

Flight

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PARIS FLIGHT SALON.—General view of the centre of the Grand Palais, showing the "Stands of Honour." In the middle, immediately under the spherical gas-bag, is the famous Bleriot cross-Channel machine. To its right is the "Rep" monoplane, in the extreme right foreground is the Farman biplane, to the left a French-made Wright flyer, and continuing round to the left the machines are respectively an Antoinette, a Voisin, and another Bleriot. The decorated spherical balloon in the distance is the Montgolfier.

TRIALS AND TRIUMPHS OF SCIENCE AND INDUSTRY.

It is a somewhat remarkable thing that in France circumstances are apt to produce dramatic effects. Thus, at the very time when the apotheosis of all the work that the pioneers of flight have been doing for hundreds of years past was about to be revealed by the opening of the Paris Aero Show by President Armand Fallières, the funeral service of Captain Ferber, who gave his life for the cause he loved, was almost due to take place at Boulogne. That drew attention to the part of the price that has had to be paid in connection with flight by heavier-than-air craft, and that is the department of the science of aerial navigation which it is the prime object of the Exhibition to reveal. For there is no gainsaying that in the matter of ballooning and of dirigible ballooning, the Frankfort Exhibition must be adjudged infinitely more representative and of vastly greater scientific interest than the Paris Show. At the very time that the President of the Republic entered the Grande Palais, however, there were whispered to him the grave tidings of the unhappy disaster to the dirigible balloon "La Republique," so that, as it were, there was a token of the toll that has been exacted by both branches of aerial locomotion. But while on this particular point of the price that humanity is paying for the admiralty of the air, we may recall that in the course of a recent leader in *FLIGHT*, attention was drawn to the remarkably few lives that have been lost in the development of the heavier-than-air machine. That statement stands to-day. Furthermore, considering what has been achieved and that the achieving of it has been the constant launching into the unknown, dirigible ballooning has demanded relatively few victims, while ordinary spherical ballooning has long since advanced to a stage when, provided due precaution be observed, it is quite one of the most safe of sports. Furthermore, it is somewhat unfortunate that "La Republique" should have been ordered to go to make her fatal voyage when it has been especially understood that the engineer who designed the craft, and those who captained her, were alike undesirous of going. We do feel that this is one of those unfortunate cases wherein the military spirit of saying this or that particular thing shall be done, has been introduced inadvisedly and prematurely into aerial navigation. It has been the fault of our Navy that our commanders do not have to understand engineering. That is to say, they give the orders as to what they want out of the vessel, not understanding the difficulties of being able to meet those demands.

We feel that in the case of the dirigible balloon "La Republique," four lives have been thrown away. Whether they have or not, however, cannot mend the matter, so at least we may draw one fine lesson from it of benefit to England, and that is this, that there was not a single daily paper in France that one could pick up that had not its comments, words not of pessimism in a moment of national disaster, but of encouragement and inspiration to use that disaster only to forward the science. There was no lamentation though there was ample sympathy. All the accounts are to the effect that the lives were given in the cause of science, and in the cause of the country. For the reason that we have yet many things to discover and many risks to take, it is well that this attitude should be recorded by way of a standing example. It may be that one day a British dirigible will come by disaster in the course of some useful work, and should that hour ever come along, at least it will console us to think that there

is a fine precedent of conduct behind us in the example set by Germany over the Zeppelin disaster, and now by France in the mishap to "La Republique."

As to the industry, surely it should astound any Britisher, who imagines that aeroplaning is mere toying, if he were to go to the Paris Exhibition and to discover the evidences not only of perfect workmanship and superb design, but also of the tremendous amount of capital and brains that are embarked in the service of this science. The first lesson of this current Show should be surely to impress on the minds of all and sundry this fact—*aerial navigation cannot go back, cannot stand still, but must inevitably go forward.* From whichever point of view we review the matter, we find that flight is now on a commercial basis. Let us study the number of manufacturers engaged in it. There is not a single world-famous motor manufacturing firm that has not striven to evolve either an engine for use on a dirigible, or for service on an aeroplane. As examples of engineering they are a joy to study, while it is a proud thing to be able to record that quite one of the most admired pieces of mechanism in the whole Show are the British-built Wolseley engines, alike for aeroplanes and dirigibles.

In the matter of design, it cannot be said that there is anything very radically original at the Paris Show, and it may be in part that that is to be accounted for by the fact that the Show is held at an awkward season. It comes in the very midst of the competition season, and the staffs of the aeroplane manufacturers pure and simple are not so large that it is possible to keep spare men and machines away from the factory in order to be in a great show and on a field of competition at one and the same time. Even at the Paris Show, the Voisin Company, for example, does not display its latest machine, though that is doubtless due in part to the somewhat invidious arrangements of some of the exhibits, whereby, though there are four so-called "Stands of Honour," that pioneer firm is not represented on any one of the quartette. We contend that it is a mistaken policy, in any case, to have stands of honour. What one may style the system of cliques has been ever much in evidence in the past among motor manufacturers, especially in France, and it will be a regrettable thing if such a policy is to be pursued in the future concerning the new industry, which deals also with the problem of locomotion. One imagines that it would be better to have an Exhibition of this sort in the month of December, allowing it to replace the yearly motor show, which is an enterprise not likely to be revived in Paris, for once the series of these things is broken it is difficult to resume them. The month of December should be the more convenient for visitors from abroad; also in the main the flying competition season should be over by then, or at least there should be a hiatus in it before the opening of the meetings that are sure to be arranged in the neighbourhood of the Mediterranean in the early months of the year. Furthermore, December is a month removed from the time of our own Show in the spring, so that the two events would not clash in any way. Meantime, since the Juvisy meeting is about to take place, all who have leisure may be recommended heartily to go across the Channel to inspect this very fine display, which offers many suggestions of interest alike in the organisation of the Exhibition and in the aircraft displayed there.

SANTOS DUMONT'S "DEMOISELLE."

DETAILS OF THE SMALLEST KNOWN FLYER IN THE WORLD.

ALTHOUGH the historic cross-Channel Bleriot is a close rival to it, there is no doubt but that the chief centre of interest in the exhibition now open in Paris is that

Clement and Mons. Charron, whereby a thousand of these little voituresses of the air are to be turned out at a reasonable price, and within a short period.

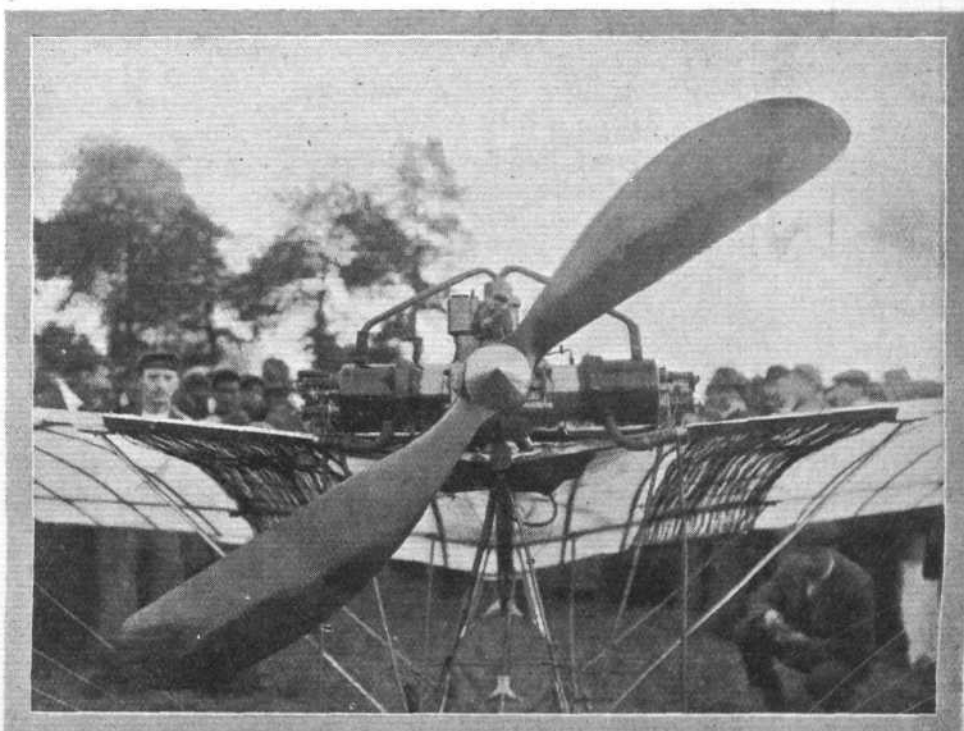
Apart from the more popular reason why so much attention is being devoted just now to the "Santos No. 20," there are many excellent technical reasons that warrant that attitude from all serious well-wishers of the science of flight. After all said and done, this machine has flown, and flown with ease and certainty almost from the first moment that it saw the light of day outside the factory, and yet its total weight is but 240 lbs. or thereabouts, while its external dimensions do not exceed some 20 ft. across by 18 ft. fore and aft, by 4 ft. 2 in. in height—or if the vertical dimension was taken to the top of the propeller in its extreme position the overall height is approximately 7 ft. 5 in.

For these reasons, and also because of the cunning manner in which that not altogether satisfactory material bamboo is used for the chassis, for the main planes, and for the rudder, the following detailed description which we are able to give will doubtless receive a hearty welcome from all readers. Accompanying this description

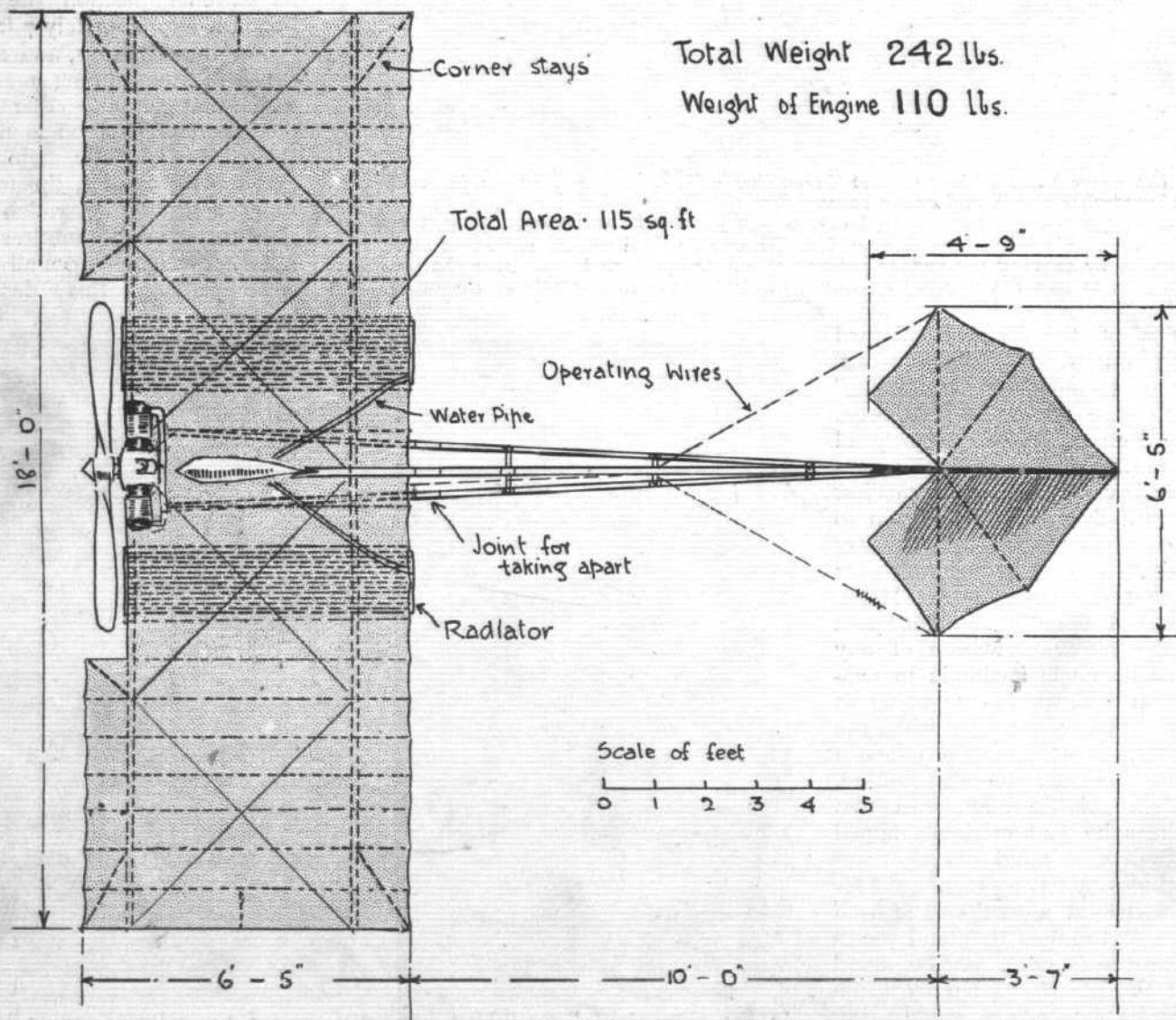
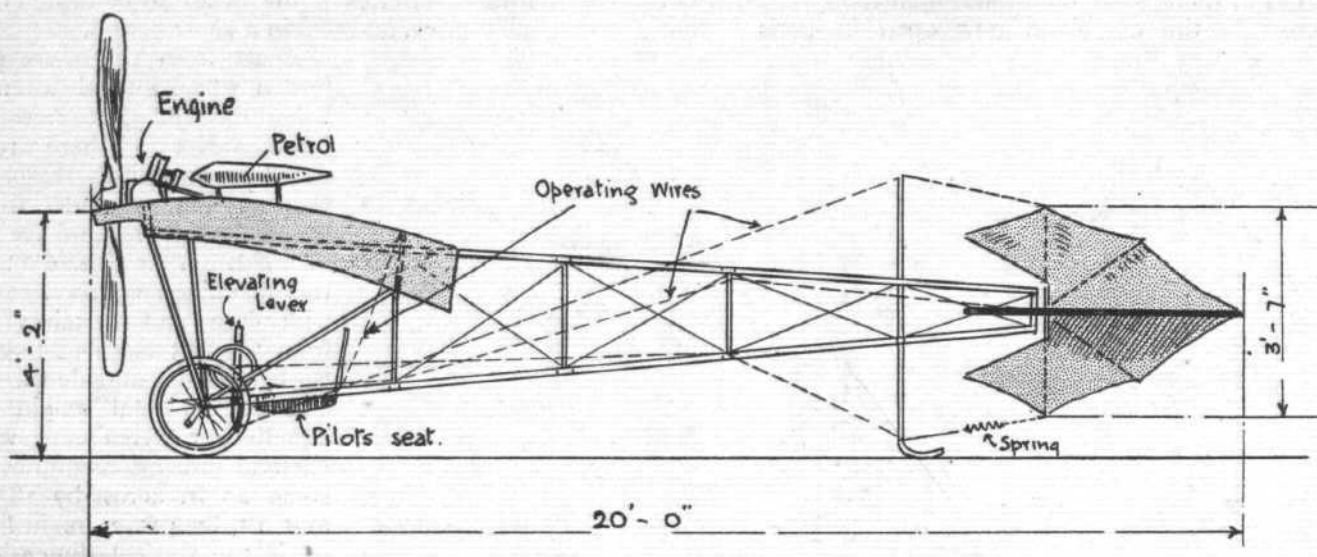


In the above central view of the "Demoiselle" M. Santos Dumont is occupying the somewhat rough and ready canvas seat that is provided for the pilot. He has in his right hand the elevating lever, which moves the universally-jointed tail up or down; his left hand is grasping the small wheel which serves to steer the machine by moving the rudder sideways, and at his back is the lever that enables him to flex the wings by leaning his body over to one side or the other.

corner of the Clement - Bayard stand on which reposes Mons. Santos Dumont's "Demoiselle," or, to give it the title it bears, "Le Santos No. 20." Partly all the world flocks round this monoplane because it is the smallest practical flyer which is known to have accomplished its primary object. But everyone also goes to see it in consequence of Mons. Santos Dumont's announcement of the free presentation of any rights he might maintain in connection with it, to the world at large. In connection with the exhibit, the designer has issued a printed circular for distribution, and in this he announces that whereas he had originally hoped that anyone could obtain these machines by having them built for themselves at a total cost of from some six to seven thousand francs (£240 to £280), yet he found that the prices charged by manufacturers for engines would inevitably increase that figure at the moment. The circular announces, however, that arrangements have been made by him with Mons.



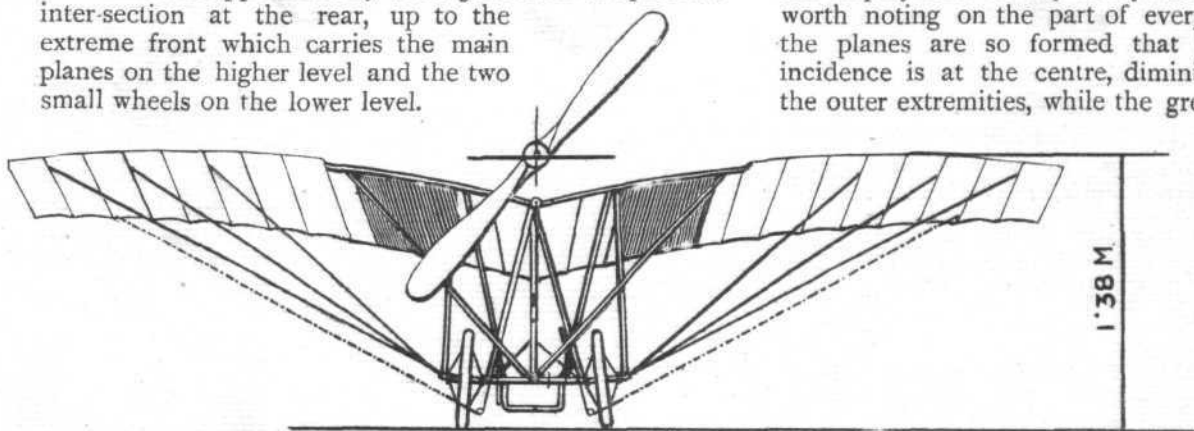
In the "Demoiselle" the 30-h.p. horizontal-opposed two-cylinder engine is fixed centrally above the dihedral angle made by the two main planes. The propeller, carried direct on the front end of the crank-shaft, is some 6 ft. 6 in. in diameter, and constitutes the fly-wheel. In the above view, the very straggling multi-tubular radiators lying on either side of the motor, and snugly stowed away beneath the main frames, are seen.



we are able to give a sheet of drawings of the type which we have already made peculiarly our own in this connection, besides another line drawing which comprises a front elevation of the complete machine and sundry photos that clearly demonstrate the nature of the framework as well as the manner in which the motor is carried upon it. The special drawing referred to has all the principal dimensions marked thereon, and as usual this comprises side elevation and plan. In addition to the photographs published herewith we would also remind the reader that four other views appeared in the last issue of *FLIGHT*, showing the machine in the air, being transported by motor car, and in respect to its important details.

The Chassis.

A main frame of girder construction is formed by three stout bamboos which are about 2 ins. in diameter at the thickest places, and are arranged two on a lower level with the other centrally above them. Inter-connecting them together are steel struts of oval section, and this main frame is approximately 16 ft. 5 in. from the point of inter-section at the rear, up to the extreme front which carries the main planes on the higher level and the two small wheels on the lower level.



The above front elevation of the "Santos No. 20," shows the method of staying the main planes, and also of flexing them. The drawing indicates, moreover, the positions occupied by the special radiators.

A practice is made in this machine of smoothing down all the bamboo knots, presumably to reduce their resistance, and of binding the bamboos between the knots so as to prevent splitting. All diagonal wires are, moreover, provided with neat little tighteners, none of which are more than an inch long. Our illustrations very clearly show the precise shape of the triangular girder frame, to which we have just referred, and also indicate the position and nature of the seat that accommodates the operator. This seat merely consists of a piece of canvas stretched across between the two lower main bamboos, the operator thus being placed quite low down in the chassis, and just aft of the two supporting bicycle wheels. Other features of the main frame are the provision of a special universal joint which carries the tail, and of a special vertical member fixed some three feet from the rear end, which not only serves to carry the wires which operate the elevator portion of the tail, but which has a runner formed at its foot to act in conjunction with the two wheels when the machine is resting on the ground. It will be observed that this runner is all that is required, inasmuch that as soon as the monoplane gets going the tail end lifts free of the ground before the fore portion rises.

A further important characteristic of the girder is that it is divided in the neighbourhood of the rear of the

main planes, so that it can be taken apart without difficulty. Brass sockets are fitted for this purpose.

The Main Planes.

Two main transverse spars constitute the principal members of the two main planes, which are set at a dihedral angle to one another, in accordance with M. Santos Dumont's well-known beliefs on this subject. These spars are of ash, but are not of an even section throughout their entire length, being heaviest a few feet away from the dihedral angle, where they are about 2 ins. wide by about $1\frac{1}{8}$ ins. deep and tapering down to a bare inch in depth, though still retaining a width of a couple of inches where they are joined to the central bamboo. The front spar lies some 9 ins. behind the leading edge of the frame, while the rear one is about 12 ins. forward of the trailing edge, and the planes are otherwise built up with bamboo ribs fixed beneath the two main spars while the surfacing is double and is formed of silk.

A further feature of the construction of the planes is the employment of light bamboo corner-stays which save the employment of any heavy end-rib, and are thus well worth noting on the part of every designer. In shape, the planes are so formed that the angle of greatest incidence is at the centre, diminishing slightly towards the outer extremities, while the greatest camber is not as

near the leading edge as usual, being barely in front of the centre.

With a total span of 18 ft., and a chord of 6 ft. 5 ins., it will be observed that the total area of the planes is about 115 sq. ft., and that the aspect ratio is approximately 2.8. As regards the camber, this is roughly about 4 ins. Other con-

structional details that are of importance while still speaking about the main planes, include the following:—The leading and trailing edges are caused to be quite sharp, owing to the use of wires that are fitted to the ends of the rib; pockets are formed in the planes, owing to a line of sewing being run between the various ribs; and another unusual detail is that no wires are to be found above the planes, all wire diagonals being arranged between the surfaces.

The Tail.

As already briefly indicated, the tail moves as a whole and is pivoted on a universal joint for that purpose. This part of the machine in particular is commendable in design, and the construction is certainly preferable to other methods in common use, in which one of the elements of the tail is divided in order to allow for the movement of the other. As will be observed, the ball-and-socket joint lies some 10 feet behind the trailing edge of the main plane, and the motion of the tail upwards and downwards for elevating, as well as sideways for steering, is controlled by steel wires in the manner that can to some extent be followed in our special illustrations.

Both tail surfaces are quite flat, being free from camber, and are stretched upon bamboo ribs. The horizontal surface constituting the elevator is 6 ft. 5 in. across from

tip to tip, and measures 4 ft. 9 in. fore and aft between its extreme points, while the vertical rudder surface has a similar shape, and an equal fore-and-aft dimension, but possesses a considerably less total area than the elevator.

Controlling Mechanism.

There are three principal means whereby the pilot can control the machine, apart from the switch-button, which is coupled up in the ignition system for the engine, and is fixed to the elevating-lever. The first of these is the elevating-lever, by means of which the tail is moved up and down, and this lever lies close to the right-hand of the pilot, as may be seen in our illustration. Next should be mentioned the small hand-wheel, which lies on the left, this controlling the steering-gear inasmuch as it enables the rudder to be moved bodily backwards and forward sideways. And thirdly there is a lever lying against the aviator's back which enables him to warp the wings by leaning his body over to left or right as may be needed. Leaning to one side causes the rear edge of the wing on the opposite side to be flexed downwards, and thus causes that side of the machine to rise. It will be observed that there is no actual connection between the wing-flexing and the tail control, which is a very important detail to be noted.

Another detail which concerns the controlling mechanism on "Le Santos No. 20" is that springs are introduced in the controlling wires for each of the steering systems so as to maintain them taut under all conditions.

The Engine and Propeller.

As regards the motor itself, this is of the twin-cylinder horizontal type with opposed cylinders. The bore and

stroke are respectively 130 mm. and 120 mm., and an output of about 30 h.p. is available, with a total weight of some 110 lbs. Brass jackets are used for circulating the water around the cylinders, and the valves, which are all mechanically operated, are situated in the cylinder-heads. Auxiliary exhaust-ports drilled through the cylinder-walls constitute an additional means of escape for the burnt gases, and the crank-shaft receives the propeller direct upon its front end, so that no additional fly-wheel is needed.

This engine is mounted upon the upper bamboo, and additional supports for it are provided between the cylinder-heads and the front transverse-spars of the main planes. It is, therefore, carried bodily up above the planes—indeed, at an unusually high altitude, and since the propeller is no less than 6 ft. 6 ins. in diameter, the blades consequently cut across the line of sight of the operator. The propeller, moreover, lies very close up to the leading edge of the planes.

Concerning the auxiliaries to the motor, a brass petrol tank of torpedo shape is fixed above the central angle of the planes, and the carburettor lies immediately beneath the motor, while a special type of radiator is used for cooling the water, and is placed on either side, as may be observed in our illustrations. This radiator is made in two sections, each of which extends the full width of the main planes, and is situated close underneath them. It is formed of very small tubes connecting a larger front tube with a larger rear tube, the small connecting tube being only about $\frac{1}{8}$ th of an inch in external diameter; some hundred of these tubes are employed on each side, and they are made of copper.

BLACKPOOL MEETING.

ALTHOUGH at the time of going to Press the final arrangements had not actually been completed, enough had been done to show that the Flying Week would certainly be held at Blackpool, and that a sufficient number of successful flyers had been secured to guarantee its success. The arrangements will be modelled on similar lines to that of Rheims, which worked so successfully, and four International events will be included. A provisional minimum list of prizes for these competitions has been drawn up as follows:—

Long Distance Race.

First prize, £2,000. Second prize, £720. Third prize, £280.
In addition, at least £400 will be given to the aviator remaining longest in the air, should he not gain either the first or second prize.

Speed Race (distance not yet decided).

First prize, £400. Second prize, £100.

Passengers' Race.

(Distance and rules not yet decided, but probably the calculations will be on the greatest total weight carried.)

First prize, £400. Second prize, £100.

Height Competition.

First prize, £600. Second prize, £240. Third prize, £160.

The chief prize in the distance contest (£2,000) has been presented by the Lancashire Aero Club, and that body is contributing £5,000 towards the guarantee fund. A prize of £500 has been offered by the *Daily Mail*, and the £1,000 *Daily Mail* prize for the first circular mile flight by a British aviator on a British machine will be open for competition during the week. A very encouraging feature is the number of entries which have

been received from British flyers, and it is hoped that one result of the meeting will be to show that Great Britain is not so backward after all. At the request of the Aero Club, the donor of the £500 prize for flying round the Blackpool Tower has agreed to withdraw it.

Already the work of preparing the aerodrome on the South Shore has been commenced, and the scale of charges for admission drawn up. Reserved seats in the grand stand will cost from three to five guineas for the week, according to position, while for admission to the paddock in front of the grand stand, where 10,000 people can be accommodated, the charge will be ten shillings per day or two guineas for the week. And in the one shilling and two shilling enclosures between 80,000 and 90,000 people can find standing room.

Altogether it is estimated that the cost of the meeting will amount to £17,000, and it has been decided that the subscribers to the guarantee fund will share the profits after all expenses have been paid. With a view to ensuring that visitors may not be kept away by fear of exorbitant hotel charges, the Blackpool Corporation announce that they have come to an understanding with the hotels and boarding-houses in the town that their charges during the week shall not be more than 5 per cent. in excess of the usual rates.

Among the best known aviators who have made arrangements to come are Mr. Henry Farman, M.M. Paulhan and Rougier, while Mr. S. F. Cody will in all probability be amongst the flyers. Mr. J. T. C. Moore-Brabazon, Mr. Frank McClean, and Mr. A. M. Singer are prominent in the list of Britishers who are likely to be seen in the air during the meeting.