D. J. MOONEY.

METAL CONSTRUCTION.

APPLICATION FILED JAN. 9, 1920.

1,357,073.

Patented Oct. 26, 1920.

3 SHEETS—SHEET 1.

Fig. 1.

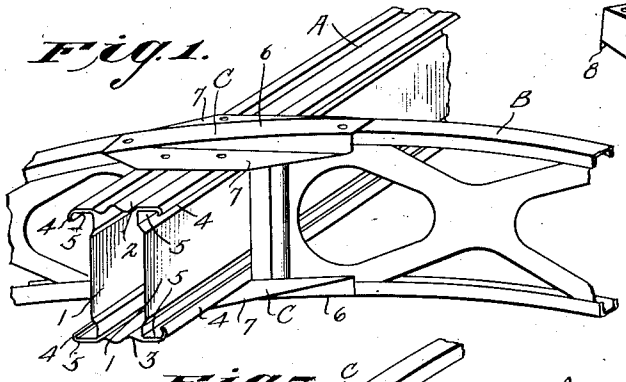


Fig. 2.

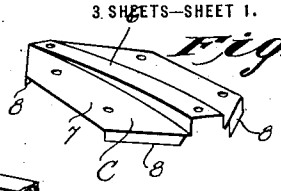


Fig. 25.



Fig. 3.

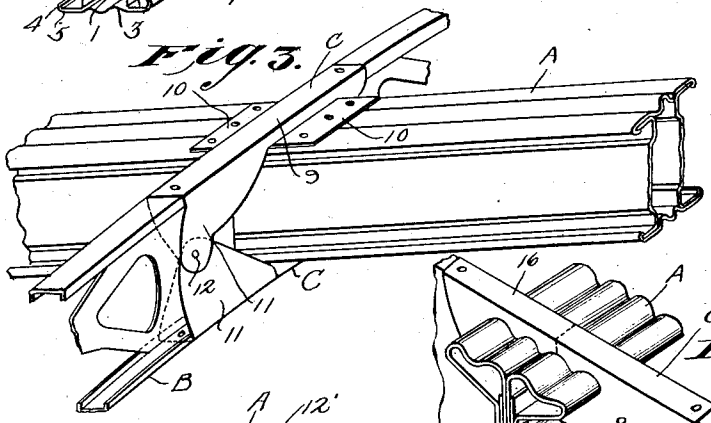


Fig. 6.

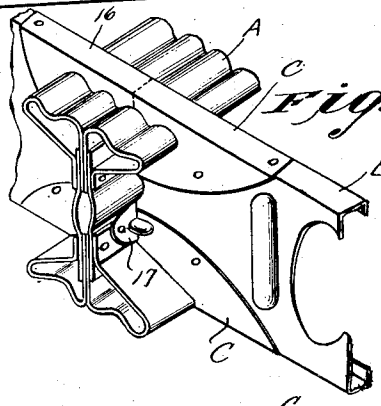


Fig. 4.

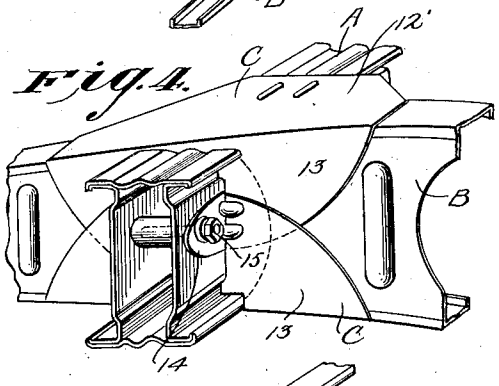


Fig. 5.

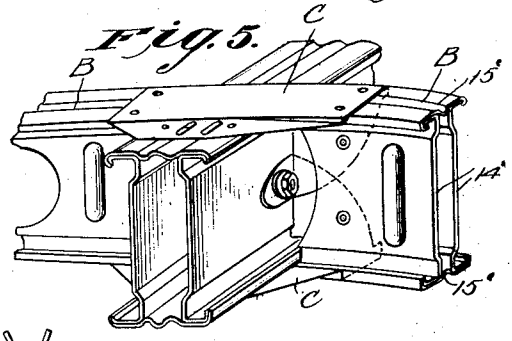


Fig. 22.

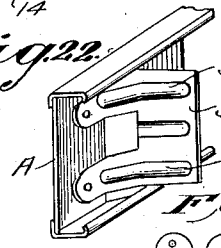
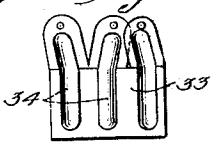


Fig. 23



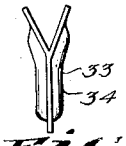


Fig. 24.

WITNESSES

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3 SHEETS—SHEET 2.

Fig. 7.

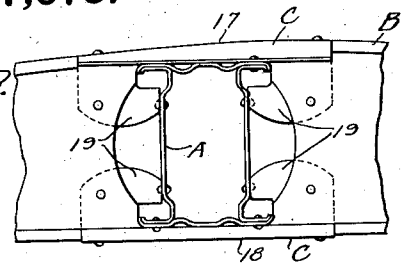


Fig. 8.

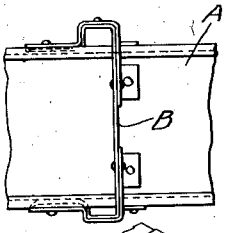


Fig. 9.

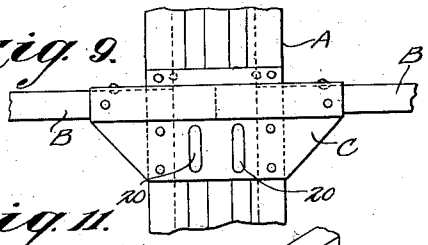


Fig. 10.

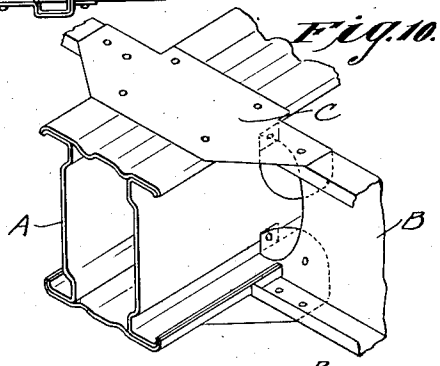


Fig. 11.

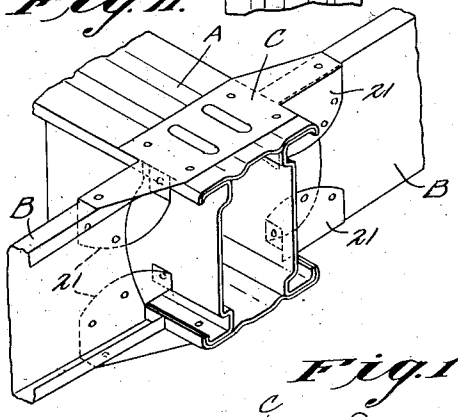


Fig. 12.

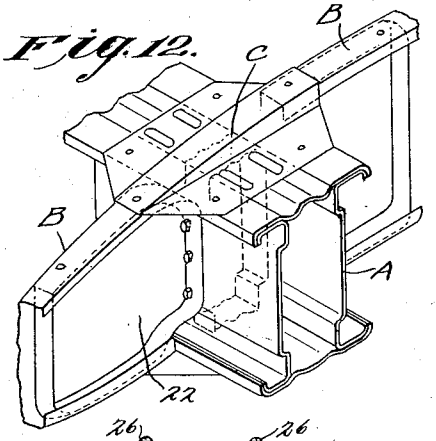


Fig. 13.

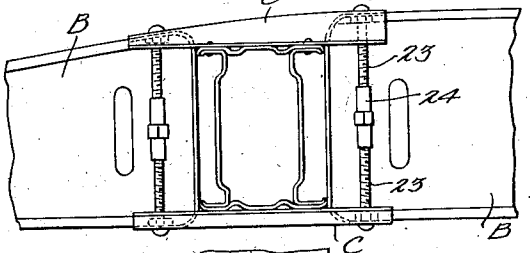


Fig. 14.

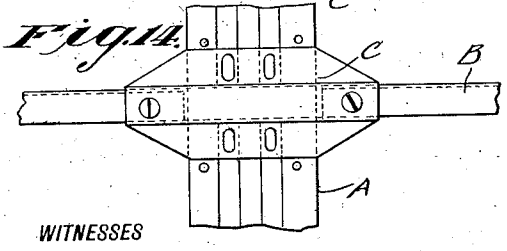


Fig. 15.

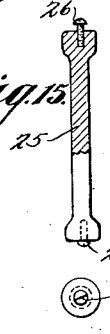
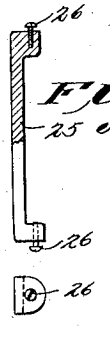


Fig. 16.



WITNESSES

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3 SHEETS—SHEET 3.

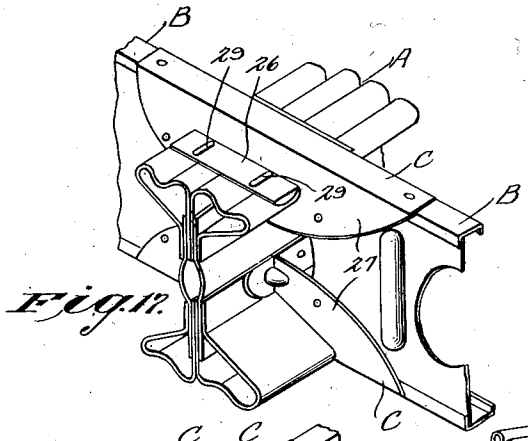


Fig. 17.

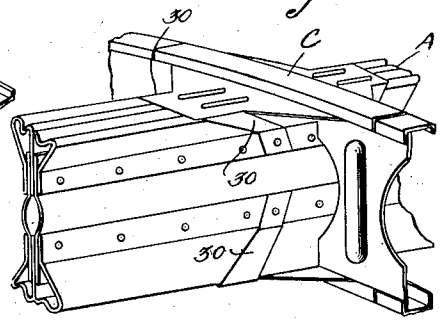


Fig. 18.

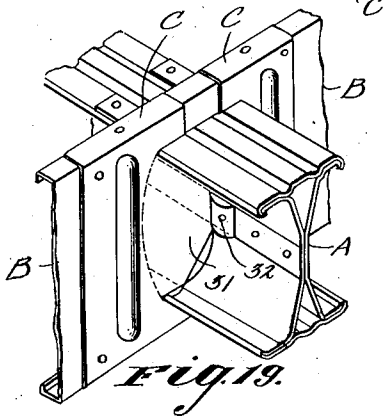


Fig. 19.

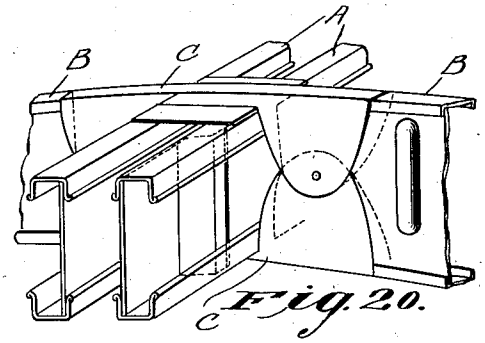


Fig. 20.

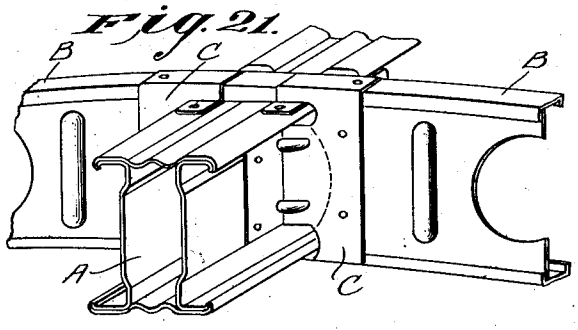


Fig. 21.

WITNESSES

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UNITED STATES PATENT OFFICE.

DERMOT JOSEPH MOONEY, OF LONDON, ENGLAND.

METAL CONSTRUCTION.

1,357,073. Specification of Letters Patent. Patented Oct. 26, 1920.

Application filed January 9, 1920. Serial No. 350,458.

To all whom it may concern:

Be it known that I, DERMOT J. MOONEY, a subject of the King of England, and a resident of London, England, have invented a new and Improved Metal Construction, of which the following is a full, clear, and exact description.

This invention relates to improvements in metal constructions, and more particularly to improved means for joining the spars or longérons with ribs at an angle thereto, an object of the invention being to provide an improved construction and arrangement of saddle or saddles which insures a rigid connection of the parts and which maintains the continuity of the rib shape, and the invention is particularly adapted for use in aeroplane construction, such, for example, as the formation of structural work to constitute the skeleton or support of the planes.

A further object is to provide improvements of the character stated which embody the maximum of strength and durability to sustain the necessary strains and stresses in all directions.

A further object is to provide a construction of the character stated which is relatively light in weight and which efficiently performs the functions for which it is intended.

With these and other objects in view the invention consists in certain novel features of construction, and combinations and arrangements of parts as will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawings—

Figure 1 is a fragmentary perspective view illustrating one form of my invention; Fig. 2 is a perspective view illustrating a slightly modified form of saddle plate; and Figs. 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, and 25 are views illustrating modifications.

I shall hereinafter refer to the spars or longérons of all the figures by the reference numeral A and shall refer to the ribs by the reference numeral B and shall point out such differences in shape of the several views as are necessary to describe the structure.

In all forms of my invention I employ saddles C above and below the spars which are secured to the spars and to the rib sections securely connecting the parts together and giving to the rib a continuity of surface or shape. These saddles C in the several modifications vary somewhat in shape and such differences in construction and shape will be hereinafter pointed out, but the same reference numeral C will be used to indicate the saddles of all of the different forms.

Referring to Fig. 1, it will be noted that the spar A is composed of sheet steel sections with plates 1, 1, spaced apart and constituting the web of the spar. The upper and lower plates 2 and 3 have flanges 4 at their edges, the flanges of the plate 2 extending downwardly and the flanges of the plate 3 extending upwardly. The plates 1, 1, have outwardly projecting flanges 5 which are inclosed within the flanges 4 and are of a dimension to fit the flanged edges of the plates 2 and 3. The plates 2 and 3 are preferably corrugated longitudinally and the plates 1, 1, are preferably offset at their intermediate portions from their upper and lower portions to give the maximum of strength to the spar. The rib sections B are of skeleton I-beam shape and the ends of the sections are in alinement at opposite sides of the spar.

The saddles C are made with longitudinal channels 6 at their intermediate portions which receive the edges of the ribs and these channel portions are made of a longitudinal shape to conform to the general line or continuity of the rib and as these ribs slope or curve and reduce in vertical dimension toward the outer ends, these channels 6 are given a longitudinal curvature or incline. Flat plates 7 are integral with the channels 6 and at opposite sides thereof, and these plates 7 are secured to the spar while the channel portions 6 are secured to the rib sections.

It will be noted that the plates 7 lie flat upon the upper and lower faces of the spar and are given the necessary lateral dimensions to give the necessary strength against lateral strains on the rib sections.

To further strengthen the parts the saddle may be made as shown in Fig. 2 with flanges 8 at the inclined ends thereof.

In the modification illustrated in Fig. 3, the saddles C are made with longitudinal channels 9 to receive the edges of the rib sections and with flat plates 10 secured to the upper and lower faces of the spar. These saddles at the end portions of the channels have the side members of the channels extended forming tongues 11 and the

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tongues 11 of the upper and lower saddles overlap and are secured by rivets 12 which are extended through the webs of the ribs.

In Fig. 4, I illustrate a modification in which the ribs B are of channel form and the saddles C have relatively flat plates 12′ which engage over the upper and lower edges respectively of the ribs and are bent at one edge forming tongues or brackets 13 having perforated lugs 14 bent at an angle thereto and secured by bolts 15 or other securing devices to the web of the spar A.

Fig. 5 illustrates a saddle C which is similar to the saddle shown in Fig. 4, but the view is taken from the opposite side of that shown in Fig. 4, and the rib B is of the double compression type comprising two plates 14′ forming the web of the rib and upper and lower plates 15′ secured thereto and having inwardly turned edges similar to the spar shown in Fig. 1.

In the modification illustrated in Fig. 6, the spar A is of general I-beam shape made up of sections and the saddles C have longitudinal channels 16 fitting the edges of the rib sections B and are cut out to receive the upper and lower portions of the spar A and are provided with perforated lugs 17 secured to the web of the spar.

In the modification illustrated in Figs. 7 and 8 the spar A is of general rectangular form in cross-section and the saddles C which extend across the same, are provided with channels 18 and at one side with tongues 19 which are secured to the web of the rib sections B, the latter being channel shaped.

Fig. 9 illustrates in plan a modified form of saddle C such as shown in Figs. 7 and 8, which is stiffened by embossments or raised portions 20.

Fig. 10 shows a saddle C in perspective which is similar in general outline to the saddle shown in Figs. 7, 8 and 9, but is flat or flush, and this form of device is used where the ribs and spar are of the same vertical dimension.

Fig. 11 illustrates in perspective a modified form of saddle C which has its tongues 21 corresponding to the tongues 19 of Fig. 7, but the tongues of the modification shown in Fig. 1 are on opposite sides at the respective ends of the saddle as the rib sections B are reversely positioned.

Fig. 12 illustrates in perspective a structure similar to that shown in Fig. 11 having in addition separate strengthening plates 22 at the sides of the rib section secured to the spar.

Figs. 13 and 14 illustrate in elevation and in top plan a modified form of saddle C having bolts 23 and turn buckles 24 projecting through the ends of the saddles and also the flanges of the ribs and firmly securing the parts together.

Instead of the bolts and turn buckles, bars 25, such as shown in Figs. 15 and 16, may be employed with screw 26 in their ends to secure the bolts to the ribs and spars.

In the modification illustrated in Fig. 17, the saddles C have side plates 27 which are cut out to receive the flanged portions of the spar A and plates 28 secured to the upper and lower faces of the spar and have embossments 29 to strengthen and prevent movement of the saddle.

In the modification illustrated in Fig. 18, the saddle C is provided with metal straps 30 which extend around the sides of the spar A and are secured thereto, the spar being of a shape similar to that shown in Fig. 6.

In the modification illustrated in Fig. 19, I employ two saddles C in alinement and fitting upon the rib sections B and having extensions 31 fitting the web of the spar A and secured thereto, as shown at 32.

In Fig. 20, I illustrate a modification in which a saddle C is employed which is similar to the saddle shown in Fig. 3, but is used in connection with a double angle spar structure A, as clearly shown.

Fig. 21 illustrates a modification which is similar to that shown in Fig. 19, but the saddles C are shaped to fit spars or ribs similar to those shown in Fig. 1.

In Figs. 22, 23 and 24 I illustrate a form of bracket 33 which may be used in connection with a spar such as shown in Fig. 20, to connect the spar and rib. This bracket has strengthening embossments 34 which gives the desired rigidity thereto.

Fig. 25 illustrates a slightly modified form of bracket 35 corresponding to the bracket shown in Figs. 22, 23 and 24 with the exception that the bracket 35 is of general T-shape in plan while the bracket shown in Figs. 22, 23 and 24 is of general Y-shape in plan.

It will be noted that with all forms of my invention the rib sections are secured at an angle to the spar and the saddles impart the desired strength to the joint and form continuing surfaces to the rib sections so that smooth surfaces are had which is desirable in this art.

Various other slight changes may be made in the general form and arrangement of parts described without departing from the invention, and hence I do not limit myself to the precise details set forth, but consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of the appended claims.

I claim:

1. A joint of the character stated, comprising a spar, rib sections at an angle to the spar, said rib sections located in alinement, and saddles secured to the spar and to the rib sections at both edges of the joint.

2. A joint of the character stated, com-

prising a spar, rib sections at an angle to the spar with the sections in alinement and having their ends abutting against the sides of the spar, and saddles located above and below the spar, said saddles secured to the spar and to the ribs.

3. A joint of the character stated, comprising a spar, rib sections at an angle to the spar with the sections in alinement and having their ends abutting against the sides of the spar, saddles located above and below the spar, said saddles secured to the spar and to the ribs, and said saddles having longitudinal channels receiving the edges of the rib sections.

4. A joint of the character stated, comprising a spar, rib sections at an angle to the spar, saddles connecting the spar and rib sections, said saddles having longitudinal channels at their intermediate portions receiving the edges of the rib sections, and flat portions on said saddles bearing against the faces of the spar and secured thereto.

DERMOT JOSEPH MOONEY.