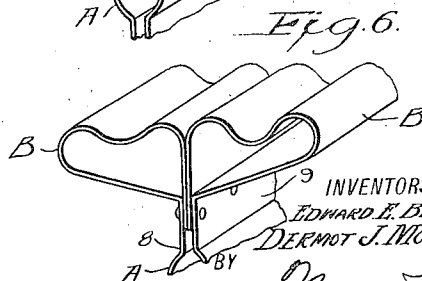
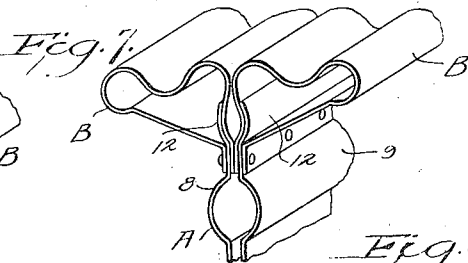
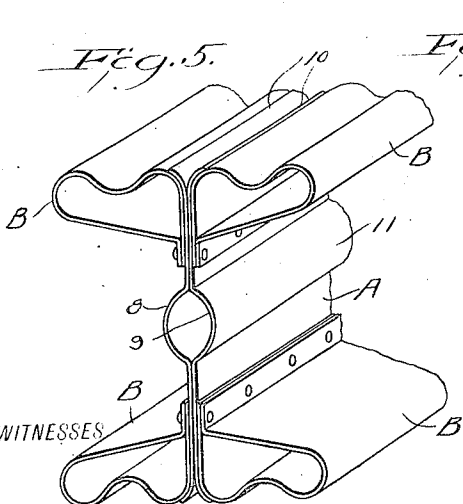
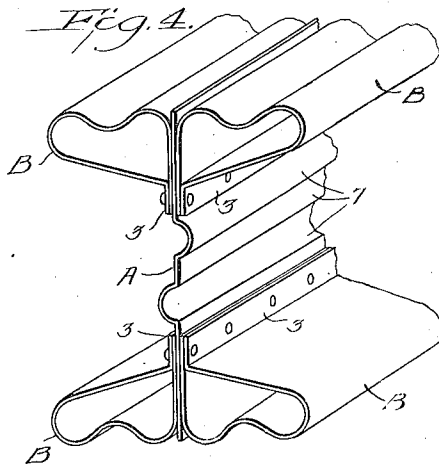
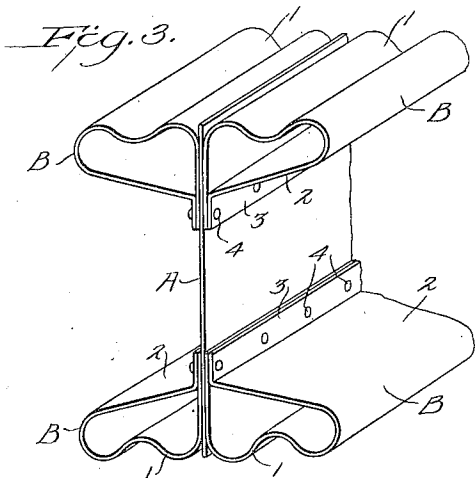
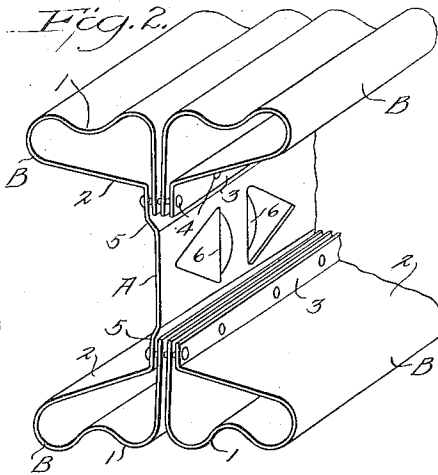
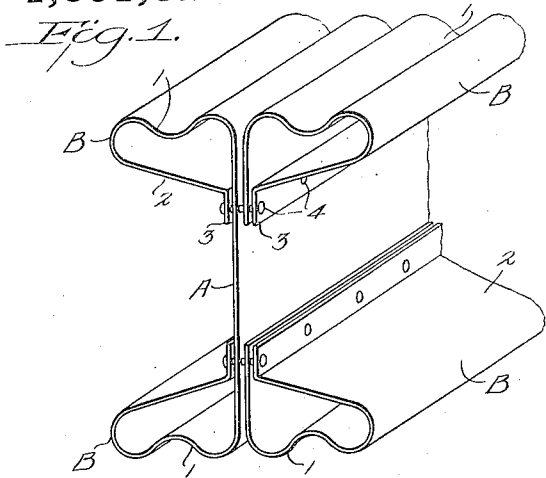


E. E. BROWN AND D. J. MOONEY,
 METAL CONSTRUCTION.
 APPLICATION FILED JAN. 28, 1920.

1,351,615.

Patented Aug. 31, 1920.



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UNITED STATES PATENT OFFICE.

EDWARD EUGENE BROWN AND DERMOT JOSEPH MOONEY, OF LONDON, ENGLAND.

METAL CONSTRUCTION.

1,351,615.

Specification of Letters Patent. Patented Aug. 31, 1920.

Application filed January 28, 1920. Serial No. 354,722.

To all whom it may concern:

Be it known that we, EDWARD E. BROWN and DERMOT J. MOONEY, both subjects of the King of Great Britain, and residents 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 construction, and more particularly to an improved construction of spar, web, or other metal frame device for use in connection with airplanes, an object of the invention being to provide a spar which will embody the maximum of strength and at the same time be as light in weight as is possible consistent with the use.

A further object is to provide a bar composed of sheet metal having hollow flanges at the edges of the web of the bar, and these flanges may be formed by bending the edges of the web portion of the bar or they may constitute separate parts altogether, riveted or otherwise secured to the web of the bar.

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 our invention.

Figs. 2, 3, 4, 5, 6 and 7 are similar views illustrating modifications.

In all forms of our invention, as illustrated in the drawings, we shall employ the reference character A to indicate the web of the bar and the reference character B to indicate the flanges of the bar, and while these parts differ in shape and construction, and such differences will be specifically pointed out in connection with the description of each figure, these same reference characters will be utilized in all figures.

Referring particularly to Fig. 1 the web A and the flanges B at one side thereof are formed from a single integral metal plate, while the flanges B at the other side of the web are formed from separate independent plates and bent into the shape of the flanges B and secured to the web A of the bar. These flanges B are formed by bending the plates outwardly as shown at 1 and then inwardly at an incline as shown at 2 with the extreme edges of the plates bent at a sharp

angle forming lips 3 which are secured to the web A by rivets 4, or by spot-welding, or other approved securing means. The flanges B are preferably corrugated on their outer faces for strength, and it is to be understood that the metal forming the parts of the bar is relatively thin and as light as consistent with the strength desired.

In the modification illustrated in Fig. 2 the web A and the flanges B at one side thereof are made integral, and the plate A forming such flange and web is bent differently from the plates shown in Fig. 1. To be more specific, the main plate of the structure shown in Fig. 2 is first bent outwardly forming the inclined inner portions 2 of the flanges and is then bent inwardly forming the corrugated outer portions 1 of the flanges. The flanges B at the other side of the bar constitute separate parts and are riveted or otherwise secured to the web A, and the latter is laterally offset at the point of attachment of the lips 3 as shown at 5. In this modification of Fig. 2 we also illustrate the web A as having outwardly projecting tongues 6 which form a vertical strengthening standard.

In the modification illustrated in Fig. 3, the web A constitutes a separate plate, and the flanges B are independent plates bent into the hollow shape shown and secured to the web A.

In Fig. 4 the construction illustrated is precisely like that shown in Fig. 3 except that the web A is corrugated as shown at 7.

In the modification illustrated in Fig. 5 the web A is formed of two plates 8 and 9 with the hollow flanges B secured thereto, and the extreme edges of these plates 8 and 9 are flared apart as shown at 10 extending partially over the outer faces of the flanges B, and for strength the plates of the web are bowed outwardly at their longitudinal center as shown at 11.

In the modification illustrated in Fig. 6 the flanges B are made integral with the plates 8 and 9 forming the web A and these flanges are bent so as to bring their inner ends between the plates 8 and 9 where they are securely riveted or otherwise connected.

In the modification illustrated in Fig. 7 the flanges B are formed of separate plates and the plates 8 and 9 of the web A are projected into the hollow flanges, and at their point of connection with the metal of the flanges they are bowed outwardly slightly

as shown at 12 and conform in shape with the shape of the metal of the flanges.

It will be noted that in all forms of our improved bar that the flanges at the edges
5 of the web A are hollow and of a general triangular shape, more or less distorted, thus permitting the maximum of strength to be imparted to the bar while employing extremely thin metal plates, and if desired
10 for other light structures the flanges B at one side of the web A can be omitted altogether.

Various other slight changes might be made in the general form and arrangement
15 of parts described without departing from our invention, and hence we do not limit ourselves to the precise details set forth, but consider ourselves at liberty to make such changes and alterations as fairly fall

within the spirit and scope of the appended 20 claims.

We claim:

1. A metal spar, comprising a web, and hollow flanges at both sides of the web at both longitudinal edges thereof, said hollow
25 flanges having straight inclined inner portions and curved outer edges, and the outer portions of said flanges having a compound curvature transversely.

2. A metal spar, comprising a web, and
30 hollow flanges at both sides of the web at both longitudinal edges thereof, said hollow flanges having straight inclined inner portions and convexly curved outer edges, and the outer portions of said flanges having
35 a compound curvature transversely.

EDWARD EUGENE BROWN.
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