March 31, 1970 C. H. FRASER 3,503,641

JOINT FOR CONNECTING PURLINS AND SAG RODS

Filed Aug. 21, 1967 3 Sheets-Sheet 1

FIG. 1

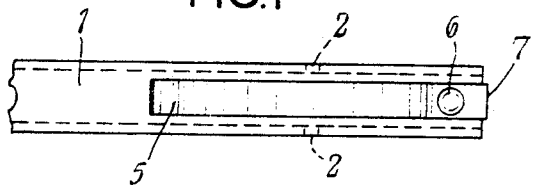


FIG. 2

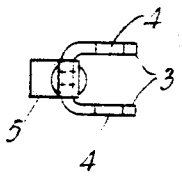


FIG. 3

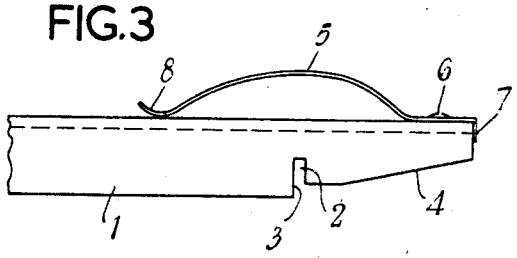


FIG. 4

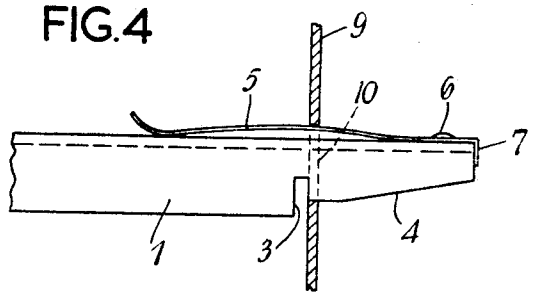
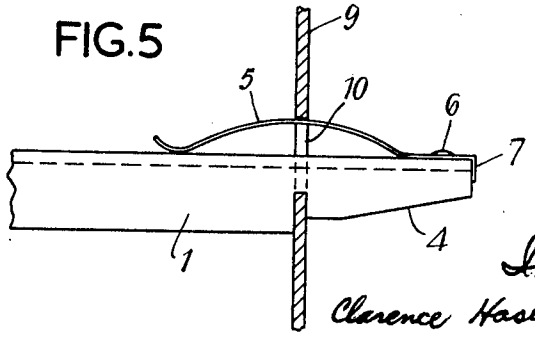


FIG. 5



Inventor:
Clarence Hasea Fraser,
By Pierce, Scheffler & Parker
his Attorneys

March 31, 1970 C. H. FRASER 3,503,641

JOINT FOR CONNECTING PURLINS AND SAG RODS

Filed Aug. 21, 1967 3 Sheets-Sheet 2

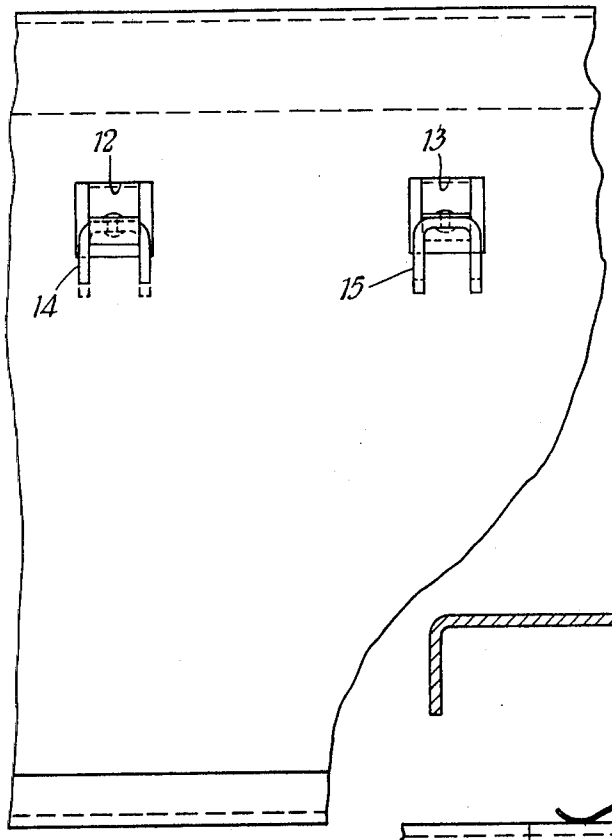


FIG. 6

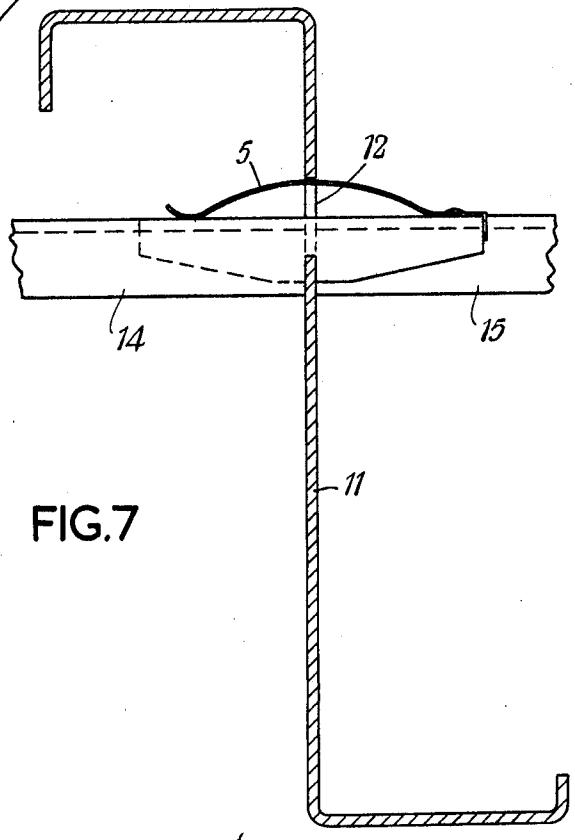


FIG. 7

Inventor:
Clarence Hosia Fraser
By Pierce, Scheffler & Parker
his Attorneys

March 31, 1970 C. H. FRASER 3,503,641

JOINT FOR CONNECTING PURLINS AND SAG RODS

Filed Aug. 21, 1967 3 Sheets-Sheet 3

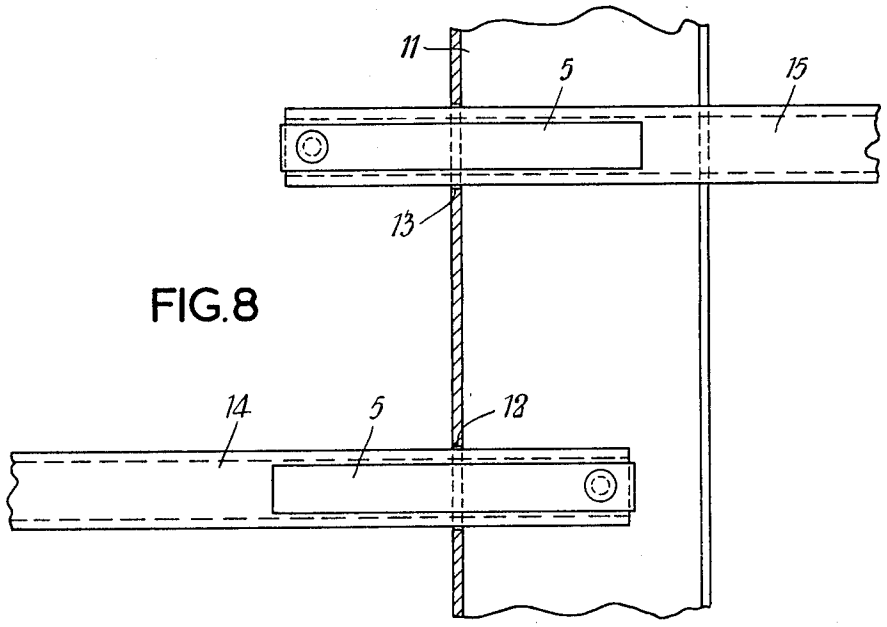


FIG.8

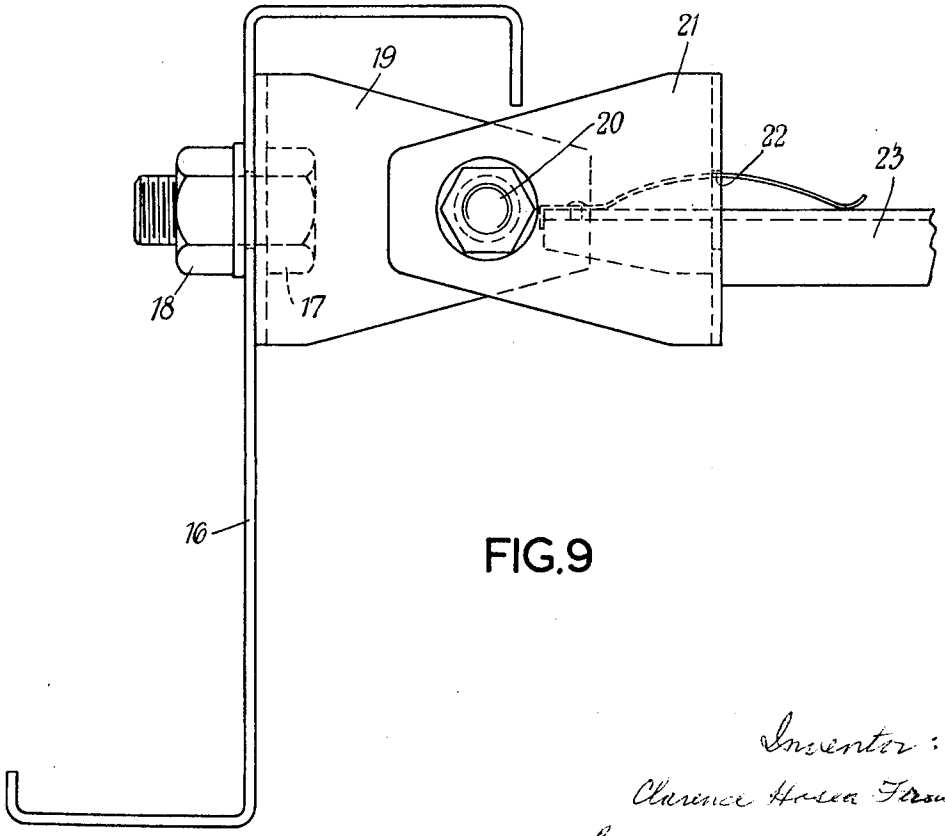


FIG.9

Inventor:
Clarence Harvey Fraser,
By Pierce, Schiffhauer & Parker
his Attorneys

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3,503,641

JOINT FOR CONNECTING PURLINS AND SAG RODS

Clarence Hosea Fraser, Coulsdon, England, assignor to Metal Trim Limited, Irvine, Ayrshire, Scotland, a British company

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Int. Cl. E04b 7/00; F16b 9/02, 21/08
U.S. Cl. 287—189.36 3 Claims

ABSTRACT OF THE DISCLOSURE

A sag rod and a method of fixing same to a purlin in the fabrication of a roof structure, the sag rod having resilient means at each end thereof, each resilient means being compressed on that end of the sag rod being passed into an aperture in a purlin to engage a slot in the sag rod with the purlin.

This invention relates to an improved method and means for straightening purlins by sag rods in the fabrication of roof structures.

When the roof of a metal building is being fabricated, it is the practice to fit purlins of sheet metal, formed into either Z or I cross-section, to the roof girders so that the roofing material may be laid. These purlins are fitted at predetermined intervals and run horizontally across the sloping roof girders. Each purlin may have to bridge as much as 20 feet from one girder to the next and therefore, although the cross-section of a purlin is such that it will withstand excessive deformation, some sagging of the purlins where they are not positively supported by a girder will take place.

To eliminate this sagging of a purlin, it has been proposed to employ sag rods which connect adjacent purlins. The uppermost purlin is held against sagging by a tie connected to its opposite purlin on the other slope of the roof and these two purlins hold each other against sagging. These two purlins are then used as datum purlins for holding the others straight and parallel. The known sag rods are normally metal rods screw threaded at each end which pass through holes in the purlins and are fixed by nuts. This arrangement necessarily involves the positioning of washers and nuts and tighening of the nuts, and it is left to the judgement of the workman as to when the purlin has been straightened and lies parallel with the datum purlin. Also, considerable time is involved in tightening the nuts. Further, it is a laborious job to dismantle the sag rods for re-use and generally the sag rods are left within the structure.

There is therefore a need for a sag rod and a method of positioning the same which may be done rapidly and with accuracy without the workman having to exercise his judgement on its correct positioning. Also, it is desirable to have as few parts as possible which are unconnected before erection.

According to the present invention there is provided a method of fixing a sag rod in relation to a sheet metal purlin in the fabrication of a roof structure, including passing one end of a sag rod through an aperture in a purlin or in a bracket fixed to the purlin thereby compressing resilient means between the sag rod and one side of the aperture and thus tending to force the sag rod to the opposite side of the aperture and passing said one end of the sag rod further through the aperture until a shoulder of the sag rod abuts one side face of the purlin, whereupon the said resilient means

moves the sag rod so that said opposite side of the aperture enters a slot in the sag rod.

The invention also includes a method of fixing a series of sag rods to straighten a plurality of sheet metal purlins in the fabrication of a roof structure, including the steps of fixing the upper end of a first sag rod to a given datum purlin, passing the lower end of the first sag rod through an aperture in a lower purlin until a shoulder on the first sag rod abuts one side face of the lower purlin and fixing said lower end within the aperture, passing the upper end of a second sag rod through a further aperture in the lower purlin until a shoulder on the second sag rod abuts the other side face of the lower purlin and fixing said upper end within the further aperture, passing the lower end of the second sag rod through an aperture in a still lower purlin until a shoulder on the second sag rod abuts one side face of the still lower purlin and fixing said lower end within the aperture, and continuing the positioning and fixing of successive sag rods in a similar manner to retain successive purlins straight and parallel with the datum purlin.

The invention also includes a sag rod comprising a predetermined length of channel section being similarly formed at each end to present outwardly facing shoulders at a given distance apart and a slot near to each end of the channel section, each of said shoulders forming the inner side wall of one of said slots and resilient means at each end of the channel section near to each slot to retain part of a purlin within the slot.

The invention will now be more particularly described, by way of example only, and with reference to a accompanying drawings, in which:

FIG. 1 is a plan view of part of a sag rod constructed in accordance with the invention;

FIG. 2 is an end view of the sag rod of FIG. 1;

FIG. 3 is a side elevation of the sag rod of FIG. 1;

FIG. 4 is a view similar to FIG. 3 showing the sag rod partly connected to a purlin;

FIG. 5 is a view similar to FIG. 4 showing the sag rod fully connected to a purlin;

FIG. 6 is a front view of a purlin with two sag rods connected thereto;

FIG. 7 is a side view of the purlin and sag rod of FIG. 6;

FIG. 8 is a plan view of the purlin and sag rods of FIG. 6; and

FIG. 9 is a side view of a modified form of fixing of a sag rod to a purlin.

Referring first of all to FIGS. 1 to 5, a sag rod includes a member of channel section **1**, the length of which is predetermined by the distance between adjacent purlins as fixed in position in the fabrication of a roof structure. The channel section **1** is shaped similarly at each end, only one of the ends being illustrated in the drawing. The channel section **1** is provided with a slot **2** one side wall **3** of which forms an abutment. The end of the channel section **1** is tapered at **4** and a leaf spring **5** is fixed to the upper surface of the channel section **1** by a rivet **6**, the outer end of the leaf spring **5** being turned over at **7** to prevent the leaf spring pivoting about the rivet **6**. As will be seen, one end of the leaf spring **5** is anchored to the channel section **1** by the rivet **6**, whereas the other end **8** of the leaf spring rests on the upper surface of the channel section **1**.

The various stages in fixing a sag rod **1** to a sheet metal purlin **9** are shown in FIGS. 4 and 5. The purlin **9** is provided with an aperture **10** and the end of the sag rod **1** is passed through the aperture **10**, this being assisted by the taper **4** of the end of the sag rod. In

moving the sag rod **1** to the position illustrated in FIG. 4 in relation to the purlin **9**, the leaf spring **5** will be compressed against one side of the aperture, thus urging the sag rod **1** firmly against the other side of the aperture **10**. On passing the sag rod **1** further through the aperture **10**, one face of the purlin **9** will abut against the shoulder **3** and, due to the pressure of spring **5**, the sag rod **1** will be urged into the position shown in FIG. 5, namely with part of the purlin **9** within the slot **2**.

The abutments **3** at each end of the sag rod **1** are at a predetermined distance apart and therefore, when both ends of the sag rod are fixed to adjacent purlins, the purlins will be at a predetermined distance apart. Thus, if a datum purlin is in its correct position on the roof structure, so therefore will the adjacent purlin be at the correct distance from the datum purlin. Also, if the datum purlin is straight, by use of the sag rod in accordance with the invention, the successive purlins can also be made straight and parallel with respect to the datum purlin. How this is done is illustrated in FIGS. 6 to 8 from which it will be seen that each purlin **11** is provided with two apertures **12** and **13**. A first sag rod, for example, sag rod **14**, is fixed at its upper end to the datum purlin and then the lower end of this sag rod **14** is fixed to the next purlin **10** by the method described in relation to FIGS. 1 to 5. A second sag rod **15** then has its upper end **6** in aperture **13** and the lower end of sag rod **15** fixed within an aperture in the next lowest purlin. In this manner all the purlins along the roof structure may be held straight and parallel with the datum purlin and with each other.

As will be appreciated, the method of fixing a sag rod to a purlin as above described necessitates the sag rod being at right angles to the purlin. In forming a sloping roof structure, however, the two top-most purlins are joined together by a tie and the sag rod of the present invention may be used as this tie. Because these two top-most purlins are at an angle to each other, some means must be provided for attaching the ties thereto and such means is illustrated in FIG. 9. A purlin **16** has fixed thereto, by bolts **17** and **18**, a bracket **19** which carries a shaft **20** which also carries as further bracket **21**, the shaft **20** allowing pivotal movement between brackets **19** and **21** so that an aperture **22** within bracket **21** may be moved to lie other than parallel with the purlin **16**. In a manner similar to that previously described a sag rod or tie **23** may be fixed within aperture **22**. If both

the topmost purlins **16** are provided with brackets **19** and **21**, the sag rod or tie **23** may extend between these two purlins **16** and hold them straight and parallel.

It will be appreciated that the leaf spring **5** above mentioned may be replaced by any other form of resilient means which will enable a sag rod to be located and held in relation to a purlin as above described. Also, the resilient means may not be attached to the sag rod but may be associated with the aperture in the purlin.

I claim:

1. A joint comprising a panel having an aperture therein and a rod member having an end thereof extending through and projecting beyond said aperture, said rod member being tapered along one side thereof from the extremity of said end toward said aperture, a transverse slot in said rod member on one side thereof adjacent the inner end of said taper for receiving a first edge portion of the aperture therein, the side wall of said slot remote from said taper extending transversely outwardly beyond the opposed side wall to define a stop shoulder, and deformable resilient means secured to said rod member on the side thereof opposite to said slot, said resilient means being compressed between said rod and a second edge portion of said aperture to resiliently bias said transverse slot into engagement with said first edge portion.

2. A joint as claimed in claim **1** wherein the deformable resilient means comprises a leaf spring.

3. A joint as claimed in claim **1** wherein the transverse slot is on the same side of said rod member as the taper.

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RAMON S. BRITTS, Primary Examiner

U.S. Cl. X.R.

52—667; 85—8.3; 248—223; 287—20