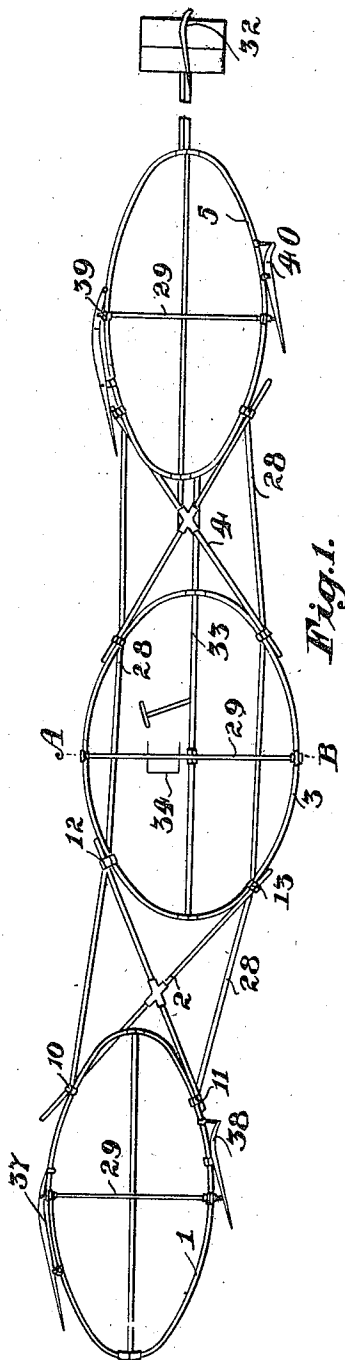


1,052,623.

J. W. SEDDON.
FLYING MACHINE.
APPLICATION FILED NOV. 14, 1910.

Patented Feb. 11, 1913.
3 SHEETS—SHEET 1.



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3 SHEETS-SHEET 2.

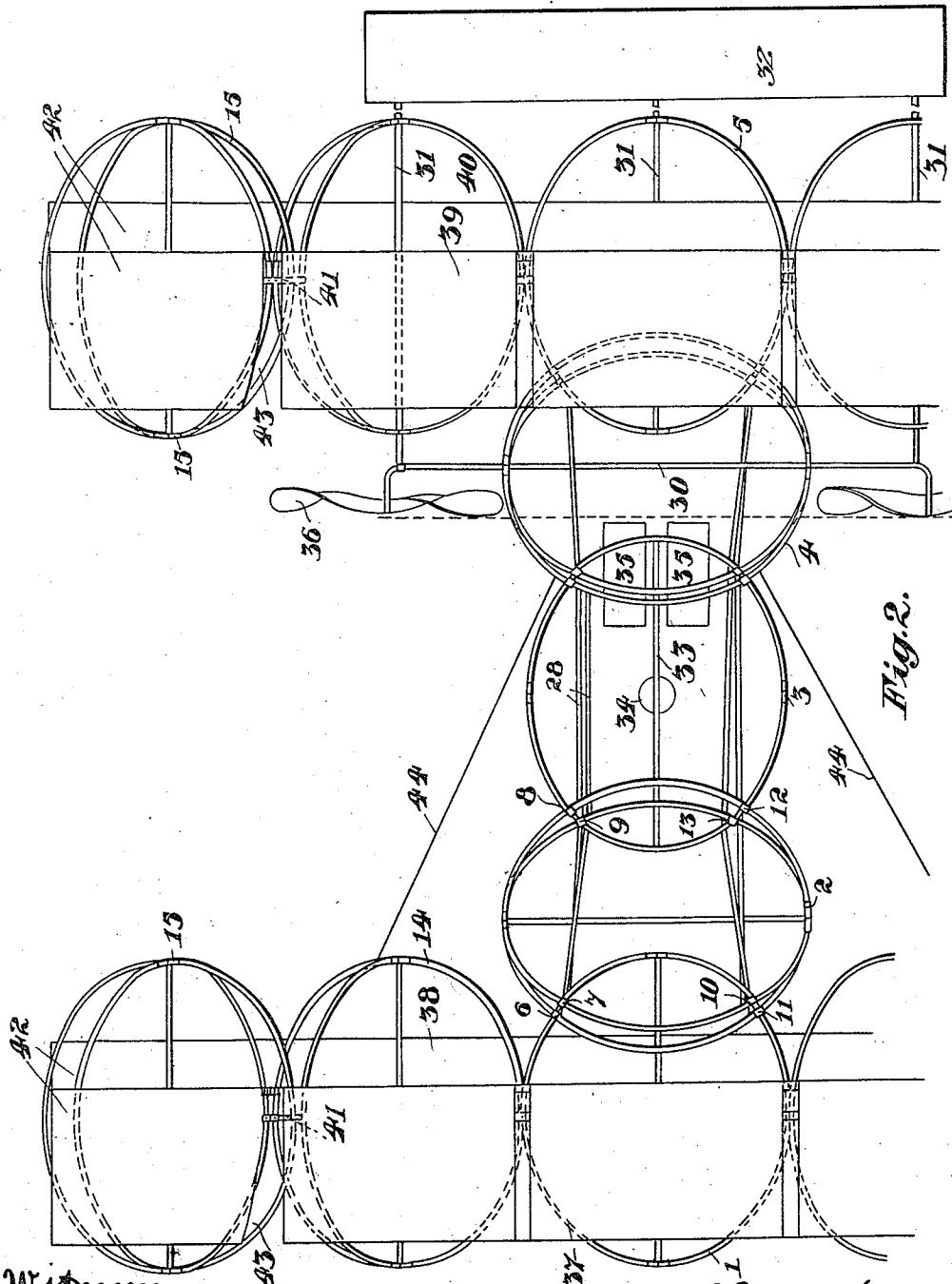


Fig. 2.

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Patented Feb. 11, 1913

3 SHEETS—SHEET 3.

1,052,623.

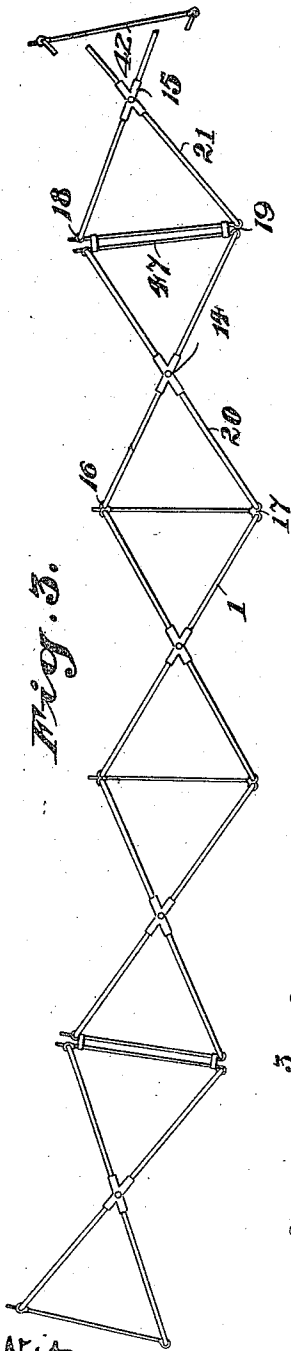


Fig. 3.

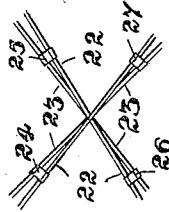


Fig. 6.

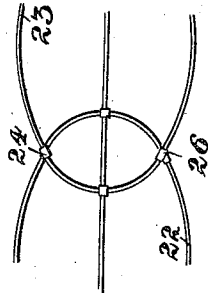


Fig. 5.

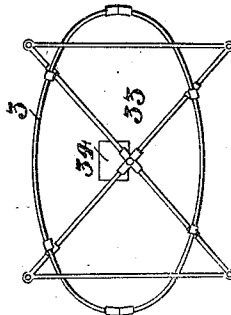


Fig. 4.

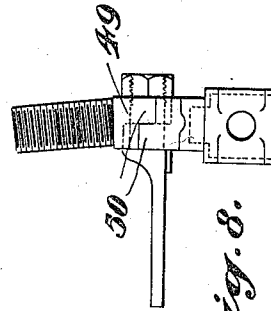


Fig. 8.

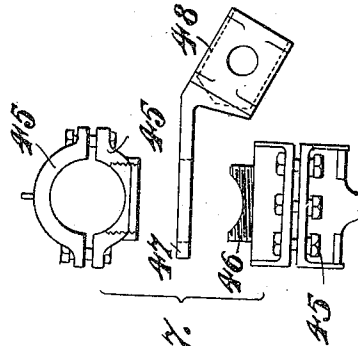


Fig. 7.

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UNITED STATES PATENT OFFICE.

JOHN WILFRID SEDDON, OF PAINSWICK, ENGLAND.

FLYING-MACHINE.

1,052,623.

Specification of Letters Patent.

Patented Feb. 11, 1913.

Application filed November 14, 1910. Serial No. 592,165.

To all whom it may concern:

Be it known that I, JOHN WILFRID SEDDON, a subject of the Kingdom of Great Britain, residing at Painswick, in the county of Gloucester, England, lieutenant, Royal Navy, have invented certain new and useful Improvements in Flying-Machines, of which the following is a specification.

This invention relates to aeroplanes and is applicable to those of the biplane, monoplane or other similar type, the improvements having for various of their several purposes to provide a construction which is exceptionally strong, which is rigid, light and which at the same time is able to "give" slightly by which means sudden shock is materially averted and the possibility of breakage substantially lessened so that in the event of the aeroplane coming into concussive contact with the ground or with another object it is enabled to withstand the effect of same in a much more satisfactory manner than has heretofore been the case.

A further feature of this invention exists in the characteristic whereby the position of certain of the planes, preferably the outer planes, may be altered by which means the lifting effort of the planes at either side of the machine may be independently reduced or increased by the aviator while in flight, in order to maintain a correct balance. The facilities for so adjusting the planes are of particular advantage when turning the aeroplane, in which operation the planes on the inner side of the machine are adjusted for increased lifting effort to compensate for their slower movement through the air, while the planes on the outer side of the machine may at the same time be adjusted to decrease their lifting effort. The adjustable planes may however be adjusted in the same manner on both sides of the aeroplane; thus if the aeroplane is to carry a greater weight the planes on both sides would be altered to increase the lifting effort while if the weight is reduced the planes would be altered to reduce the lifting effort and the aeroplane could then be driven in the air at the same speed while consuming a smaller amount of fuel, or caused to fly at an increased speed while

consuming the same amount of fuel, this advantage accruing by reason of the decreased resistance to the air offered by the planes when in their altered position.

In order that this invention may be readily understood and more easily carried into practice, reference may be had to the appended explanatory three sheets of drawings, on which:—

Figure 1 is a side elevation of an aeroplane constructed in accordance with the present invention. Fig. 2 is a plan of the aeroplane shown in Fig. 1. Fig. 3 is a front elevation of the aeroplane shown in Figs. 1 and 2. Fig. 4 is a section on line A—B of Fig. 1. Fig. 5 is a side elevation illustrating a modified form of the construction. Fig. 6 is a front elevation of the construction shown in Fig. 5. Figs. 7 and 8 illustrate forms of clips, useful for assembling the hereinafter described framework.

In a convenient embodiment of these improvements the framework is built up essentially of a series of metal, wood, composite, or other rings or hoops, preferably of circular or elliptical or substantially circular or elliptical configuration, the said rings or hoops being secured or aggregated together in such a manner as to form the main frame of the machine.

Figs. 1, 2, 3 and 4 show an arrangement in which the fuselage, or main longitudinal portion of the frame is constituted of the five crossed pairs of hoops 1, 2, 3, 4, 5. Referring to the pair of hoops numbered 3 it will be seen on reference to Fig. 4 that each of the hoops of this pair is arranged at an angle of approximately 45° (say) to the vertical. The pairs numbered 1 and 5 are substantially the same in aspect as the pair numbered 3. Intermediate to the pairs numbered 1, 3, 5 are the pairs numbered 2 and 4. Each of the pairs 2 and 4 has its common axis arranged transversely of the length of the machine instead of longitudinally as is the case with the pairs numbered 1, 3, 5. By so incorporating the pair 2 intermediate to the pairs 1 and 3 the six hoops may be clipped or secured together at the eight points numbered 6, 7, 8, 9, 10, 11, 12 and 13. This is also the case with the pair 4 which is intermediate to the pair

numbered 3. and 5. The laterally projecting parts of the frame, by which the planes are carried, may be assembled in a manner differing from that of the longitudinal part of the frame. This is particularly shown in Fig. 3 from which it will be seen that each of the side extensions is composed of the two pairs of hoops numbered 14 and 15 both of which have their common axes disposed longitudinally of the machine. The pair of hoops numbered 14 are clipped or secured to the pair numbered 1 at the two points 16, 17, and the pair 15 are secured to the pair 14 at the points 18, 19.

It will be seen from Fig. 3 that the laterally projecting parts of the frame are not horizontal but slightly upraised; this is to provide for the lateral dihedral angle, and the upraised position may be attained by making the upper halves of the pair of hoops 14, less curved or of such form that the said upper halves of pair 14 are slightly shallower than their lower halves, thus causing the hoops of pair 14, from a front aspect, to constitute the diagonals of a rhomboid. Or if it be desired to use hoops all of the same formation the hoops may overlap at the points 16, 18 and may be secured at two places instead of one. The lateral framework from a front aspect may thus be constituted of three rectangles and two intermediate rhomboids.

It will be seen from Fig. 1 that the pairs 1 and 5 are upraised in relation to the pair 3. This arrangement permits in a particularly simple and satisfactory way of a longitudinal dihedral angle, *i. e.* an angle equivalent to the lateral dihedral angle, but which is apparent on viewing the machine from the side instead of from the front, and it will thus be understood that the aeroplane illustrated comprises five pairs of hoops for the front planes, five pairs for the back planes, and five pairs for the fusilage which latter however has one of its pairs common to the hoops for the front planes and another of its pairs common to the hoops for the rear planes. Such an arrangement, provided with both lateral and longitudinal dihedral angles is particularly stable when in flight. It is however to be particularly understood that the invention is applicable to numerous other forms or arrangements of aeroplanes. Also the construction of fusilage may be used with side extensions of any ordinary formation, constituted, for instance of spars.

Figs. 5 and 6 illustrate another method by which the hoops may be aggregated. The pair 22 has its hoops arranged at approximately 45° (say) to the vertical. The pair 23 has its hoops at substantially the same incline as that of the hoops of the pair 22 and the two pairs are clipped or secured together at points 24, 25, 26 and 27. In order that all the hoops may be secured to a common axial

tube the hoops of pair 23 may be slightly less inclined to the vertical than the hoops of pair 22, this being necessary to provide for the thickness of the hoop tubing at the points of intersection. Such a construction may be partially or entirely collapsible. Thus the frame may be made so that it can be disassembled into the various pairs of hoops for transport. Or each pair of hoops may be further divisible into the individual hoops or into half hoops or the pair of hoops may be divisible into two parts each consisting of two hoop halves joined together at an angle. Four longitudinal rows of stays 28 may be incorporated to strengthen the structure and to act as back-bone members, in tension or compression according to circumstances. Vertical struts 29 may also be provided, also horizontal struts 30, arranged as desired to add strength to the structure. Horizontal struts 31 in the front of the machine may serve to support the elevator 32 and may also support the propellers 36. The backbone of the elevator is enabled to strengthen the front transverse member of the machine through the medium of the struts 31. In addition to these there is preferably a main central stay or tube 33, or series of central longitudinal tubes on which the pilot seat 34 is mounted and from which the engines 35 may be suspended by a suitable framework. The engines 35, of which two may conveniently be used are disposed one on each side of the tube 33 and may each drive an independent propeller 36, or provision may be made for clutching the two propellers together to thereby cause them to work in unison. Conveniently four planes 37, 38, 39, 40 are used, extending completely across the machine, two being at the rear and two at the front. The said planes are suitably clipped or connected to the hoop framework. Of the front or rear pairs of planes the lower ones are smaller and are arranged a little in advance of the upper planes as by this arrangement the air is perhaps more beneficially diverted, and the efficiency of the lifting surface increased. Each of the four planes is fitted in five parts so that the backbone of each part forms a stay or strut connected to and tending to strengthen the main framework. Intermediate packing pieces are disposed between the extremities of such last mentioned struts. By virtue of the clips by which the hoops or pairs of hoops are connected together the position of any pair of hoops may be altered to adjust the position of the wings in accordance with the weight to be carried, or other circumstances. It will be obvious that the shape of the hoop framework is particularly adapted for the reception of the wings.

Figs. 7 and 8 show convenient clips, useful to provide for the various hoops and parts of the framework being clipped together and

also to provide for the straight struts and equivalent members being clipped in conjunction with the framework. Such clips or connecting devices are provided which are advantageously of a character permitting of the parts of the framework being adjusted to a different position, as for instance to permit of the aforementioned adjustment of the position of any pair of hoops in the operation of adjusting the wings. In an instance in which it is desired to clip together the tubes of two hoops, each tube is encircled by a collar 45 assembled in two parts and one of the said collars is provided with a boss 46 adapted to screw into the other collar in such a manner that the tube of the one hoop may take any inclination in relation to the tube of the other. In order to permit of the incorporation of straight struts or members the screwed boss or any suitable part between the two collars 45 may be encircled by a ring or equivalent member 47 having at or near its periphery one or more sockets 48 into which the extremities of the struts may be screwed or secured. Or if desired the periphery or perimeter of the ring member may carry one or more pivots 49 which carry the extremities of the straight struts, in such a manner as to permit of the latter being displaced into various positions, thus two straight struts may have perforated extremities 50 each of approximately half the width of the strut and which extremities are both secured upon the one pivot 49 by a nut or other suitable means. The extremities 50 may be formed integral with the struts, or preferably one or both are secured to the struts by a screw connection so that the extremity when detached from the pivot can be rotated to the desired length before being secured by the pivots from rotation. In Fig. 8 one of the extremities 50 is adapted to be screwed into the end of the strut, the other extremity 50 comprising a socket which receives the end of the other strut. The four pairs of hoops 15 are not rigidly clipped to the hoops 14 but are connected thereto by vertical pivots or trunnions such as 41 by which means the hoops 15 and side wings 42 may be swung either forwardly or rearwardly, to assist in balancing the machine. When the wings are swung forwardly their lifting effort increases and vice-versa. Thus when a greater weight is to be carried all four of the wings 42 are put forward. When turning to the right the wings on the right hand side are advanced and those on the left hand side retarded. Should the weight on one side of the machine be greater than that on the other the wings 42 on that side are advanced. The trunnions 41 may be as near as possible vertical in side elevation but are inclined in front elevation to conform with the lateral dihedral angle. The wings 42 may have parts 43 cut away so as not to

obstruct the extent of their displacement. By the foregoing description it will thus be understood that by so operating the planes I utilize the lateral dihedral angle to vary the lifting effort on either or both sides of the machine. Each of the wings 42 is suitably connected, as for instance by a wire, to the steering wheel or member and is preferably connected in such a manner that the ordinary operation of the rudders also operates the swinging planes in the required manner for turning. Means may also be incorporated whereby the wings may be operated individually or collectively by the steering member, but independently of the rudders. Provision may also be made whereby the wings 42 can be locked or temporarily secured in any desired position.

The rudders, of which four may be used, may be of the usual or of any suitable form, and it will be understood that the construction of the aeroplane is particularly applicable for the incorporation of four rudders two at the front and two at the rear. The steering member may also be adapted to operate the elevator in any suitable manner, the elevator being of any convenient or suitable form. The landing gear and other appurtenances may also be of any suitable or convenient form of construction.

By the use of two or more propellers arranged out of the center line and independently driven, it is possible to cause a greater volume of air to flow under one side of the aeroplane than under the other, thus giving a greater lifting effort on the one side, and by this means the aeroplane can be righted when heeled over (transversely). During this operation the aeroplane can be maintained in a straight course by a rudder and can thus be "righted" if desired, while at the same time maintaining a straight course.

Referring again to the construction of the framework it will be clear, on reference to the drawings, that the transverse structures are secured to the fuselage or longitudinal structure by the pairs of rings 2 and 4, overlapping the rings of the transverse structures, by which means a particularly efficient and satisfactory connection is effected. The hoops are conveniently of metal tube, the thickness of the metal of the tube being advantageously greater in those rings near the center of the structure than in those at the extremities. It will be noticed that the construction is almost exclusively devoid of wires such as are prevalent in the majority of machines at present in use, but if desired two wires 44 may be arranged to supplement the strength of the rear transverse member, or this may be done by strutting from pair 2 after the manner of the front transverse member. There are a few other points at which tension wiring may be employed with advantage.

While I have described the hoop construction only in connection with aeroplanes I wish it to be particularly understood that such construction in its various forms is not restricted to this application but may be used with particular advantage in dirigibles, aeroplane dirigibles, pontoon work, and numerous other purposes as will be readily understood.

What I claim as my invention and desire to secure by Letters Patent is:—

1. A flying machine comprising in combination, a structure composed of an assemblage of hoops arranged in alinement and disposed transversely of the longitudinal axis of the structure at the front thereof, planes mounted above and below said hoops and extending transversely of said structure, a rear portion comprising an assemblage of hoops extending transversely of said structure and in parallel relation to the front assemblage, planes mounted transversely above and below said rear assemblage, and a longitudinally disposed hoop structure connecting said front and rear assemblages, substantially as described.

2. A flying machine comprising in combination, a structure composed of an assemblage of hoops arranged in alinement and disposed transversely to form the front of said structure, a rear portion for said structure comprising an assemblage of hoops extending transversely of the machine and in parallel relation to the front assemblage, planes for said rear assemblage of hoops, and a hoop structure extending longitudinally of the machine and connecting said front and rear assemblages, substantially as described.

3. A flying machine comprising in combination, a supporting structure comprising a plurality of hoops arranged in angular relation with respect to each other, and supporting planes mounted on said hoops, substantially as described.

4. A flying machine comprising in combination, a supporting structure comprising a front part composed of a plurality of hoops arranged in angular relation with respect to each other, a rear portion composed of a plurality of hoops arranged in angular relation with respect to each other, supporting planes on said front and rear portions, and struts and tension members connecting said rear and front portions, substantially as described.

5. A flying machine comprising in combination, a supporting structure comprising a front portion composed of a plurality of hoops arranged in angular relation with respect to each other, a rear portion composed of a plurality of hoops arranged in angular relation with respect to each other, supporting planes for said front and rear portions, an intermediate portion composed of groups

of hoops connecting the front and rear portions, one group of hoops being arranged in angular relation with respect to the other group of such intermediate portions, substantially as described.

6. A flying machine frame comprising a plurality of hoops arranged in groups with the hoops of one group connected with each other and the groups connected with each other, the hoops of one group being angularly disposed with respect to each other, and the hoops of the adjacent group being angularly disposed with respect to each other and with respect to the hoops of the group to which they are attached, substantially as described.

7. A flying machine frame comprising a plurality of connected groups of hoops, the hoops of one group being angularly disposed at approximately 45 degrees from the vertical, and the hoops of the next adjacent group being disposed at right angles to the hoops of the first mentioned hoops, substantially as described.

8. A flying machine frame comprising a plurality of connected end and intermediate groups of hoops, the hoops of certain groups being disposed with their planes parallel with the longitudinal axis of the frame and the hoops of intermediate groups being disposed with their planes angular to the longitudinal axis of the frame, substantially as described.

9. A rigid frame structure comprising in combination, a plurality of rigidly connected groups of independent hoops, the hoops of each group being angularly disposed with respect to each other, substantially as described.

10. A rigid frame structure comprising in combination, a plurality of rigidly connected groups of hoops, the hoops of each group being angularly disposed with respect to each other, and the planes of the hoops of one group being angular to the planes of the hoops of the next adjacent group.

11. A flying machine frame comprising in combination, a plurality of groups of connected hoops, the hoops of each group being angularly disposed with respect to each other, some of said groups extending transversely of the longitudinal axis of the frame and the lateral group extending transversely being tilted upward bodily with respect to the longitudinal axis of the frame, substantially as described.

12. A flying machine frame comprising in combination, a plurality of connected groups of hoops with the hoops of each group angularly disposed with respect to each other and certain of the groups extending transversely of the longitudinal axis of the frame, the transversely extending groups being disposed on a curved line

with the outermost group elevated with respect to the longitudinal axis of the frame, substantially as described.

5 13. A flying machine frame comprising in combination, a plurality of rigidly connected independently formed hoops arranged in angular relation with respect to each other and in overlapping relation with respect to each other, substantially as described.

10 14. A flying machine frame comprising in combination, a plurality of independently formed hoops arranged in angular relation with respect to each other and in overlapping relation with respect to each other, and means for connecting said hoops at the overlapping junction, substantially as described.

15 15. A flying machine frame comprising in combination, a plurality of groups of in-

dependently formed hoops with the hoops 20 of each group angularly disposed with respect to each other and the hoops of adjacent groups lying in overlapping relation, and devices for rigidly connecting the hoops of adjacent groups at their overlapping 25 junctures, substantially as described.

16. A flying machine comprising in combination, a frame composed of rigidly connected hoops having a longitudinal and transversely extending front and rear por- 30 tions, and supporting planes on said transverse portion, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

JOHN WILFRID SEDDON.

Witnesses:

HAROLD N. KEY,

C. G. DIELL.