BULLETINS

OF THE

Aerial Experiment Association

Bulletin No. ~~XIV~~ _____ Issued ~~MONDAY, OCT. 12,~~ 1908

MR. McCURDY'S COPY.

BEINN BHREAGH, NEAR BADDECK, NOVA SCOTIA

Bulletin Staff.

Alexander Graham Bell.....Editor.
Gardiner H. Bell.....Asst. Editor.
Charles R. Cox.....Typewriter.
Mabel B. McCurdy.....Stenographer.

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Beinn Bhreagh, Near Baddeck, Nova Scotia.

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A MEMORIAL TO SELFRIDGE.

Why not publish Selfridge's paper on "A Brief sketch of the Progress of the art of Aviation", which appeared in Bulletin No.II, as a memorial to him. His father has given his consent to its publication outside of the Association provided the manuscript is revised by some expert to see that the statements and references contained in it are correct. Mr. Chanute has undertaken to do this.

We could prepare this volume with a biography of Selfridge with his photograph as a frontispiece. The Chairman has already been requested to appoint a committee to prepare a biography to be incorporated in the records of the Association, and has appointed our new Secretary, Mr. J.A.D. McCurdy as the Committee. Mr. McCurdy will have no difficulty in obtaining details of the life of Lieut. Selfridge from members of the family, and he himself personally was closely associated with him during the whole period of his connection with the Association.

We could add very greatly to the interest and value of Lieut. Selfridge's paper by making a collection of photographs of the different forms of apparatus alluded to by him and reproducing them in proper style as a photographic appendix to the paper.

The addition of an index would make the volume a real contribution to the literature of Aviation. Indeed it would become the standard work upon the subject.

Mr. Ernest La Rue Jones, Editor of Aeronautics has had the opportunity of reading Bulletin No.II, and he expressed

the desire to publish the whole work in parts in his Magazine. I stated that there was no objection on the part of the Association to the republication of this article, but that of course it would be necessary for him to obtain the consent of the author himself. Before he could do so the accident to the Wright Brothers flying machine occurred, and he was unable to obtain the permission of the author, although I am sure that Lieut. Selfridge would have been only too glad to give his consent had he known of the correspondence.

I have just received the following note from the Editor of Aeronautics refering to the matter:-

COPY.

AERONAUTICS,
Broadway and 57th Street,
New York.

New York, Sept. 30, 1904

Dr. Alexander Graham Bell,
Harmondsport, N.Y.

Dear Dr. Bell:-

> Referring to Lieut. Selfridge's as to Aviation, would it be proper to publish this history in the Magazine? The City Editor of the Philadelphia Inquirer has asked me to beg the same privilege from you for his paper, and if permission is granted, I would furnish him with the copy. I have made a copy of the history, and will return your copy to Nova Scotia.
>
> Please accept my sincere thanks for the privilege of seeing this, and trust there will be no objection to printing it, as I know of no other work that is as concise, and, at the same time, complete as this.
>
> (Signed) E.L. Jones.

Of course it would be possible for us to have the volume printed without any expense to us by taking advantage of the request from the Editor of Aeronautics. We could print

it in parts in his magazine, and give us a number of copies to be bound up in book form for presentation to personal friends of Lieut. Selfridge, and to public libraries. The only question is whether the printing and illustrations would be sufficiently good for our purpose. The illustrations that appear in Aeronautics are not of the best, nor indeed does the paper used in the Journal admit of very fine reproductions. There is another consideration, the volume would be sufficiently important to be presented to the public through a suitable publisher; a large number of copies could undoubtedly be sold. I propose to write to the Editor of Aeronautics requesting him to take no action in the matter until we have considered fully what to do.

My present idea is to submit the manuscript to Mr. Chanute for correction, and make a collection of photographs to illustrate it. We would then publish the book and present the copyright to Mr. H. A. Selfridge. We could allow "Aeronautics" to reprint the article in parts at their own expense, or do the printing for us if the Editor will use such quality of paper as we approve. We could supply him with plates to make suitable illustrations and make an arrangement with him by which we could pay a portion of the expenses in order to secure a satisfactory publication. This would be cheaper for us than if we were to assume the whole cost of publication ourselves. The plan would also assist the Journal "Aeronautics" and it is certainly consistent with the objects of the Association to give a helping hand to such a Journal during its period of infancy. I should be glad to hear the views of the members of the Association individually regarding the suggested memorial to Selfridge. A.G.B.

McCurdy to Mrs. Bell.

To Mrs. A. G. Bell,
Baddeck, N.S.

Hammondsport, N.Y., Oct. 2, 1908:- About Mr. Bell coming to Hammondsport:- The "Silver-Dart was all ready absolutely, all but the engine which is well under way, and we expect to start flying within two weeks time at the outside.

Now Mr. Bell said that he would like to come here, if we were all ready to fly at once, but as we were not, there really was nothing for him to do except look at the machine. He was awfully nice about it, and said that he would come if he could be of any use to the game and us, but as it would only mean looking at the structure and going away, and the structure was in general lines, the same as he had already seen he thought that he would go right through to Baddeck.

He decided at the last to stay over (in Washington) and help out Mrs. Hubbard with her reception; so Casey and Gardiner came on to Hammondsport with Glenn and myself.

Casey wanted so much to fly. We had hard luck all round and poor Casey didn't get in the air. However that is nothing. It has happened lots of times before with all of us. It was so nice being all together again and talking with each other. The pleasure was only marred by one thing and that was the absence of old Tom.*** The weather here is getting pretty bad for flying all the time. Winds blow almost every day. We are staking a lot on the "Silver-Dart's future with new engine. It will be such a satisfaction to have the engine maintain its power indefinitely so that you can come down only when you want to. Casey and Gardiner left for Boston yesterday. J.A.D. McC

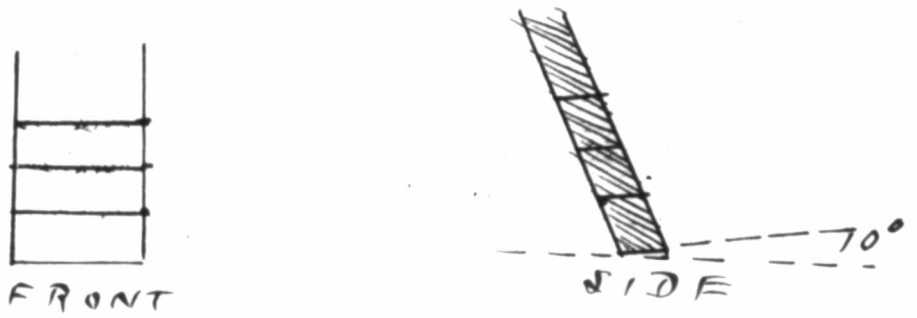
BALDWIN'S EXPERIMENTS WITH HYDROPLANES, OCT. 6, 1908: By Gardiner H. Bell.

Exp. 1. On Oct. 6, the Dhonnas Beag was tried out with the new propellers. Each of these propellers is 2.28 meters in diameter with a pitch of 30° at the tips. The boat was tried on the regular 100 meter course with the following results:-

100 m in 15 sec down
100 m in 19 sec up
200 m in 34 sec

In the above experiment no hydroplanes were used.

Exp. 2. We then put on three sets of hydroplanes each set of four blades inclined at an angle of about 10°.



The speed in this case was:-

100 m in 26 sec down.

In trying to turn at the lower end of the course, the rudder became disabled and the Dhonnas Beag had to be towed home. Throughout the experiment the wind, which was light, blew down the course.

It may be seen that the hydroplanes were anything but satisfactory, but it is hoped that the new ones which are to be constructed on a different plan, will give successful results i.e., increase the speed instead of diminish it.

Exp. 3. After repairing the rudder another experiment was tried in the afternoon with the same outfit. The boat had no more than gotten headway when the taper pin clinching the sprocket to the propeller shaft, was sheared off. This ended the experiments for the day.

It may be stated that the trial with hydroplanes was purely an experiment, and that after familiarizing ourselves with the subject we shall undoubtedly attain better results. G.H.B.

BALDWIN'S EXPERIMENTS WITH HYDROPLANES, OCT. 8, 1908: by Gardiner H. Bell.

On Oct. 8 the Dhonnas Beag was tried out in view of gaining more knowledge of the hydroplanes, and the following results have been reported:-

Exp. 1. Double propellers were used throughout the experiments, 2.28 meters diameter, and 30° pitch at tips, with the following result:-

100 meters in 24 sec.

At this point the engine acted badly, and a non-vibrating coil was connected up in place of the former one. In above experiment two front hydroplanes alone were used, causing the boat to lift out of the water forward about four inches.

Exp. 2. Same outfit as with experiment 1 with a result:-

100 meters in 25 sec down.
100 meters in 39 sec up.
200 meters in 64 sec

Exp. 3. The forward planes were taken off and the after ones put on, with a result:-

100 meters in 24.5 sec down.

The boat still did not steer well and was towed back.

Exp. 5. Then an experiment was made to try and ascertain the lift of the hydroplanes. The boat was lifted out of the water, in the rear about three inches (as in Exp. 3) by means of a spring balance attached at the point where the hydroplanes were. The balance registered 75 lbs. Hence in experiment 3 the hydroplanes had an approximate lift of 75 lbs.

G.H.B.

BALDWIN'S EXPERIMENTS WITH HYDROPLANES.

By A. G. Bell.

Mr. Baldwin is rather disappointed with the results so far obtained with the hydroplanes he has employed on the Dhonnas Beag. Without the hydroplanes the boat makes a speed of about 13 miles an hour; with the hydroplanes this speed is cut down about one-half without much apparent indication of lifting the boat; so that under the present arrangement the boat is impeded without any counterbalancing advantage.

Mr. Baldwin thinks that there is no reason why we should not obtain results comparable to those obtained by Forlanini. We do not, however, know precisely the dimensions and arrangement of the hydroplanes used by him. We only have the idea of a Venetain Blind sort of arrangement under water.

The hydroplanes used by Mr. Baldwin consist of blades of iron about 25 x 4 cm, and about 3 mm thick. There are three sets, each set consisting of four hydroplanes. The total surface of the submerged hydroplanes is therefore about 1200 sq. cm.

When the frames are vertical the hydroplanes make an angle of 5° with the horizontal as in Fig. 1. When the frames are sloped forwards as shown in Fig. 2 the hydroplanes make an angle of about 10°. The encouraging feature of the experiments so far, is that the speed of the boat is markedly greater with the hydroplanes at five degrees than at ten. This shows that the hydroplanes are producing some sort of effect, at least so far as drift is concerned; and it is reasonable to suppose that there is a corresponding effect upon lift even though we

have not the means of measuring it. It is to be noted, however, that the greatest retardation was observed when the framework was sloped forward as in Fig. 2, in which case there was a vertical component of pressure downwards offered by the vertical framework itself.

This suggests the thought that it might perhaps be advisable to slope the framework backwards as in Fig. 3, so that there should be an upward instead of downward component of pressure due to its resistance. This of course would involve changing the setting of the hydroplanes to prevent them from being inclined at a negative angle.

It might also be worth considering whether the sloped-back verticals might not alone be used as hydroplanes. The present hydroplanes have to be made of pretty thick material to stand the pressure upon them. Whereas, if the verticals were used as hydroplanes by being sloped backwards sufficiently (see Fig. 4) there would be better economy of material. The width of the planes extending from fore to aft resisting better the pressure of the water.

The front edges could be thickened instead of presenting a knife edge if desired, and the whole arrangement would be somewhat like a hay rake with blades instead of prongs. A.G.B.

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FIG 1.

SAFETY:

By A. G. Bell.

In the development of the Hammondsport machines a great deal of attention has been paid to the means of operating the various controls. The steering-wheel by means of which the front control and the vertical rudder are operated, and the body-fork for working the lateral controls are undoubtedly convenient; but comparatively little attention has been paid to the comfort and security of the operater.

I think it would be well to consider what changes might be advisable in the interests of safety in the event of a serious accident. At present the man is cramped into a small space with hardly room to move. The only provision for his safety in case of accident seems to lie in the large extension of the apparatus in the longitudinal and lateral directions. In making a bad landing one of these extensions comes first to the ground; and, by crushing gradually in, acts as a buffer to reduce the shock of alighting. The man is saved at the expense of the machine; and fragility of construction becomes an element of safety.

The tendency of development however, has been to save the machine from damage by increasing the strength of its parts; but every increase of strength involves increased shock to the man at the moment of landing. If the machine crushes in, the shock to the man will be slight; whereas if it does not break, or yield to the blow, the operator will experience the full effect of the shock.

In the interests of safety I would suggest that the operator should have something solid above him to hold on to, and room in front of him to swing forwards and upwards when the shock occurs, as the bob of a pendulum would do under similar circumstances.

A year or two ago a railroad train carrying American passengers from Liverpool to London was badly wrecked; and all the people in one of the cars were killed or injured, with the exception of one man, who saved himself by swinging freely from some part of the car with his feet clear of the floor.

Of course any application of the swinging principle to an aerodrome would involve a clear space in front of the man which would permit his body to swing forwards and upwards under the sudden shock of a bad landing.

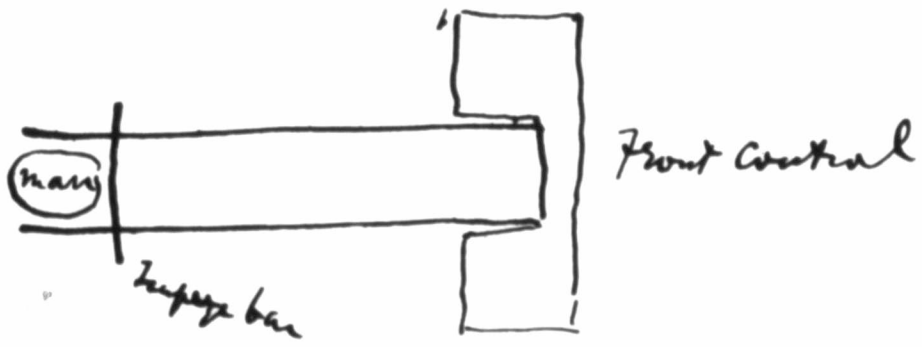
This would involve a change in the arrangement of the steering gear; but on the principle of considering only one point at a time so as not to have the mind distracted by side issues which only tend to produce confusion of thought and vagueness of conception, we will for the moment avoid the consideration of what changes in the steering gear would be necessary or advisable, and limit ourselves to the central thought of swinging, for safety, in an emergency.

A simple holding-on strap like those found in street cars would be sufficient to materially decrease the chances of injury. A universal-joint arrangement like this would require free space, not only in front of the man, but around him, so that he should not be thrown against any part of the apparatus.

It would be a comparatively simple matter to incorporate in an aerodrome a sort of trapeze bar for the operator to hold on to, and this idea seems to me the most practicable to form a basis for development.

In a practical aerodrome the center of gravity is in advance of the center of surface, so that when from any cause headway is lost, the machine tends to dive. Loss of headway was undoubtedly the cause of the dive that cost poor Selfridge his life. It is against the disastrous results of such a dive that the operater chiefly needs protection. So long as we have headway our various controls, which are really rudders, will operate; But all rudders are useless when headway is lost; and all our aerodromes under such circumstances are liable to dive. We should certainly give serious attention to the development of means for minimizing the danger to the operater.

In an aerodrome like the "June Bug", in which the front control is carried upon the end of an extension containing two parallel bars separated by a space there could be little difficulty in arranging a trapeze bar in front of the man at a convenient elevation across the longitudinal rods.



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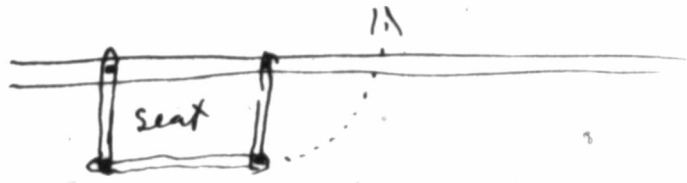
Or the man might sit upon a swing: The longitudinal bars for example, might afford support for a swinging seat arranged after the manner of parallel rulers.



This arrangement is capable of development in quite a number of interesting ways. At first sight the disadvantages seem to outweigh the advantages; but we will avoid the disadvantages and consider only the advantages, for that is the way to advance an embryo invention.

While it would never do to have a loose swinging seat alone, it is obvious that the man could brace himself against a fixed, rigid, feet-rest, and could further support himself by resting his arms upon the fixed longitudinal supports.

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There are great possibilities of development here. It is obvious that the swinging seat could be connected by levers so as to operate the front control, or a horizontal tail, or both combined, in an automatic manner through the weight of the man. At the same time, the man, through the medium of his fixed foot-rest and the fixed suporting bars on which he rests his arms, would have full power of adjusting the position of his seat in any way he chooses. In fact a voluntary movement of his seat could be made his means of steering in a vertical direction up or down.

The automatic feature too may be of importance especially in an emergency when a man is apt to lose his head. Suppose the man to be seated on his swing, say with his arms folded and his feet clear of the foot-rest, then his weight would tend to keep the vertical supports of his seat in a vertical position. Now if from any cause the machine should dive, his seat would swing forwards under the influence of gravity, thus operating the front control automatically to steer the machine up. Or suppose that the machine from some cause should move upon an upgrade instead of pursuing a horizontal path the seat would swing backwards thus operating the front control automatically to steer the machine down. This automatic action, however, would not interfere with voluntary control of the steering gear by the operator himself.

In this way the course adjustments would be controlled automatically by gravity and the fine adjustments by the voluntary act of the operator himself. A.G.B.

CUTTING EDGES: By F.W. Baldwin.

Dr. Chanute suggested an improvement that could be made in our aero-surfaces of the Red Wing type which seems to have a very wide application to the general design of aerodromes or hydro-dromes.

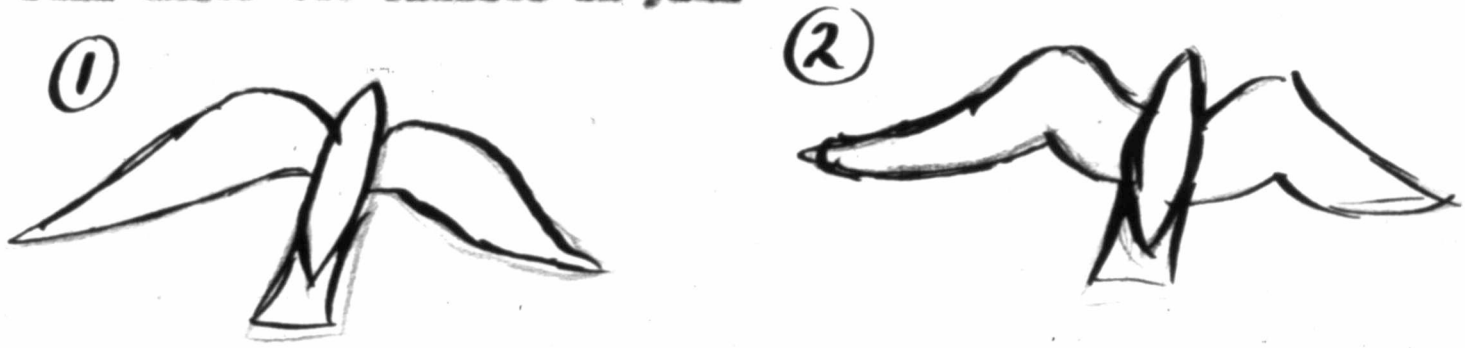
His suggestion was to put the curved edge in front instead of the straight one as in our present arrangement.

The reason for this change is apparent and yet none of the machines we have at present are designed with a view to having slanting or curved cutting edges. A wedge naturally offers less resistance to the air than does a plane driven at right angles to the line of flight. A great deal of attention is paid to the cross section of struts etc. to insure a fair form, but none whatever to the angle at which the strut itself cuts the air. The French expression "angle of attack" seems to express the idea better than the angle of incidence. Now why should all our cutting edges, whether of the supporting planes or of the truss itself, be presented at right angles, so as to offer their maximum resistance?

Take the case of a simple flat equilateral triangular glider. Compare its efficiency first with the apex as a cutting edge and then with one flat side as a cutting edge. It offers much less resistance (i.e., it is a more efficient glider) with the apex leading. In this case twice the length of cutting edge is presented to the wind at a cutting angle of 60° and it is more efficient than when one edge is presented at 90° to the wind. Of course there is a limit beyond which it would not be advantageous to reduce the cutting angle, but it seems to be

a case in which the two sides of a triangle are better, if not shorter than the third side.

Rushing off to nature to support our ideas by analogy is, I think, very apt to be misleading unless we have a clear idea of the object served by a certain feature, but as far as I know from a very limited knowledge of the shape of birds wings the cutting edge never is at right angles to the line of advance. From a hazy recollection it seems to me that wings fall under two classes in plan

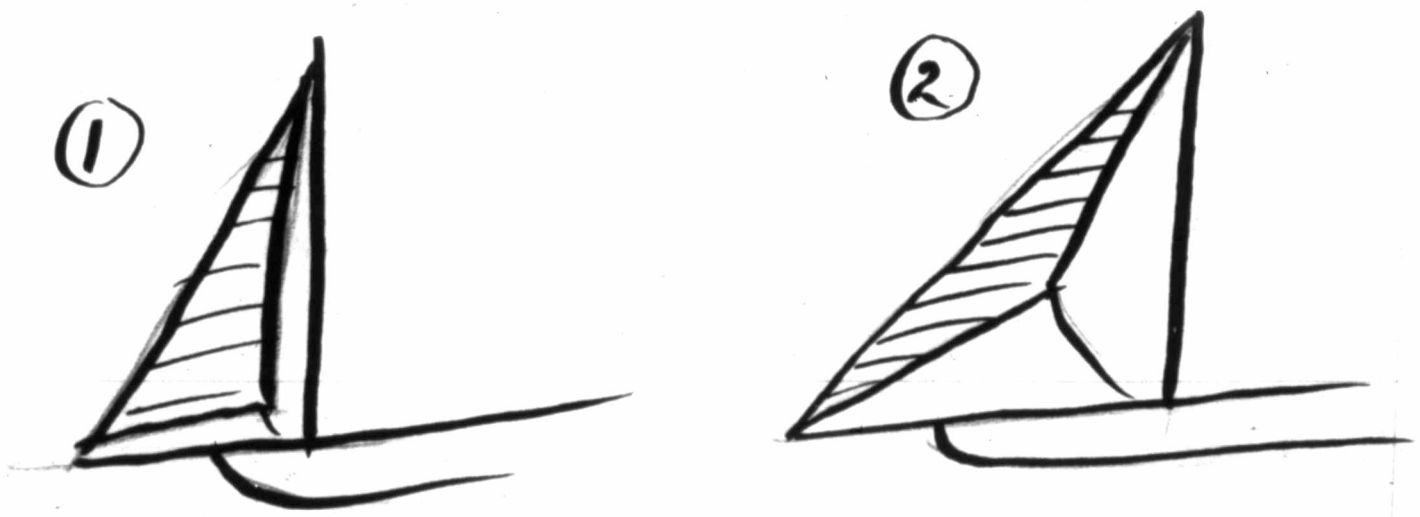


both of which have a slanting cutting edge. Propellers bear out the same principle. Modern practice in high speed water propellers has been to rake the blades back radially more and more. Why?

Why has Mr. Wright employed a propeller which is analogous to type (2) of the birds wing?

-3-

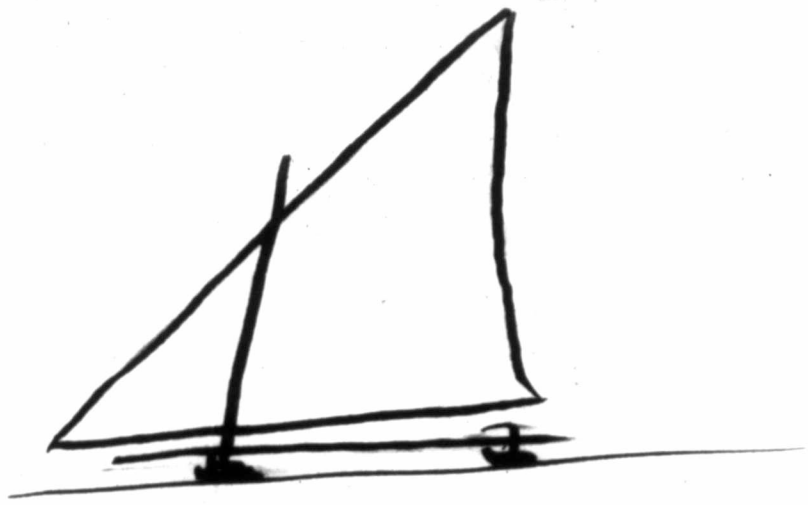
The best form of sails bears out exactly the same idea. Mr. William Fyfe one of the most successful designers in the world made a large number of experiments to determine the best shape for the headsails of boats and came to the following conclusion:-



Sail (2) with the long easy cutting angle was much more efficient in windward work than (1) although both sails have exactly the same area.

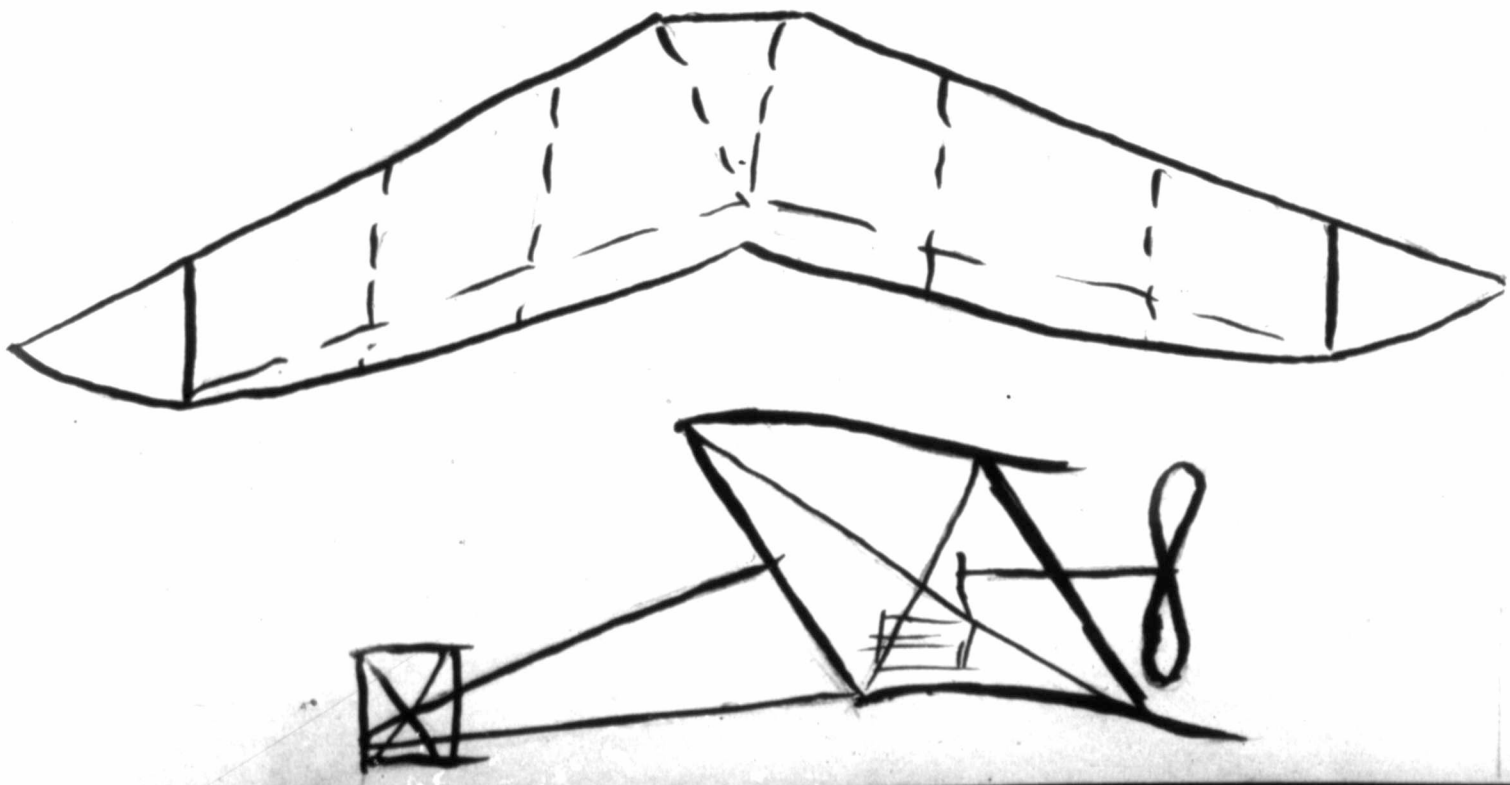
In the sail plans for ice-boats (which are more nearly comparable to the aero-surfaces of a flying machine) the shape of the sails with respect to the cutting edge is more fully appreciated.

On ice-boats the old lateen rig is very hard to beat in spite of its many disadvantages.



Wherever we look the angle of the cutting edge emphasizes its impertance. We object to using wire one gauge larger than necessary or to its vibration, because of the increased head-resistance, and yet persist in driving the framework of the whole machine through the air in the worst possible way at right angles to the line of flight.

Trusses of the Red Wing type lend themselves easily to a greatly improved angle for the cutting edges with possibly some advantages in fore and aft stability. F.W.B.



THE SELFRIDGE MEMORIAL.

(Suggestions by Mrs. Bell).

The best way to make a permanent Memorial of Lieut. Selfridge is to publish his paper in such form that it would be attractive to, and therefore reach the largest possible number of those more or less interested in Aviation and in deeds of heroism.

Pamphlets to my mind are generally so much money wasted. In the first place they are very commonly thrown unopened into the waste-paper basket, even when opened and read with approval their preservation is a matter of difficulty owing to their shape, which is not adapted for bookshelves.

I would therefore suggest that the paper be published by some publishing house like The Century Company. The copyright is not it seems to me a matter of moment. Mr. Selfridge has sufficient means, and the A.E.A. is not proposing this as a pecuniary thing. With Chanute as Editor - a foreword from you - and with illustrations inserted in the body of the work - the index - and a good biographical sketch, and his photograph - also a photograph illustrating the work of Orville Wright with whom his name will always be associated - it seems to me we could produce something that would be widely distributed. I am premising of course that the paper is, as you say, of importance.

In regard to Aeronautics, I agree with you we should help it all we can, but in this case our chief object is the memorial to our comrade, and everything must be subordinate to that. Aeronautics might be allowed to publish it, but the publishing house should be consulted first. M.G.B.

THE LAUNCHING OF AN AERODROME:
By Gardiner H. Bell.

At the present stage of the game there are three distinct ways of launching an aerodrome, namely, The Wright's method, which necessitates the use of a starting machine; the method of rising into the air on wheels used at Hammondsport, and elsewhere, and that of rising from the water.

It is easy to see that each of these modes of ascent has its difficulties. The first, because without the starting apparatus an ascension cannot be made; the second, because a long, level stretch is not always at hand, and the third, for the same reason and also because sufficient speed cannot be attained by the machine's own motive power, causing it to rise from the water. Though it has its difficulties, the third and last way is the safest, and if only for this reason, should be encouraged.

There is a scheme on foot which will embody three distinct phases in rising, caused by increase of speed. The machine is to be a combination of aeroplanes, boat, and hydroplane. It will commence headway as a boat, when headway is increased it will rise on its hydroplanes, insuring a still greater speed, in turn bringing into play the aeroplanes which will take it into the air.

G.H.B.

THE OUTLOOK ON AVIATION: by Gardiner H. Bell.

The following is a partial list of articles relating to Aviation, which appeared during the month of September.

The Airship is here: by Frederick Todd. The World's Work, Sept. 1908.

First rate article. Pictures exceedingly good.

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The Real Navigation of the Air: By George H. Guy. Review of Reviews, Sept. 1908.

An article which covers pretty well the work being done in foreign countries. It also speaks of the Zeppelin Dirigible.

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The Wright Brothers Aeroplane: by Orville and Wilbur Wright. Century Magazine, Sept. 1908.

This article is one of a very few we have had from the Wright Brothers. It traces their experiments from the beginning. Though it is not a detailed account, it is, nevertheless interesting.

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The Aeroplane and Its Future: By Henri Farman. The Metropolitan Magazine, Oct. 1908.

This article contains principally a biography of his own machine.

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GENERAL REMARKS.

There seems to be more activity in the aerial world abroad than there is in this country at the present time. This is only natural under the present circumstances, however.

At Le Mans, France, there seems to have been some rivalry between Wilbur Wright and Henri Farman. On October 1, Farman succeeded in covering a distance of 36 kilometers. It is stated that had he not met with some slight accident, causing him to land, he might have succeeded in giving Wilbur Wright a close race. At present Wilbur Wright's record is 48 kilometers - the farthest distance yet covered by a heavier-than-air machine.

It seems that the Russian Government is making contracts for a heavier-than-air machine for naval use, whose principal feature must be in flying slowly; for they claim that unless a machine can accomplish this it would not be practicable for naval warfare.

It is understood that Mr. A.M. Herring of New York is to deliver a machine to the Government before Oct. 14. Mr. Herring has never tried out his machine, and indeed, little is known concerning it, for all of his work has been done in secret. Mr. Herring does not consider Fort Meyer a suitable place for carrying on his experiments, and has asked that an officer be detailed to go with him elsewhere.

The Nations of the world are beginning to realize the tremendous part which aerial machines are to play in the future of their armies and navies, and they will use every possible means to be first in the art of aerial navigation.

G.H.B.

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