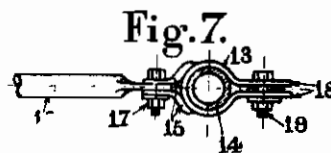
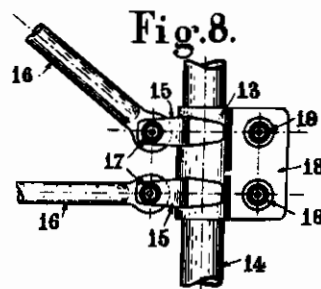
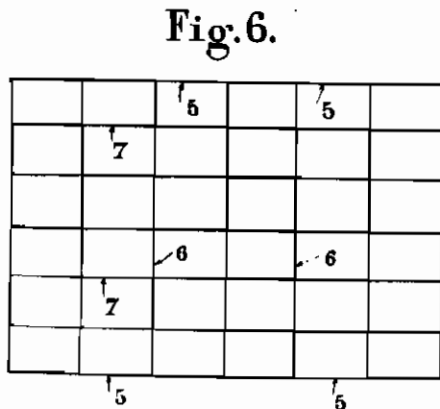
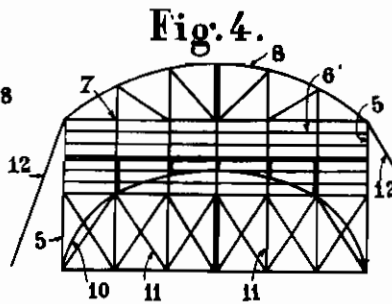
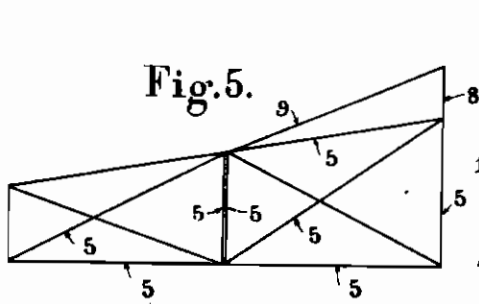
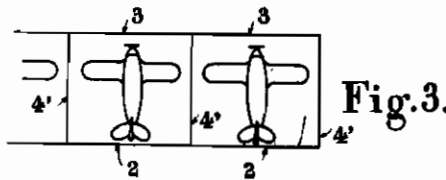
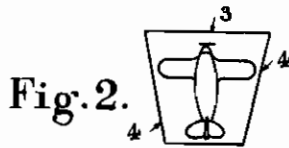
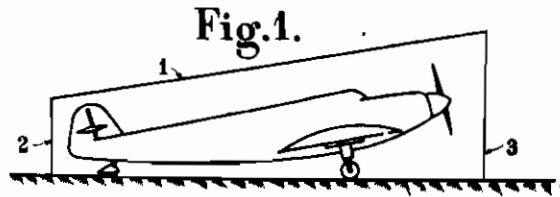


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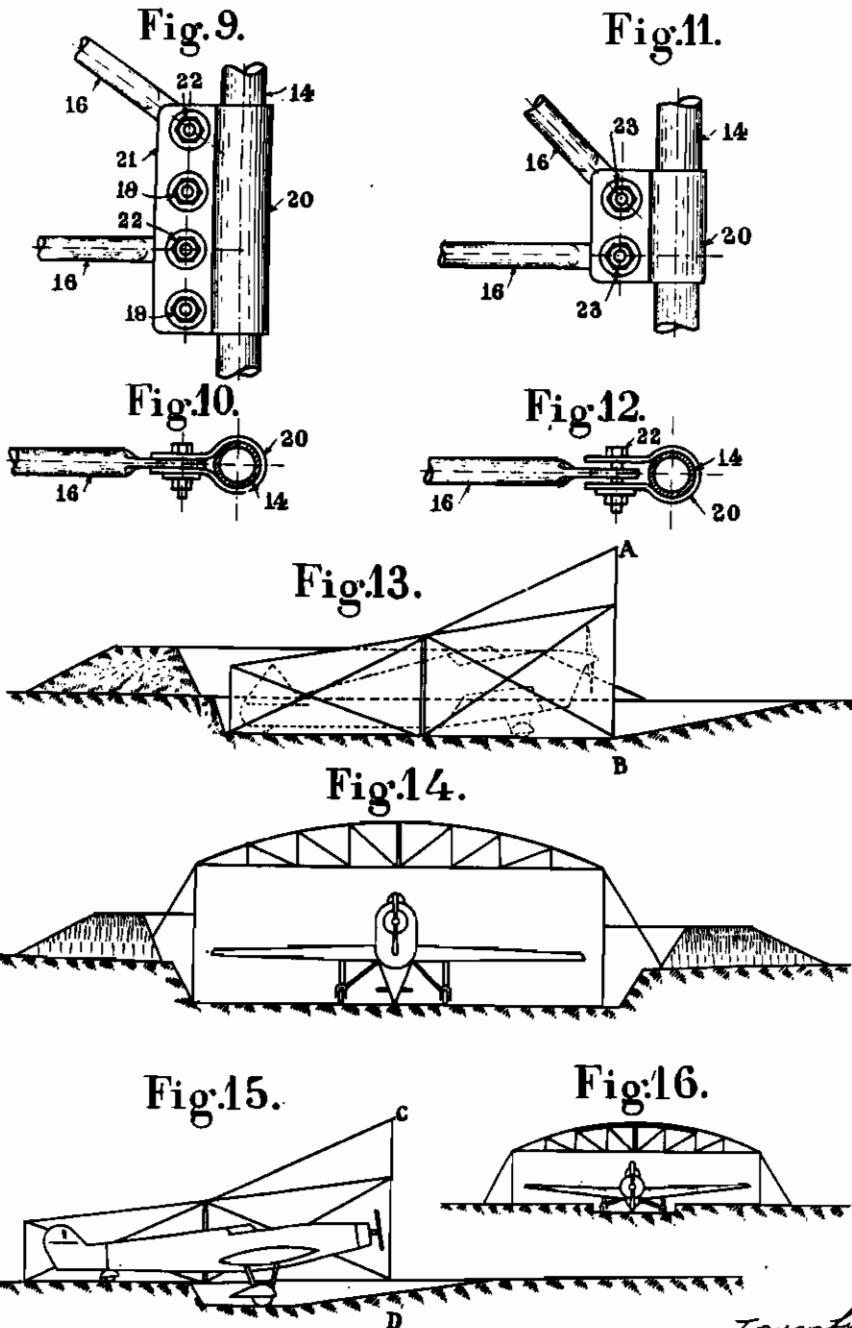
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ALIEN PROPERTY CUSTODIAN

DEMOUNTABLE HANGAR FOR AEROPLANES AND SEAPLANES

Georges Servan Cantacuzene, Paris, France; vested in the Alien Property Custodian

Application filed December 10, 1940

In time of war, aeroplanes are highly exposed to being bombed by the enemy aircraft, so long as they remain grouped in the large hangars which the conveniences of peacetime have caused to be built at the boundary of the aerodromes. This danger arises as much from the grouping of the aeroplanes as from the dimensions of the hangars which render them visible and recognizable from a great distance.

This drawback is obviated by dispersing the aeroplanes over a larger number of aviation fields. It is advantageous to change them, when they have been identified by the enemy.

Since the aeroplanes have to be maintained sheltered from the inclemencies of the elements, especially during bad weather, it is advantageous to replace the large hangars of peacetime by small campaign hangars, hardly visible, rapidly mountable and demountable, (and) readily transportable. This is the object of the present invention.

A hangar is, by nature, a construction comprising two essential elements; a strong framework defining an accommodation space and a covering fixed upon the framework and delimiting the said space.

Ordinary hangars, fixed or demountable, form a space of substantially parallelepiped shape. It follows from this that the available space is badly utilized, seeing that the aeroplane has a shape of which the vertical and lateral overall size is much less at the rear side than at the front side.

The hangar which forms the subject of the present invention is adapted, on the contrary, to the shape of the aeroplane, while the roof is sloped from the front towards the rear. An isolated hangar can be designed for a single aeroplane, or several individual hangars can be connected together in order to form a group or multiple hangar for two or more aeroplanes.

The invention is hereafter described with reference to the accompanying drawings, in which:

Fig. 1 represents diagrammatically in longitudinal vertical central section a suitable form of the improved hangar.

Figs. 2 and 3 are plan views showing diagrammatically an isolated hangar for an individual aeroplane and a group of hangars for several planes.

Figs. 4, 5 and 6 represent diagrammatically the hangar framework, Fig. 4 being a front elevation, Fig. 5 a side elevation, and Fig. 6 a plan view.

Figs. 7 and 8 represent in plan and in side elevation respectively the composition of the pre-

ferred attachments for assembly of the elements of the framework.

Figs. 9 to 12 represent similar views of two modified attachments.

Figs. 13 and 14 represent diagrammatically in central longitudinal section and in transverse section upon the line A—B of Fig. 13 respectively the improved hangar mounted within an excavation.

Figs. 15 and 16 are corresponding views of an alternative arrangement, Fig. 16 being in section upon the line C—D of Fig. 15.

The adaptation of the shape of the hangar to that of the aeroplane which it is to house is represented diagrammatically in Fig. 1, the roof 1 being inclined from the front towards the rear. The end wall 2 has a height sufficient to allow the passage of a man behind the aeroplane if the latter possesses, at this point, a height less than that of a man. The front wall 3 has a height slightly greater than that of the aeroplane, at this point.

Fig. 2 shows the said adaptation of shape in the case of an isolated hangar. The lateral walls 4 can follow the line of least overall size, in the lateral direction. It is possible to juxtapose the walls 4 of several hangars of this type combined together to form a multiple hangar for several aeroplanes or else to couple the several hangars along a straight common front line; however in this last case it is also possible, preferably, as shown in Fig. 3, to combine together several hangars of which the lateral walls 4 are parallel.

This adaptation of the shape of the hangar to that of the aeroplane has the result of suppressing the useless space of the ordinary hangars. It follows that the hangar will profit from the following advantages: Economy in material—and therefore in the cost price, in the labour necessary for mounting and demounting, and in the weight to be transported during changes of site; reduction in the resistance opposed to the wind, whence greater stability, decrease of visibility for the aerial foe and facility of camouflage.

Another essential characteristic of the present invention is the mode of construction of the hangar. Like every hangar, the structure is provided with walls which must be rigid and impenetrable to wind and rain. Its front wall must, however, be removable in order to allow the exit and return of the aeroplane.

The front wall can be, for example, constituted by fabric curtains sliding laterally and suitably fastened when they block the entrance. The rigidity of the other walls is obtained by the use

of a framework which may be built up of wood or of sectional or tubular metal. This framework is characterized by the exclusion of separate supporting uprights, by the use, for the lateral and end walls, of rigid triangulated frames, by the division of these frames into elements of limited weight in such a way that each can be manipulated by two men during mounting and demounting, by the fixation of the walls to the ground by means of fittings traversed by metal screw pickets driven into the earth, and by a special arrangement of the sustaining trusses, which arrangement will be more fully described hereafter.

The triangulated frames forming the framework of the lateral walls are designated by 5. Their upper members or top booms perform the function of wall plates upon which are fixed in a demountable manner the rafters 6 intended to support the roof, in concurrence with purlins 7 parallel to the said members.

The whole is supported and stiffened by transverse roof trusses to the number of at least three, viz:

(1) A front truss 8 which has a straight lower member or bottom boom and a curved upper member or top boom. Its supports are, by assembly, made fast with the upper corners of the lateral frames 5. It is external to the closed space of the hangar. Struts 9 give it the necessary resistance to the wind;

(2) A middle truss 10, which is made fast, by assembly and by the intermediary of its terminal uprights, to the lateral frames 5. It has a straight upper member or top boom and a curved lower member or bottom boom, the latter having its concavity directed downwards. It is internal to the closed space of the hangar;

(3) An end truss 11 which is of the type having upper and lower members or booms parallel to one another. It forms the framework of the end wall of the hangar.

If the dimensions of the hangar require it, the number of the trusses in question may be increased, either to the exterior, or to the interior of the closed space. The hangar can, in this case, take the form, for example, of a prismatic body in rearward prolongation of a paralleloiped body.

The resistance of the hangar to the transverse forces is increased by guys 12 of which the lower extremity is fixed to the ground by a fitting traversed by a metal screw picket.

As described with reference to the lateral frames, the trusses are divided into sections or partial panels of which the weight allows their manipulation by only two men.

If several individual hangars are mounted in a group, the guys 12 are applied to the corner of the terminal cells of the multiple hangar.

The assembly together of the partial panels contributing to form the transverse trusses and the lateral frames, as well as the assembly connecting the principal rafters to the roof purlins and the purlins to the common rafters or transverse elements which support the roof, is effected by any suitable means allowing the demounting, for example by gussets and bolts. The assembly together of the partial elements, booms,

lattice bars, struts, etc., contributing to form the said panels, is effected either by connectors of the current type, or, preferably, by attachments or which the object is to permit, first the standardization of their pattern, and secondly a fixation of the joints by plain clamping.

As shown in Figs. 7 and 8, a sheet-metal plate is pressed so as to present a split cylindrical portion 13, adapted to be fixed by clamping upon the tube of the member 14; lugs 15 are cut out from the two sides of the part 13 and turned back so as to make a fork to which the lattice bars or diagonals 16 are assembled by bolts 17, while the free edges of the portion 13 provide two flat faces 18, opposite to the attachment lugs 15 and traversed by bolts 19, effecting the clamping of the split portion 13 upon the member 14.

A modification of this assembly is represented in Figs. 9 and 10, where the sheet-metal plate is simply folded so as to present a cylindrical portion 20 and two flat edge portions 21, traversed by bolts 19 serving for the clamping of the portion 20 upon the tube 14 and other bolts 22 serving for the assembly of the lattice bars or diagonals 16.

The modes of assembly described above and represented by Figs. 7-8 and 9-10 respectively offer the advantage of allowing the fixation beforehand of the attachment upon the tubular member, independently of the subsequent mounting of the lattice bars or diagonals.

It will however be possible to utilize attachments in which the fixing upon the tubular member and the mounting of the lattice bars or diagonals will take place simultaneously. This type of attachment, represented in Figs. 11 and 12, comprises only bolts 23 serving at the same time for the clamping of the split cylindrical portion 20 upon the member 14 and for the assembly of the triangulation elements 16.

It will likewise be possible to constitute the panels composing the transverse trusses and the lateral frames by welding together the metallic elements tubes or profiled bars, according to the known technique.

With the object of obtaining a partial protection against bombing from the air, it will be possible to mount the hangar in an excavation of small depth, the spoil from the excavation serving for the establishment of a parapet protecting the sides and the end of the hangar against splinters from bursts, while an inclined plane allows the exit and return of the aeroplane. This arrangement is represented in Figs. 13 and 14.

It is possible likewise, with the object of reducing the height of the hangars, to dig a longitudinal pit or excavation of depth slightly less than the height of the landing carriage of the aeroplane and of width corresponding to its span, the said pit rejoining the ground surface, towards the front, by an inclined plane. This arrangement is represented in Figs. 15 and 16.

The ground, in the interior of the hangar or only upon the surface travelled by the wheels of the aeroplane, can be paved with removable slabs, such as those forming the subject of the French patent No. 827,752, dated October 11th 1937.

GEORGES SERVAN CANTACUZENE.