the two profiled rods are pressed against the welding plate and melted to the extent that the length of the profiled rods is reduced by approx. 2 mm. In this pressing operation, a first portion of a so-called

weld bead is formed in all areas of the profiled rods. Next, the profiled rods are retracted briefly from the welding plate, so that the latter can return back to its starting position. Next, the heated connecting surfaces of the two profiled rods are again pressed against one another, whereupon the aforementioned weld bead is enlarged, while the length of the profiled rods is further shortened by approx. 1 mm at the same time, so that the profiled rods have already reached the predetermined final dimension for the window frame at the welded and/or joined ends.

[0004] The weld beads formed by the joining of the profiled rods in the area of the connecting surfaces are not only present on the outside peripherally but also on all webs in the interior of the profiled rods. These weld beads may be sharp-edged in some cases and do not create an attractive appearance on the visible surfaces of the subsequent window frame. These weld beads are therefore removed from the visible surfaces of the welded and/or joined window frame. This is accomplished by using special blades and/or milling devices on the top and/or front sides and on the bottom and/or rear sides of the welded window frame in at least one subsequent additional operation, which usually results in the formation of a so-called shadow groove. These additional operations not only necessarily increase the amount of time required to manufacture a window frame but also require an additional device. Furthermore, a shadow groove has a somewhat rougher surface in comparison with the remaining surface of the window frame, which thus facilitates the deposition of dirt particles.

[0005] To avoid at least some of the effort for eliminating the visible weld beads, which are therefore unwanted and therefore to reduce the time required for manufacture of a window frame, a method has become known from Unexamined German Patent Application 10 2015 013 439, wherein the outer portions of the weld beads formed in the area of the connecting sites of the two profiled rods on the visible surfaces of the subsequent window frame after removal of the welding

plate are pressed inward, and then the welding plate is again moved to a position between the connecting surfaces of the profiled rods, and the connecting surfaces are reheated with simultaneous deformation of the weld beads pressed inward, and finally, after removing the welding plate, the connecting surfaces of the two profiled rods are joined together.

[0006] However, this known method does not yield the desired success with all the cross sections of profiled rods that are used for manufacturing window frames and with the plastics that are used. Furthermore, it is considered to be a disadvantage that a surface, which is usually completely flat, is present in the area of the connecting sites of the finished window frame on its top side and/or front side and on its bottom side and/or rear side.

[0007] The present invention is based on the object of providing a method and a device that can be used for welding two profiled rods made of plastic, which are used to form a window frame and can be used with all the cross sections of profiled rods and the plastics that are used for manufacturing window frames, and a type of shadow groove is formed due to these profiled rods on its top side and/or front side and on its bottom side and/or rear side in the area of the connecting sites of the finished window frame.

[0008] To achieve this object, it is proposed according to the invention that, in a method of the generic type described above, after the welding plate has been removed, only the outer beads, which are formed on the visible surfaces of the subsequent window frame in the area of the connecting sites of the two profiled rods, are pressed slightly inward, forming an oblique edge, and then removed together with the inner beads, and next the connecting surfaces of the two profiled rods are joined together. Such slight pressing on the outer beads directed inward is understood to be pressing by approx. 0.5 to 1.5 mm,

depending on the thickness of the material of the profiled rods, which are usually formed as hollow profiles.

[0009] Such a method can be used with all of the cross sections of profiled rods on the plastics used for the manufacture of window frames, and a type of shadow groove is obtained, improving the visual appearance of the window frame. Likewise, there are no longer any beads present on the visible surfaces.

[0010] The invention will now be described in greater detail on the basis of an exemplary embodiment, which is shown in greatly simplified form in the drawing and is not drawn to scale.

[0011] Figures 1 through 5 show details of the main parts of a device for carrying out the invention in successive method steps.

[0012] In Figures 1 to 4 of the drawings, of the device according to the invention for welding profiled rods for forming an essentially known window frame, only one so-called bordering ramp 1, a slide 2 and a welding plate 3 can be seen, these being components of a welding head, which is essentially known and is therefore not shown here. The bordering ramp 1 shown here sits on the top side of a hollow profiled rod 4 made of plastic, only portions of which can be seen, its two end faces being cut to specification and its internal continuous chambers normally being of different sizes due to appropriately arranged webs. On the bottom side of the profiled rod 4, which cannot be seen in the figure, there is a second advantageously identical bordering ramp 1, which is arranged in mirror image to the first bordering ramp 1, such that the profiled rod 4 is clamped between the two bordering ramps 1 and protrudes above the end face 5 of the bordering ramp 1, which runs obliquely and protrudes there by a predetermined amount, usually approx. 3 mm. This end face 5 runs at an acute angle of approx. 45° to 70°, advantageously less than 60°. A slide 2 having a wedge-shaped cross

section and an end face 7 running at a right angle to the profiled rod 4 is guided displaceably on this end face 5, so that there is a right angle or approximately a right angle here between the end face 7 and the base surface of each bordering ramp 1.

[0013] As shown only in Figure 5, the aforementioned welding head has a second profiled rod 4, which is also clamped between two bordering ramps 1 in the manner described above, and with which a slide 2 is also assigned to the bordering ramp 1. This arrangement is known to be provided in mirror image on the other side of the welding plate. It may be assembled with two, four or six welding heads, depending on the design of the welding system.

[0014] To initiate the welding and/or joining operation now, the welding plate 3, which is normally outside of the area of the profiled rods 4 and is heated, is inserted between the end face and the connecting face of the two profiled rods 4, wherein each bordering ramp 1 is initially a distance of approx. 3 mm from the welding plate 3 (Figure 1). Now the profiled rods 4 are pressed against the welding plate 3 with a predetermined force. Therefore, the end face and/or the connecting face of the two profiled rods 4 is/are heated and partially melted. The size of the pressing force of the profiled rods 4 on the welding plate 3 is retained here, so the distance between each bordering ramp 1 and the welding plate 3 is reduced, and a bead 8a, 8b (Figure 2) is formed both outside and inside the wall of each profiled rods as well as on all webs situated in the interior of the profiled rods 4, its shape possibly being different and differing from the shape shown in simplified form here. As soon as the distance between the bordering ramp 1 and the welding plate 3 has been reduced by approx. $\frac{2}{3}$, which is approx. 2 mm, the pressing force is reduced, and the profiled rods 4 are retracted from the welding plate 3. Next the welding plate 3 is removed from the area of the profiled rods 4.

[0015] The slide 2 is operative next. By means of a drive (not shown) of a known design, the slide is moved out of its position according to Figures 1 and 2 and into the position in Figure 3 by moving along the end face 6 of the bordering ramp 1. In this position, the tip of the slide 2, which is advantageously slightly rounded, is approximately at the center of the thickness of the outside wall of the profiled rod 4. With this movement of the slide 2, the resulting outer bead 8a, which is still in a plastic condition due to the heating that has preferably occurred, is necessarily pressed inward and/or downward, e.g., by approx. 1.1 mm, whereupon the two weld beads 8a and 8b are combined to form one larger bead 8c, the shape of which also does not correspond exactly to the shape drawn in the figure (Figure 3).

[0016] In a subsequent step, a blade 9 mounted on a carriage (not shown), for example, is used as the separating device, which is moved at a right angle to the plane of the drawing along the end face 7 of the slide 2, wherein at least most of the bead 8c of the profiled rod 4 is separated (Figure 4). It is advantageous if the carriage (not shown) holds another blade 9, so that most of the bead 8c is separated at the same time on both end faces of the profiled rods 4 being connected to one another. Thus, the two separating devices of a window corner are guided on a shared carriage, and the two separating devices can be held on the carriage in such a way (not shown here) that they are adjustable in height. The separated parts of the beads 8c can then be removed by means of a stream of air, for example, out of the area of the profiled rods 4 being connected to one another. Following that, the two slides 2 are first moved back so far away from the profiled rods that they are outside of the wall, as can be seen clearly in Figure 5. Next, the end faces of the two profiled rods 4, which have been mitered and are still in the heated and therefore plastic state, are pressed against one another and welded (Figure 5). This figure also shows that a small groove 10 having a V-shaped cross section remains at the surface between the two profiled rods 4 in

the area of the connecting site. This groove 10 may also have a slightly different shape, depending on the design of the tip of the slide 2.

[0017] It is possible to move the welding plate 3 again into the area of the two profiled rods 4 after removing the separated beads 8c and to again press the profiled rods 4 against the welding plate 3. However, this pressing operation is carried out only briefly and with an extremely low pressing force, so that the length of the profiled rods 4 is shortened only insignificantly as a result, but the end faces of the profiled rods 4 are heated again. Such a brief pressing operation is understood to be a period of approx. 2 sec. to 15 sec., depending on the type and thickness of the material of the profiled rods 4.

[0018] It is known that the profiled rods 4 may be made of plastic to form a window frame, the upper and/or front surface of which is rarely completely planar. In most cases, an inclination or a rounded surface is provided on the inner and/or outer edge. To also ensure that an outer bead is no longer being formed even in these areas, for example, the slide 2 may be designed to be profiled. It is possible for at least two separate slides 2 to be provided, of which the second slide 2 runs at an angle to the first slide 2.

Patent Claims

1. A method for welding two hollow profiled rods made of plastic to form a window frame, wherein the hollow profiled rods to be joined together are heated to a predetermined temperature by inserting a welding plate between connecting surfaces of the hollow profiled rods and pressing said connecting surfaces against the welding plate, forming outer and inner weld beads, and wherein the hollow profiled rods are pressed together under pressure after removing the welding plate with a simultaneous increase in the size of the weld beads, wherein, after removing the welding plate, only the outer weld beads formed on a visible surface of a subsequent window frame in an area of the connecting surfaces of the hollow profiled rods are pressed slightly inward forming an oblique edge, and then are removed together with the inner weld beads, and then the connecting surfaces of the hollow profiled rods are joined together.
2. The method according to claim 1, wherein after removing the inner and outer weld beads, the welding plate is again moved briefly between the connecting surfaces of the hollow profiled rods, and said connecting surfaces of the hollow profiled rods are reheated.
3. The device for carrying out the method according to claim 1 or 2, consisting of a welding head and the welding plate and two tension units, each of which has an upper and a lower bordering ramp configured to receive the hollow profiled rods and press the connecting surfaces of said hollow profiled rods against the welding plate, wherein at least one slide that is movable at a right angle to the visible surface of the subsequent window frame is arranged in an area of mutually facing end faces of each bordering ramp for shaping the weld beads.

4. The device according to claim 3, wherein an effective end face of each bordering ramp runs at an angle of approx. 45 to 70° to a base surface of said bordering ramp.
5. The device according to claim 4, wherein the slide has a wedge-shaped cross section, a free end face of the slide together with the base surface of each bordering ramp forming a right angle or approximately a right angle.
6. The device according to any one of claims 3 to 5, wherein a separating device is provided for each bordering ramp.
7. The device according to claim 6, wherein the separating device is designed as a blade and is movable parallel to the visible surface of the subsequent window frame.
8. The device according to claim 6 or 7, wherein two separating devices of a window corner are both guided on a common carriage.
9. The device according to claim 8, wherein the two separating devices are held on the carriage and configured to be adjustable in height.

Fig.1

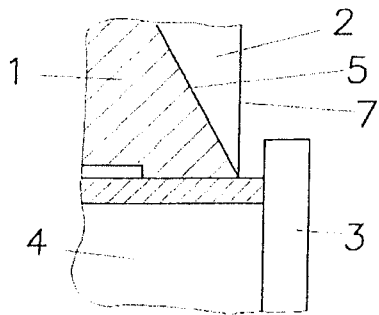


Fig.2

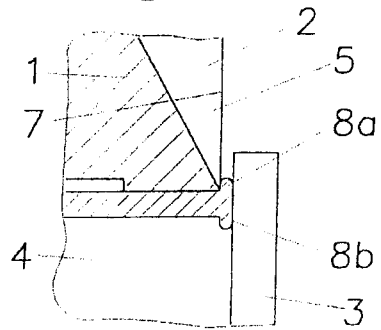


Fig.3

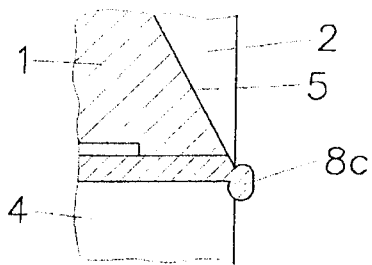


Fig.4

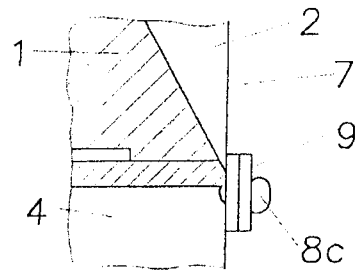


Fig.5

