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Frame Structure for a Switch Gear Cabinet

The invention relates to a frame structure comprising frame limbs for a switch gear cabinet, in which the frame limbs are preferably designed in mirror-image like manner in relation to their cross-sectional diagonals and which comprise at right angles to the exterior sides of the frame structure profile sides provided with fixation rebates, which profile sides in the interior region merge into sections which form a receiving cavity for the fixation of mounting rails.

A frame structure of this type is known from DE 43 36 204 A1, wherein the receiving cavity is outlined by sections of the frame limb which are at right angles to the profile sides of the frame limb and form a receiving cavity for mounting rails which are of essentially

square cross-section.

Frame limbs for frame structures of a switch gear cabinet are known in a variety of cross-sectional configurations as shown inter alia by DE 40 36 664 A1, DE 41 32 803 A1, DE 81 07 658 U1 and DE 87 03 695 U1.

The frame limbs according to DE 40 36 664 A1 and of DE 81 07 658 U1 comprise in the regions forming outwardly directed sides of the frame structure, receiving grooves for accommodating sealing elements.

It is known from DE 41 32 803 A1 and from DE 87 03 695 U1 to connect to the regions forming the exterior sides of the frame structure at an angle of 135° thereto connecting sections, which are connected to the profile sides by way of profile regions at right angles to the profile sides.

In each of DE 81 07 658 U1 and DE 87 03 695 U1 different profile regions are disclosed, positioned parallel and at right angles to the profile sides forming the outsides and which are inwardly directed in respect of the frame structure and are provided with fixation rebates.

All these frame structures assembled from frame limbs to a greater or lesser extent comply with the requirements of a switch gear cabinet. Thus in the one case, the sealed application of the cladding elements to the frame structure is improved, whereas in the other case the fixation facilities on the inside of the frame structure are utilized and facilitated. The chamfering of the external corners provides a rebate for the bent over edges of the cladding elements and space for accommodating the hinge and closure elements.

It is an object of the invention to provide a frame structure of the aforementioned type, which comprises in an optimal manner by means of easily manufactured frame limbs, with the requirements of a switch gear cabinet, in respect of the fitting in sealing relationship of the edged ends of cladding elements, the provision of an adequately large rebate for accommodating the outer edges for the edge bent cladding elements and for the

accommodation of hinge and closure elements and of universal fixation facilities in the interior region of the frame structure.

According to the invention, this object is attained by the combination of the following integers:

- a) the profile sides of the frame limbs are interconnected by way of a connecting section which forms a chamfered outer edge of the frame structure,
- b) the transitions between the connecting section and the profile sides of the frame limbs are formed as double-layered sealing webs orientated at right angles to the exterior sides of the frame structure or as U-shaped contact webs having a contact section extending parallel to the associated exterior side, the sealing webs and contact webs optionally having zero length,
- c) the profile sides at their edges facing away from the connecting section, merge into receiving sections having fixation rebates, which are at right angles to the associated profile side and are bent around towards the connecting section, and
- d) the receiving sections, remote from the profile sides merge into terminal sections, forming an open or closed dovetail groove, which is preferably symmetrical about the cross-sectional diagonal.

The so designed and orientated frame limbs of the frame structure, can nevertheless be manufactured easily, with adequate strength and in particular torsional rigidity, for example if manufactured as an edge pressed component or as an extrusion profile section.

The sealing webs may so coact with sealing elements forming part of the cladding elements, that a tight seal of the open sides of the frame structure is attained. If contact webs are provided, these may likewise be fitted with the sealing elements. The connecting section gives rise to the formation on the frame structure of a rebate for accommodating the outer edges and which is preferably symmetrical about the cross-sectional diagonal of the

frame limb cross-section and provides adequate room for the edge-bent regions of the abutting cladding elements with adequate space also for the accommodation of the hinge and closure elements of a cabinet door. The rebate on the inside of the frame limb which ends with a dovetail groove configuration, provides excellent fixation facilities for mounting rails and the like, for which purpose in the simplest case, a kind of snap-on connection may be selected. Besides the receiving sections, the profile sides of the frame limbs may likewise be utilized as fastening surfaces to provide fastening facilities in several directions.

For sealing purposes it is provided in one embodiment that the double-layered sealing webs are formed by a web section orientated at an angle of 135° to the connecting section and by part of the profile sides, which are interconnected by way of a rounded-off transitional region or that the contact webs are formed by a web section at an angle of 135° to the connecting section and a portion of the profile sides, which are interconnected by the contact section extending parallel to the exterior sides of the frame structure.

The rebate for the mounting rails of the frame limbs is supplemented by the provision of the dovetail groove in that the open dovetail groove is formed by simple terminal sections, which are connected at an obtuse angle to the receiving sections and which in the direction of the associated profile side, are bent over or that the closed dovetail groove is formed by twice bent over terminal sections where the first partial sections follow at an obtuse angle onto the receiving sections and are bent over in the direction towards the associated profile side, whereas the second partial sections are orientated in opposite directions and parallel to the connecting section.

In this context, in the embodiments where the dovetail groove is closed, provision may be made that the second partial sections of the twice bent over terminal sections are in contact with the inside of the connecting section and preferably are bonded thereto, e.g. adhesively, by welding or spot-welding, in order to increase the torsional rigidity of the frame limb and thereby of the frame structure.

The stability of the frame limbs, in particular their torsional rigidity, may according to a

further modification be further improved in that the connecting section is stiffened by two outwardly bent stiffening beads, preferably provided symmetrically to the cross-sectional diagonal and each providing a first section, which is preferably parallel to the outside of the frame structure facing it and a second section, which is preferably parallel to the profile side facing it.

The universal fixation facilities in the region of the inside of the frame structure, may be attained in that the profile sides and/or the receiving sections are provided with rows of fixation rebates, optionally in accordance with a modular system.

The invention will now be further explained with reference to frame limbs for a frame structure of a switch gear cabinet illustrated in the drawings in cross-section. There is shown in:

Fig. 1 a frame limb having two sealing webs and a rebate with an open dovetail groove,

Fig. 2 a frame limb having two contact webs and a rebate with an open dovetail groove,

Fig. 3 a frame limb having two sealing webs and a rebate with a closed dovetail groove,

Fig. 4 a frame limb having two contact webs and a rebate with a closed dovetail groove,

Fig. 5 a frame limb according to Fig. 3 having additionally a rigidized connecting section
and

Fig. 6 a frame limb according to Fig. 4 having an additionally rigidized connection
section.

It is common to all embodiments that the frame limbs 10 have a configuration which is preferably mirror-symmetrical about the cross-sectional diagonal 11, such that it can be used for any frame limb of the frame structure. The orientation in the frame structure is always such that the frame limbs 10 do not form an outer edge but by way of a connecting

section 12 directed towards the former, form an outer edge rebate into which the press-bent edges of the cladding elements and cabinet doors project. In addition hinge and closure elements may be fitted to the connecting section 12.

In the embodiment according to Fig. 1, the connecting section 12 merges into sealing edges 13 and 16 in the profile sides 15 and 17, which may be provided with connection rebates 19 and 20. The profile sides 15 and 17 are orientated at right angles to the exterior sides of the frame structure facing them. The sealing webs 13 and 16 are formed by a web section 14 and 18 which may also have zero length as well as by part of the profile sides 15 and 17 of double-layer construction, in which context the web sections 14 and 18 are also at right angles to the outsides of the frame structure facing them. The web sections 14 and 18 merge into the profile sides 15 and 17 by rounded transitional regions. In the event that the cladding elements are fitted with sealing elements, a definite sealing relationship between the frame limb 10 and the cladding elements is brought about by these sealing elements along the sealing webs 13 and 16 projecting from the frame limb 10.

The profile sides 15 and 17 provide mounting surfaces in two directions. The edges of the profile sides 15 and 17 facing away from the sealing webs 13 and 16, merge into receiving sections 21 and 22, which likewise are provided with fixing rebates and which form the outlines of a rebate in which mounting rails can be fitted. These receiving sections 21 and 22 are at right angles to the profile sides 15 and 17 and are bent over in the direction towards the connecting section 12. Singly edge-pressed terminal sections 25 and 26 follow onto the receiving sections 21 and 22 and are at an obtuse angle to the receiving sections 21 and 22, outlining an open dovetail groove 27, in which the mounting rails as well may be fixed in a simple manner.

As shown in the embodiment according to Fig. 2, it is also possible for contact webs 13' and 16' to be press-formed in the transitional regions leading from the connecting section 12 to the profile sides 15 and 17, formed by the web sections 14 and 18, which may likewise have zero length, the contact sections 28 and 29 as well as parts of the profile sides 15 and 17. The contact sections 28 and 29 extend parallel to the exterior sides of the frame structure facing them and may be provided with sealing elements. The remaining

construction of the frame limbs 10 is identical to that of the frame limb 10 according to Fig. 1.

As shown by the embodiments according to Figs. 3 and 4, it is also possible for doubly edge-pressed terminal sections 25, 30 and 26, 31 to follow onto the receiving sections 21 and 22, to outline a closed dovetail groove 27'. Once again, the first partial sections are at an obtuse angle to the receiving sections 21 and 22, whereas the second partial sections are parallel to the connecting section 12 and preferably bear in contact against the inside thereof and are bonded thereto, e.g. adhesively, by welding or by spot-welding.

As shown by the embodiments according to Figs. 5 and 6, the torsional rigidity of the frame limb 10 may be increased by additional rigidizing of the connecting section 12. Preferably symmetrically to the cross-sectional diagonal 11, the connecting section 12 is rigidized by two outwardly deformed rigidizing beads 32 and 33. These rigidizing beads 32 and 33 each define a section 34 and 36, preferably extending parallel to the outside of the frame structure facing it and a section 35 and 37 which preferably is orientated parallel to the profile side 15 and 17 facing it. In this context the depth of corrugation is such that the function of the sealing webs 13 and 16 or of the contact webs 13' and 16' is not impaired.

Claims

1. Frame structure comprising frame limbs for a switch gear cabinet, in which the frame limbs are preferably designed in mirror-image like manner in relation to their cross-sectional diagonals and which comprise at right angles to the exterior sides of the frame structure profile sides provided with fixation rebates, which profile sides in the interior region merge into sections which form a receiving cavity for the fixation of mounting rails,
characterized by
the combination of the following integers:
 - a) the profile sides (15, 17) of the frame limbs (10) are interconnected by way of a connecting section (12) which forms a chamfered outer edge of the frame structure,
 - b) the transitions between the connecting section (12) and the profile sides (15, 17) of the frame limbs (10) are formed as double-layered sealing webs (13, 16) orientated at right angles to the exterior sides of the frame structure or as U-shaped contact webs (13', 16') having a contact section (28, 29) extending parallel to the associated exterior side, the sealing webs (13, 16) and contact webs (13', 16') optionally having zero length,
 - c) the profile sides (15, 17) at their edges facing away from the connecting section (12), merge into receiving sections (21, 22) having fixation rebates (23, 24), which are at right angles to the associated profile side (15, 17) and are bent around towards the connecting section (12), and
 - d) the receiving sections (21, 22), remote from the profile sides (15, 17) merge into terminal sections (25, 26 or 25, 30; 26, 31), forming an open or closed



dovetail groove (27, 27'), which is preferably symmetrical about the cross-sectional diagonal (11).

2. Frame structure according to claim 1, characterized in that the double-layered sealing webs (13, 16) are formed by a web section (14, 18), which optionally may have zero length, at an angle of 135° to the connecting section (12) and by part of the profile sides (15, 17) which are interconnected by way of a rounded-off transitional region.
3. Frame structure according to claim 1, characterized in that the contact webs (13', 16') are formed by a web section (14, 18) at an angle of 135° to the connecting section (12), which optionally has zero length and by part of the profile sides (15, 17), which are interconnected by the contact section (28, 25) extending parallel to the exterior sides of the frame structure.
4. Frame structure according to any one of claims 1 to 3, characterized in that the open dovetail groove (27) is formed by simple terminal sections (25, 26), which are connected at an obtuse angle to the receiving sections (21, 22) and which in the direction of the associated profile side (15, 17), are bent around.
5. Frame structure according to any one of claims 1 to 3, characterized in that the closed dovetail groove (27) is formed by twice bent over terminal sections (25, 30; 26, 31), where the first partial sections follow at an obtuse angle onto the receiving sections (21, 22) and are bent over in the direction towards the associated profile side (15, 17), whereas the second partial sections are orientated in opposite directions and parallel to the connecting section (12).



6. Frame structure according to claim 5,
characterized in
that the second partial sections of the twice bent over terminal sections 25, 30; 26, 31) are in contact with the inside of the connecting section (17) and preferably are bonded thereto, e.g. adhesively, by welding or spot-welding.
7. Frame limb (note: this should undoubtedly be frame structure) according to any one of claims 1 to 6,
characterized in
that the connecting section (12) is stiffened by two outwardly bent stiffening beads (32, 33), preferably provided symmetrically to the cross-sectional diagonal (11) and each providing a first section (34, 36), which is preferably parallel to the outside of the frame structure facing it and a second section (36, 37), which is preferably parallel to the profile side (15, 17) facing it.
8. Frame limb (note: this should undoubtedly be frame structure) according to any one of claims 1 to 7,
characterized in
that the profile sides (15, 17) and/or the receiving sections (21, 22) are provided with rows of fixation rebates (19, 20, 23, 24) in accordance with a modular system.

