

PATENT SPECIFICATION 1,018,980

DRAWINGS ATTACHED.

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COMPLETE SPECIFICATION.

Improvements in and relating to Interlocking Sheet Panels.

We, HANDFORD INDUSTRIES PTY. LTD., a Company incorporated under the Laws of the State of Queensland, Commonwealth of Australia, and carrying on business at Pritchard Road, Virginia, Brisbane, Queensland, Australia, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to improvements in and relating to interlocking sheet panels; and it has more particular reference to panels of sheet metal or other sheet materials for use as roofing or siding sheets.

It is well-known to provide panels of sheet metal or other sheet materials, each having a panel body of elongated, rectangular form provided with an integral female rib along one longitudinal edge and an integral male rib along the other longitudinal edge, both ribs being in the form of inverted channels and protruding from the same side of the panel body, adjacent panels being joined by engagement of the male rib of one panel in the female rib of the other panel. It will be apparent that each channel-type rib comprises a base web having two integral flanges, one flange being a first flange connecting directly with the panel body while the other flange is a second or free flange. Interlocking sheet panels of this general type will be referred to hereinafter as "panels of the type described".

In order to prevent relative lateral movement of the male rib in the female rib at the joint between two panels of the type described, various types of rib-locking arrangements have been proposed in the past, these depending upon snap-action engagement of the male rib in the female rib, using the resilience of

the sheet material. However, we have found that this type of connection panels has certain disadvantages, such as the obvious difficulty in effecting engagement over a long joint when resilient engagement is to be made. Also, in order to obtain a strong grip between male and female ribs at a joint, a high degree of resilience has hitherto been required, and this may lead in many cases to the material developing a permanent set. Then again, many of the previous constructions have not been sufficiently weather-proof, leakage occurring at some of the joints between the panels.

Our present invention aims principally to provide rib-locking arrangements in panels of the type described whereby a firm grip may be obtained between the male and female ribs at each joint without any likelihood of the material being strained in the engagement action, thus leading to greater ease of assembly and also of dis-assembly without damage when so required. Other objects and advantages of the invention will be hereinafter apparent.

With the foregoing and other objects in view, our invention resides broadly in a panel of sheet material of the type described; characterized in that the second or free flange of the inverted-channel female rib has at its free edge a longitudinal return bead extending back towards the first flange of the female rib and adapted to engage and hinge in a locking groove on the first flange of the inverted-channel male rib of an adjacent similar sheet panel, the arrangement being such that the female rib may be engaged hingedly over the male rib of the said adjacent panel to a locked position in which the two panel bodies are substantially coplanar and the male rib at the joint is opera-

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tively engaged between both flanges of the female rib. Other features of the invention will become apparent from the following description.

5 In order that the invention may be more readily understood and put into practical effect, reference will now be made to the accompanying drawings, wherein:—

10 Fig. 1 is a perspective view of the ends of two adjacent joined identical panels in accordance with one embodiment of the invention;

Fig. 2 is a sectional end view of one of the two panels illustrated in Fig. 1;

15 Fig. 3 is a sectional end view of a joint between two panels of the types shown in Figs. 1 and 2;

20 Fig. 4 is a similar view to Fig. 3, but illustrating the hinging action by which the joint may be made or broken;

Fig. 5 is a view, similar to Fig. 3, showing a joint between the panels according to a modification of the invention, and

25 Fig. 6 is a perspective view of an attachment strap usable for panels of the types shown in Figs. 1 to 4.

Referring initially to Figs. 1 to 4 of the drawings, we provide a number of identical sheet metal panels 10, each having a male rib 11 and female rib 12, both of inverted channel form and disposed on the same side of the plane of the elongated rectangular body portion 13 of the panel 10. In this instance, the female channel rib 12 has a first or integral flange 14 extending at right angles to the body portion 13 for say one and one-half inches, and it is then turned through a right angle to form a web 15 which extends for five-eighths of an inch parallel to the body portion 13 before being returned through a right angle towards the body portion 13 at right angles thereto to constitute the second or free flange 16.

30 The second or free flange 16 extends for about one-half inch and is rolled at its extremity into a bead 17 of about one-quarter inch diameter extending towards the first flange 14 to restrict the mouth 18 of the female channel 12 to that extent. It will be apparent that this bead 17, which constitutes a return bead of the free flange 16 is disposed at about one inch from the plane of the body portion 13 of the panel 10, thus being closer to the web 15 than to the body portion 13, and it is adapted to act as a hinge and retaining bead for the male rib 11.

35 The male rib 11 in this instance also has a first or integral flange 19 at right angles to the body portion 13 and extending firstly for a distance slightly less than one inch, whereafter it is bent at right angles so that it has a portion 20 parallel to and in the same direction as the main body portion 13 of the panel 10. It is then bent at right angles away from the body portion 13 so that it has a portion 21 a little

over one-quarter inch long before being turned again at right angles over a portion 22 which returns to just short of the plane of the lower part of the flange 19. The portions 20, 21 and 22 define a longitudinal groove or channel 23 in the first or integral flange 19 of the male rib 11. The portion 22 is then extended up to a height corresponding closely to the inner face of the web 15 of the female channel-type rib 12, whereafter it is turned through a right angle in the form of a male rib channel web 24 adapted to extend across the interior of the female channel rib 12 and then back at right angles to form a male rib second or free flange 25 adapted to lie against and along the first or integral flange 14 of the female rib 12. In this way, the male rib 11 has its two flanges 19 and 25 spaced by a little over one-half inch so that its two flanges 19 and 25 will be adjacent the corresponding flanges 16 and 14 of the female channel rib 12, the male rib 11 fitting fairly closely in the female rib 12.

The male rib 11 of the panel 10 may be secured in place on a beam along with the remainder of the panel 10, using attachment nails 26 as illustrated in Fig. 2 or attachment straps 27 as shown in Fig. 6, the nails 26 or straps 27 being secured to beams (indicated in dotted outline in the drawings) in known manner. In the case of an attachment strap 27, this has an upper hooked portion 28 to engage over the upper end of the male rib 11, keeping above the groove 23 defined by the portions 20, 21 and 22 of the male rib first flange 19. The attaching of a panel by the male rib in these ways is quite well-known, and we prefer that this be done by using the attachment straps 27 since they allow for the small sliding movement of the panels which results from expansion and contraction under different weather conditions.

When the male rib 11 has been secured in place as illustrated in Fig. 2, or by using a strap 27, it will be seen that the second or free flange 25 extends back to the plane of the body portion 13 of the panel 10 for the sake of stability, but it is obvious that this flange 25 could be foreshortened to save material, if so desired. A female rib 12 of another panel 10 may then be engaged over the male rib 11 of the secured panel, as illustrated in Fig. 4, the return bead 17 of the second or free flange 16 of the female rib 12 being located in the groove 23 of the male rib first flange 19. For this purpose, the panel 10 which is to be engaged on the secured panel will first be inclined upwards to permit initial engagement to be made, and then the panel will be hinged downwards to bring its body into the same plane as that of the body of the first or secured panel, the female rib 12 hinging over the male rib 11, with the bead 17 hinging in the groove 23 of the first flange 19 of the secured male rib 11.

It will be apparent that, provided the distance between the hinge line of the groove 23 and the junction of the web 24 and free flange 25 of the male rib 11 is not more than the distance across the restricted mouth 18 of the female channel rib 12, a suitable hinging action may be obtained, without resilient movement of the various channel flanges being required. The final position, as shown in Fig. 3, is one in which the bead 17 is engaged firmly in the groove 23 of the male rib first flange 19, this latter flange being substantially coplanar with the second or free flange 16 of the female rib 12, and the second or free flange 25 of the male rib 11 will be bearing firmly against the inner face of the first flange 14 of the female rib 12.

Thus, the joints may be made very easily, while the panels 10 may, if required, be pulled apart without causing damage by the reverse procedure of that described earlier. To ensure that a strong locking action is obtained the bead 17 of the female rib 12 may be of relatively large diameter and engaging in a relatively deep groove of the male rib, and at the same time, the position of engagement may be well spaced from the plane of the panels since no springing of flanges is involved and hence there is no likelihood of exceeding the elastic limit of the panel material. Various other advantages arise from the aforementioned construction. For example, the bead 17 of the female rib second or free end of the female rib 12, is sufficiently spaced from the panel bodies 13 to ensure that there will be no residual moisture at the bead 17. It will be apparent that any sheet materials may be used for the panels, such as sheet plastics instead of metal, and the sheets do not require to be of resilient or elastic nature since the engagement is primarily a hinged one instead of a springy one. Then again, the sheet material may be of any desired gauge for the same reasons, this being particularly advantageous since with previous joints, an increase in gauge necessitated a larger joint to permit the required resilience of the thicker components.

It will be apparent that many modified forms of joints and panels involving the same principles may be used. For example, Fig. 5 shows a joint in which a return bead 17a of the free flange 16a of the female rib 12a is engaged in a groove 23a of the first flange 19a of a male flange 11a. However, it will be noted that the remainder of the male flange 11a beyond the groove 23a is shaped so that the distance between the groove 23a (at the hinging position) and any outer portion of the male rib 11a is less than the width of the mouth of the female rib 12a.

Naturally, a small amount of springing could be permitted during the hinging engagement in many cases without departing

from the invention or affecting the final result and efficiency. It will also be understood that the invention embraces all variations and alterations which lie within its scope and ambit, as defined by the appended claims.

WHAT WE CLAIM IS:—

1. A panel of sheet material of the type described; characterized in that the second or free flange of the inverted-channel female rib has at its free edge a longitudinal return bead extending back towards the first flange of the female rib and adapted to engage and hinge in a locking groove on the first flange of the inverted-channel male rib of an adjacent similar sheet panel, the arrangement being such that the female rib may be engaged hingedly over the male rib of the said adjacent panel to a locked position in which the two panel bodies are substantially coplanar and the male rib at the joint is operatively engaged between both flanges of the female rib.
2. A panel according to Claim 1, wherein the return bead of the second flange of the female rib and the locking groove of the first flange of the male rib are spaced from the plane of the panel body at corresponding distances therefrom greater than the distance between the return bead and the web of the female rib.
3. A panel according to any one of the preceding claims, wherein the first and second flanges of the inverted-channel female rib are at right angles to the panel body, and the web of the inverted-channel female rib is at right angles to the first and second flanges thereof.
4. A panel according to any one of the preceding claims, wherein the first and second flanges of the inverted-channel male rib are at right angles to the panel body, and the web of the inverted-channel male rib is at right angles to the first and second flanges thereof.
5. A panel according to Claim 4 when appended to Claim 3, wherein the second flange of the male rib is arranged to bear against the first flange of the female rib of an adjacent panel when the two panels are operatively engaged and the panel bodies are substantially coplanar.
6. A panel of sheet material of the type described, substantially as hereinbefore described with reference to Figs. 1 to 4 of the accompanying drawings.
7. A panel of sheet material of the type described, substantially as hereinbefore described with reference to Fig. 5 of the accompanying drawings.

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2. A panel according to Claim 1, wherein the return bead of the second flange of the female rib and the locking groove of the first flange of the male rib are spaced from the plane of the panel body at corresponding distances therefrom greater than the distance between the return bead and the web of the female rib.
3. A panel according to any one of the preceding claims, wherein the first and second flanges of the inverted-channel female rib are at right angles to the panel body, and the web of the inverted-channel female rib is at right angles to the first and second flanges thereof.
4. A panel according to any one of the preceding claims, wherein the first and second flanges of the inverted-channel male rib are at right angles to the panel body, and the web of the inverted-channel male rib is at right angles to the first and second flanges thereof.
5. A panel according to Claim 4 when appended to Claim 3, wherein the second flange of the male rib is arranged to bear against the first flange of the female rib of an adjacent panel when the two panels are operatively engaged and the panel bodies are substantially coplanar.
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