United States Patent

Cookson

[15] 3,699,737

[45] Oct. 24, 1972

[54] **ROOFING AND SIDING SHEETS AND FASTENING MEANS THEREFOR**

[72] Inventor: **William Cookson,** Fareham, England

[73] Assignee: **Cookson Sheet Metal Developments Limited,** Southampton, England

[22] Filed: **Nov. 13, 1970**

[21] Appl. No.: **89,164**

Related U.S. Application Data

[62] Division of Ser. No. 800,835, Feb. 17, 1969, Pat. No. 3,606,720.

[52] **U.S. Cl.**.....**52/489,** 52/478

[51] **Int. Cl.**.....**E04d 3/30**

[58] **Field of Search**.....52/519, 520, 521, 529–531, 52/536–538, 545, 543, 478, 712, 714, 715, 489

[56] **References Cited**

FOREIGN PATENTS OR APPLICATIONS

819,668	1959	Great Britain	52/545
848,358	1960	Great Britain	52/520
910,110	1962	Great Britain	52/520
984,136	1965	Great Britain	52/520

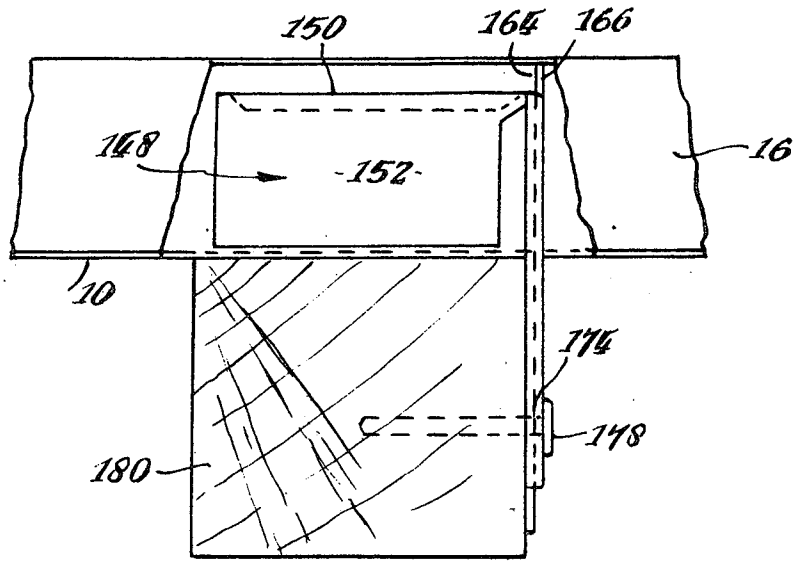
Primary Examiner—John E. Murtagh

Attorney—Abraham Engel and Howard J. Churchill

[57] **ABSTRACT**

An assembly of a fastening clip and a roofing or siding sheet having wide-based ribs especially wherein a lateral male rib has means for interlocking with an overlying lateral female rib of a neighboring sheet, the male rib having a fixing channel for securing the rib to a structural member. The clip acts as a concealed fixing for the intermediate wide-based rib of the sheet, the clip having free arms to engage internal pockets in the rib and camming means secured to its base wall and rotatable relative to the base wall so that a free end of the camming means bears against the base wall of the rib, thereby urging the free arms of the clip into the internal pockets of the rib.

14 Claims, 7 Drawing Figures



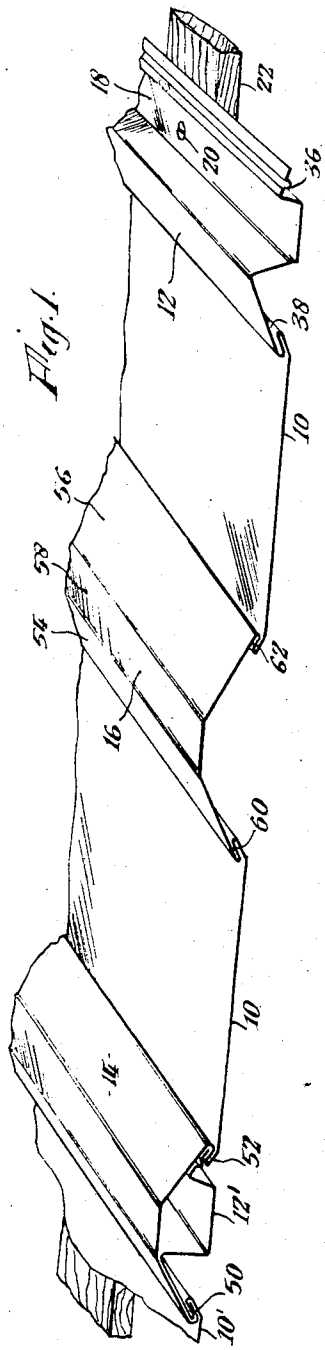


Fig. 1.

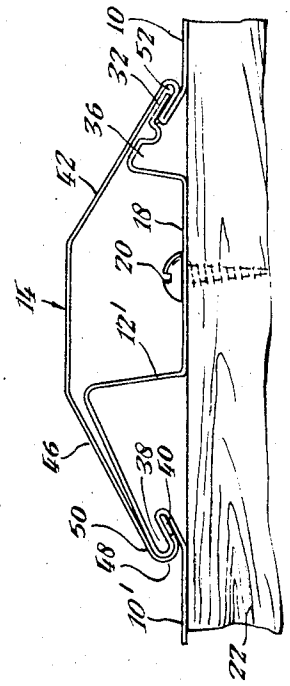


Fig. 3.

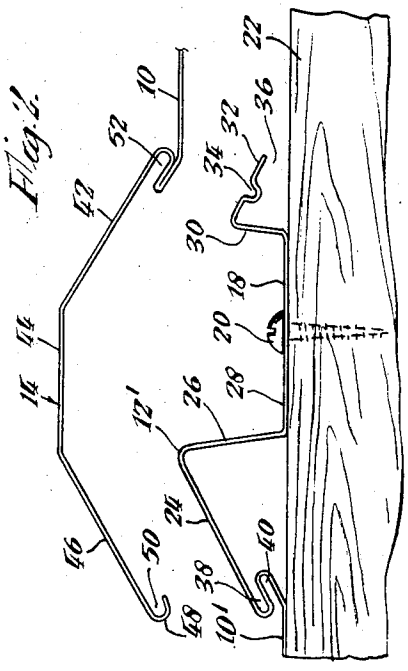


Fig. 2.

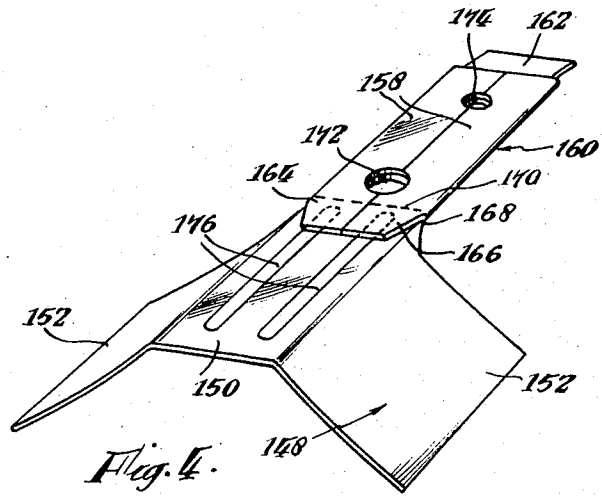

174
162
158
172
160
164
170
168
176
166
152
150
152
148

Fig. 4.

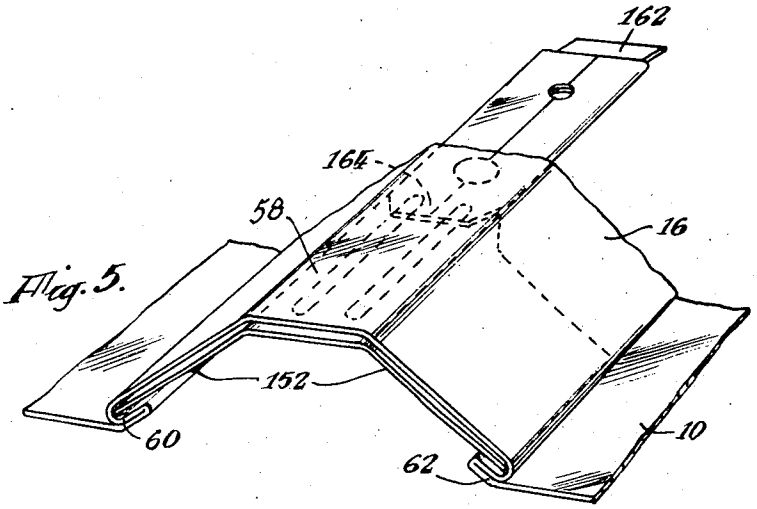

162
164
58
16
152
60
62
10

Fig. 5.

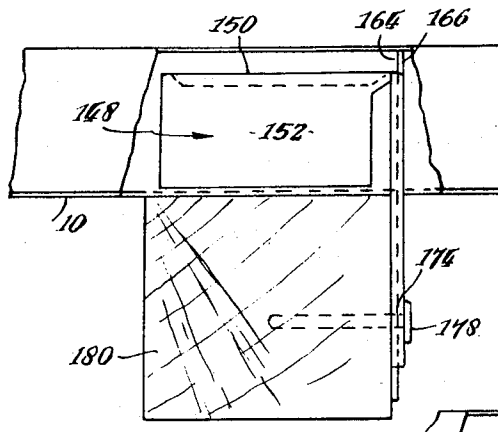

150
164
166
168
152
16
10
174
178
180

Fig. 6.

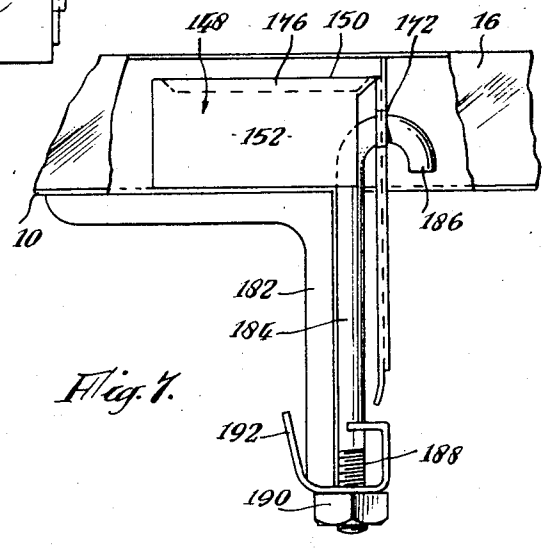

148
146
150
172
16
152
186
10
182
184
192
188
190

Fig. 7.

ROOFING AND SIDING SHEETS AND FASTENING MEANS THEREFOR

This application is division of application Ser. No. 800,835 filed Feb. 17, 1969, now U.S. Pat. No. 3,606,720.

This invention relates to an assembly of hollow members, e.g. roofing or siding sheets and the like with hollow ribs, and fastening means, especially concealed fastening means, for securing them to structural members.

Difficulties have been experienced in designing satisfactory means of securing ribbed sheets of light gauge material to structural members without perforating the sheets. This has particularly applied to sheets having the ribs which may be described as wide-based, that is to say, having side walls which make angles below about 45° with the plane of the sheet because these shapes are unable to accept and retain spring action locking means to securely fasten the ribs to the structural members. Various forms of spring action fastening means have been proposed to secure the overlapping ribs of adjacent sheets along their length and also to secure ribs to structural members. Such fastening means have often led to failure of the fixings through wind suction loading because the wind can lift the sheets sufficiently to spring off the fastening means, the sheets as a consequence being sucked off the building.

It is an object of this invention to provide an assembly of a member having a hollow section, e.g. a ribbed sheet, and a fastening clip for internally securing the hollow section to a structural member. Side walls of the clip may be designed for insertion into pockets in two walls of the hollow section. It is another object to provide locking means in the clip to hold the clip in place when engaging the pockets.

A further object is to provide assemblies of sheets in combination with fastening clips as above set out.

In this specification members having a hollow section include but are not limited to roofing, siding and other cladding members, panels and sheets, including, e.g. fascias, and securing, covering and edging strips or units for building and like purposes. For brevity "member having a hollow section" may be referred to as "hollow member".

The term "roofing and siding sheet" (or "roofing or siding sheet") includes roofing, siding and other cladding sheets.

According to this invention there is provided an assembly comprising a member having a hollow section provided with spaced pockets and a fastening clip for securing the hollow section to a structural member, the clip having a base wall with side walls for insertion into the pockets, camming means secured to the base wall being rotatable with respect thereto to bear on the base of the hollow section to force the side walls of the clip into secure locking engagement with the pockets.

The member having a hollow section may be a roofing or siding sheet having a hollow rib with sidewalls provided with pockets for the reception of the side walls of the clip. The base wall of the clip may be extended to provide a fixing plate for securing the clip to a structural member, the fixing plate being rotatable with respect to the base wall and having camming means so that when the plate is rotated out of the rib the camming means bears on the underside of the rib forcing the side walls into secure locking engagement with the pockets.

The invention includes an assembly of a roofing or siding sheet and a clip as above set forth wherein the hollow rib of the sheet is intermediate the edges, the sheet having at one edge a male rib and at the opposite edge a female rib, the female rib having a free outer wall provided with latching means and an inner wall provided with a pocket, the female rib being adapted to overlie and engage the male rib of a neighboring like sheet, the male rib including a fixing channel portion, engagement means to engage latching means on an outer wall of the female rib of a neighboring like sheet and latching means to engage into a pocket on an inner wall of such female rib so that when such female rib is pressed down over the male rib its latching means engage over the engagement means of the male rib and its pocket interlocks with the latching means on the male rib. By "neighboring like sheet" there is intended a sheet having at least a male rib or a female rib (as appropriate) similar to the male or female rib of the first mentioned sheet.

There is also provided an assembly as above set out including a number of sheets as above set out locked together by interengagement of the respective male and female ribs.

The fastening clips may be assembled in the ribs of a roofing sheet in the factory without the clips interfering with the nesting together of the sheets for transport purposes. Subsequently the camming means are operated, e.g. the fixing plates as above mentioned are bent downwardly from the sheets on the roof of a building and secured to purlins. In this manner, roofing sheets with assembled clips obviate the transport costs incurred when transporting clips as a separate item and they also save assembly time on the roof.

The invention will be further described by way of example only with reference to the accompanying drawings wherein:

FIG. 1 is a part perspective view of a roofing sheet assembly shown without clips;

FIG. 2 is a cross-section view of the male and female ribs of sheets before assembly;

FIG. 3 is a cross-section view of the male and female rib after assembly;

FIG. 4 is a perspective view of a rib clip;

FIG. 5 is a part perspective view of a rib of a sheet with assembled rib clip;

FIG. 6 is a view, broken for clarity, of the rib and clip shown in FIG. 5 fixed to a wood purlin; and

FIG. 7 is a view, broken for clarity, of the rib shown in FIG. 6 fixed to a steel purlin.

In FIG. 1 a roofing sheet **10** is made from sheet metal, plastics, or other suitable material. It comprises a male rib **12**, a female rib **14** and an intermediate rib **16**, all being wide-based ribs as above defined. Male rib **12** has combined with it a fixing channel **18**. A neighboring sheet **10'** is shown with its male rib **12'** which is similar to rib **12** interlocked with female rib **14** of sheet **10**. Screws or nails **20** through fixing channels **18** secure the ribs **12** and **12'** to wood purlin **22**, see also FIG. **2**.

Details of the assembly of the intermediate rib **16** with a purlin clip are shown in FIGS. **5**, **6** and **7** subsequently described.

In FIGS. 1 and 2 male rib 12' comprises slanting walls 24 and 32, an inner wall 26, a base wall 28, and an outer wall 30, slanting wall 32 being in the form of an outwardly directed flange 32 with a stiffening bead 34. Walls 26,28 and 30 provide the fixing channel 18. Flange 32 at the free edge of the sheet with its stiffening bead 34 comprise latching means 36. At the base of slanting wall 24 is formed an internal pocket, which affords outwardly a bead 38, and an external pocket 40. Bead 38 and pocket 40 provide engagement means. Female rib 14 comprises an inner slanting wall 42, a top wall 44 and a semi-resilient outer wall 46, having a lip 48 in the form of an inwardly turning hook providing latching means 50. At the base of slanting wall 42 is provided an internal pocket 52.

Intermediate rib 16 in FIGS. 1, 5, 6 and 7 comprises, as indicated in FIG. 1, two slanting walls 54 and 56 and a top wall 58. In the base of slanting walls 54 and 56 are provided identical pockets 60,62. Sheet 10 is an example of a member having a hollow section (the hollow rib 16) provided with pockets.

To assemble the roofing sheets 10 and 10' to purlin 22 as shown in FIG. 1 the fixing channel of sheet 10' (or, in another example, the fixing channel of a part sheet) is first screwed or nailed to the purlin. The procedure for securing the rib clip is omitted at this stage for clarity. Female rib 14 is next downwardly pressed on to male rib 12' (see FIG. 2) until lip 48 of female rib 14 latches over bead 38 and into external pocket 40. At the same time pocket 52 of female rib 14 rides down over flange 32 of latching means 36 and the flange springs into pocket 52 as shown in FIG. 3. In this manner the female and male ribs are securely locked together and cannot part through wind suction loading on the surface of the sheet.

In FIGS. 4, 5, 6 and 7 is shown fixing clip 148 for securing sheet 10 to a purlin or other structural member. Clip 148 is made of sheet metal or other suitable material and it comprises a base wall 150 and two inclined semi-springy side walls 152. Base wall 150 has an extension comprising a wall with overlapping and folded down side portions 158 comprising a fixing plate 160. One end of the fixing plate 160 has a lip 162 and the other end has camming means 164 comprising a tongue 166, overlying the base wall 150. One end 168 of base wall 150 provides a hinge line 170 (shown dotted in FIG. 4). Fixing holes 172 and 174 are provided in the fixing plate 160. In the wall 150 are positioned two internal stiffening beads 176.

Rib clip 148 has its side walls 152 made at a slightly more open angle to each other and to the base wall 150 than the angle of the side walls of the intermediate rib 16 to each other and to the top wall of the rib so that when the rib clip 148 is inserted into the pockets 60 and 62 at one end of rib 16 there is sufficient spring tension of the walls of the clip against the rib walls to prevent too easy sliding movement of the clip in the rib. Roofing sheet 10 may have a plurality of intermediate ribs in each of which are carried a number of rib clips at such positions that they may be secured to purlins on the roof. Sheets are packed together for transport in the usual manner as the inserted clips do not interfere with the nesting of the ribs together.

On the roof of a building the sheets are assembled on the purlins as previously explained and fixing plate 160 of each rib clip 148 is bent downwardly at hinge line 170 by grasping and pulling down the lip 162. In the process the camming means 164 rotates upwardly and bears tightly on the underside of the top wall of the rib 16 so causing the side walls 152 to move down further into pockets 60 and 62 of rib 16, thus becoming securely engaged and locked in the pockets. Thus rib clip 148 cannot rattle in rib 16 when sheet 10 is subjected to wind loading. The locking between the clip and the rib, however, is not made so tight as to prevent a limited amount of sliding of the clip in the rib when the rib is subjected to thermal movement.

In FIG. 6 rib clip 148 is shown secured by a nail 178 through hole 174 in fixing plate 160, to a wood purlin 180. The concealed fastening of the clip in the rib provides a leak proof connection with an unmarred outer surface of the rib, a particularly valuable feature when sheets are made from pre-painted materials. The predrilled hole 174 provides a much quicker fastening method than when holes have to be punched through the top of the rib as in conventional methods of fixing roofing sheets and damage which can arise from such processes is completely eliminated.

In FIG. 7, the fastening clip 148 locked in rib 16 is shown secured to a metal purlin 182. A standard hook bolt 184 has its hook 186 inserted into the hole 172 of rib clip 148 and its threaded end 188 is fitted with a nut 190 to secure an attachment clip 192 to purlin 180, thus holding the purlin and rib clip in secure contact.

In this manner the rib clip can be used either for bolting it to steel or nailing it to wood structures to provide a positive fixing of the roofing sheet to the building.

It will be understood that the invention may be applied to many forms of assemblies of securing devices and sheets and panels, particularly in the building industry as the external appearance of the securing device is not confined to any particular cross sectional shape. The invention may be used, for example, for securing panelling to walls of a building and/or covering the edges of such panelling. A rib section similar to rib 16 and constituting a member having a hollow section as above referred to may thus be used as a covering and/or securing piece. It may be made from sheet metal, or plastics and may be used to securely fasten the edges of panels to a building by use in conjunction with the rib section of a clip having rotating camming means similar to those above described. The edge or edges of one or more panels may be engaged and covered by the rib section. The rib section may be made of heavy gauge material such as an aluminum extrusion or other sections made of solid material, as well as from sheet material.

What is claimed is:

1. An assembly including a member having a hollow section, the hollow section having a base a wall and two opposed side walls having pockets opening in the direction of the base wall, and a fastening clip for securing the member to a structural member, the clip comprising a base wall to lie adjacent the base wall of the hollow section and connected thereto two spaced side walls, free edge portions of the side walls being adapted for insertion into the pockets of the side walls of the hollow section, camming means secured to the base wall of the clip and being rotatable with respect thereto, the camming means having a free end which on rotation of the camming means bears on the base

wall of the hollow section to force the said free edge portions of the side walls of the clip into secure locking engagement with the pockets.

2. An assembly according to claim 1 wherein the base wall of the clip is extended to provide a fixing plate for securing the clip to a structural member, said camming means being integral with the fixing plate, the fixing plate and camming means being hinged with respect to the base wall of the clip so that the camming means can rotate so that the free end of the camming means bears on the underside of the base wall of the hollow section while an end of the fixing plate remote from the camming means rotates out of the hollow section thereby exposing means at said end for securing the fixing plate to a structural member.

3. An assembly according to claim 1 wherein the walls of the clip are resilient and can be bent toward each other upon insertion in the hollow section.

4. An assembly according to claim 1 wherein the walls of the clip are in the unstressed condition at a greater angle to each other than are the side walls of the hollow section.

5. An assembly according to claim 1 wherein the side walls of the hollow section are at an angle greater than 90° to each other.

6. An assembly according to claim 1 wherein the hollow section is an upstanding rib in a sheet of metal, the rib having a top wall forming the said base wall.

7. An assembly according to claim 6 wherein the hollow rib of the sheet is intermediate opposite edges of the sheet, the sheet having at one of said opposite edges a male rib and at the other of the said opposite edges a female rib, the female rib having a free outer wall provided with latching means and an inner wall provided with a pocket, the female rib being adapted to overlie and engage the male rib of a neighboring like sheet, the male rib including a fixing channel portion, engagement means to engage latching means on an outer wall of the female rib of a neighboring like sheet and latching means to engage into a pocket on an inner wall of such female rib so that when such female rib is pressed down over the male rib its latching means engage over the engagement means of the male rib and its pocket interlocks with the latching means on the male rib.

8. An assembly according to claim 7 wherein the latching means on the free outer wall of the female rib of the sheet is in the form of an inwardly turning hook.

9. An assembly according to claim 8 wherein the engagement means to engage the latching means on the outer wall of the female rib of the sheet comprises a bead formed at the base of a wall of the male rib.

10. An assembly according to claim 7 wherein the female rib of the sheet comprises an inner slanting wall having at the base an internal pocket, the latching means on the male rib being formed by a flange at a free edge of the sheet.

11. An assembly according to claim 7 wherein the walls of the rib make angles below 45° with the plane of the sheet.

12. An assembly according to claim 7 wherein all the ribs of the sheet include slanting portions forming walls of the ribs and wherein said walls make angles below 45° with the plane of the sheet.

13. An assembly according to claim 12 wherein the walls of the female rib of the sheet are joined by a top wall and the walls of the male rib are joined by walls forming a fixing channel by means of which the male rib may be fixed to an underlying structural member.

14. An assembly according to claim 7 including a number of sheets locked together by interengagement of their respective male and female ribs.

* * * * *