BULLETINS

OF THE

Aerial Experiment Association

Bulletin No. III Issued MONDAY JULY 27, 1908

MR. McCURDY'S COPY.

BEINN BHREAGH, NEAR BADDECK, NOVA SCOTIA

Bulletins of the Aerial Experiment Association.

BULLETIN NO. III ISSUED MONDAY, JULY 27, 1908.

Baddeck, Nova Scotia.

Bulletin No.XII----------Monday----------July 27, 1908----

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THE BULLETINS OF THE AERIAL EXPERIMENT ASSOCIATION:

by A. G. Bell.

The Bulletins of the A.E.A. are prepared by Dr. A. G. Bell, Chairman of the Association; and are typewritten by his Private Secretary, Mr. Charles H. Cox. Mr. Cox makes one original and six carbon copies which are distributed as follows:

1. Association Copy (the original)
2. Dr. A. G. Bell's Copy.
3. Lieut. T. Selfridge's Copy.
4. Mr. F. W. Baldwin's Copy.
5. Mr. J.A.D. McCurdy's Copy.
6. Mr. G. H. Curtiss's Copy.
7. Beinn Bhreagh Laboratory Copy.

Bulletin No. 1 was issued Monday, July 13, 1908; No. II, Monday July 20; and the present Bulletin No.III appears Monday, July 27. Weekly issues may be expected in future if the members of the Association will lend their assistance to the Chairman by contributing material so that the whole labor of preparation may not fall upon him alone.

The Bulletin material should be considered as confidential by members of the Association, excepting where it may be thought desirable by the Association to permit the re-publication of special communications in the technical journals, or in the daily press.

There could be no possible objection to the re-publication of historical material like Lieut. Selfridge's paper in Bulletin No.II, or the Associated Press Dispatches sent by members. In fact most of the Bulletin material could be freely offered to the Public without injury to the Association.

Communications, however, relating to the future work of the Association, or of its members, and statements of in-

ventions or discoveries by members, should be considered as strictly confidential unless otherwise decided upon by vote of the Association. Mr. Curtiss's plans for an improved motor, for example, which appeared in the first Bulletin, may perhaps give rise to a patented invention by Mr. Curtiss. The interests of Mr. Curtiss, and of the Association, therefore demand that the article in question should not be given to the general public at the present time: and so also with other papers of similar character.

Discretional power should be given to the Secretary to permit the re-publication of material from the Bulletins. He should report to the Association from time to time what permits he has issued and obtain the formal approval of the Association in order to relieve him from personal responsibility.

Re-publications should contain a statement to the effect that the articles in question have been copied from the Bulletins of the A.E.A. "by permission of the Association".

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NOTES.

Patent Examination:--- After making a thorough examination of aerodrome No. 3, "Curtiss's June Bug" at Hammondsport, N.Y., Mr. Cameron reports that he believes there are several patentable features about the apparatus. Messrs. Mauro, Cameron, Lewis & Massie have therefore been requested to make a preliminary examination of existing patents to ascertain whether the details that are believed to be patentable are novel A.G.B.

Co-operative Work:--- Work upon aerodrome Nos. 4, and 5 is being carried on simultaneously at Hammondsport and Beinn Bhreagh, and the official headquarters of the A.E.A. remains at Hammondsport for the present.

Messrs. Curtiss and Selfridge are at Hammondsport where they will give their personal assistance to Mr. McCurdy in developing his plans for aerodrome No. 4. Messrs. Bell and Baldwin are at Beinn Bhreagh and they will give their assistance to Mr. McCurdy by correspondence.

Mr. Baldwin at Beinn Bhreagh will give his personal assistance to Dr. Bell in carrying out his plans for a tetrahedral aerodrome which will be No. 5; and Messrs. Curtiss and Selfridge and McCurdy will give Dr. Bell their assistance by correspondence.A.G.B.

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WORK OF THE AERIAL EXPERIMENT ASSOCIATION.

As recorded in telegrams sent by members of the A.E.A.

To Charles T. Thompson,
Supt. Associated Press, N.Y.

Hammondsport, N.Y., June 25, 1908---Last night at about 8 P.M., Mr. Curtiss made two short flights. Owing to a strong side wind the machine was found to make considerable lee-way though with no tendency to tip. The fields in which the tests are being conducted is somewhat restricted by various obstacles except in one part. In order to clear these the machine must rise to a greater height than the experimenters deem prudent at this time, and as the drift caused by the machine necessitated flying over instead of around these obstacles, the tests were postponed till this morning.

At 6 A.M. Mr. Curtiss made a beautiful flight of 725 yards in 41 seconds at the rate of 36.2 m per hour, running before a wind that varied between 6 and 8 miles an hour. The machine tipped sharply to port shortly after getting in the air, but was righted immediately by means of the tip controls, and kept on an even keel from then till the end of the flight.

The surfaces had been revarnished and made completely air-tight since the last long flight. This increased the efficiency of the apparatus to such an extent that the motor developed too much power even with the spark fully retarded. Mr. Curtiss finally had to move his weight forward to aid the front control and keep the machine from climbing, despite of this, he reached a maximum height of 40 feet.

Owing to this difficulty, Mr. Curtiss decided to discontinue his flight. This he did by shutting off the engine and gliding to the ground. No damage was sustained and the Aerial Experiment Association hope to try out the machine again this afternoon after the necessary alterations have been completed. This has been by far the most successful of all the flights to date.

(Signed) T. Selfridge.

To Charles T. Thompson,
Supt. Associated Press, N.Y.,

Hammondsport, N.Y., June 25, 1908---G. H. Curtiss in his "June Bug" aerodrome No. 3, of the Aerial Experiment Association flew 1140 yards, 3420 feet in 60 seconds this evening about 7.30 P.M. The flight was stopped on account of the trees and a fence which limit the practice ground. This performance is the most remarkable on record, being only the seventh flight of the machine and the eighth attempt by the aviator. The controls worked perfectly in every respect, the machine having to travel on the arc of a circle to be able to make this distance owing to the limits of the field. The height varied from 3 to 20 feet.

The Aerial Experiment Association has just telephoned the Aero Club of America that it is now ready to try for the Scientific American Cup which is to be given to the machine that officially flies the distance of one kilometer in a straight line. This distance was surpassed to-night by 46 yards.

All credit is due to the marvellously efficient eight cylinder Curtiss air-cooled motor which has never given the slightest difficulty and to the wonderful aptitude shown by the aviator Mr. Curtiss. There were several hundred spectators.

(Signed) T. Selfridge.

To Charles T. Thompson,
Supt. Associated Press, N.Y.

Hammondsport, N.Y., June 27, 1908---Mr. Curtiss again made two very successful flights here to-day of 400 yards in 24 seconds and 340 yards in 33 seconds at the rates of 34 and 33 miles per hour respectively. These flights were terminated at the will of the operator at a smooth place in the field in order to avoid running the machine back through the standing grain at the further end of the grounds. Their object was to test the efficiency of some alterations which had been decided upon. They proved all that had been expected and the machine is under better control than ever. It is hoped that the cup committee of the Aero Club will be able to come to Hammondsport as soon as possible as the Aerial Experiment Association has now been ready for it for the last three days. The Curtiss motor worked very satisfactorily.

(Signed)T. Selfridge.

To Charles T. Thompson,
Supt. Associated Press, N.Y.

Hammondsport, N.Y., July 3, 1908--- The Aerial Experiment Association's aerodrome No. 3, G. H. Curtiss aviator, made a flight of 3/4 of a mile here this evening in 68 1/5 seconds at 38 miles an hour. The machine traveled in a semi-circle.

The flight was one of several that were made in preparation for the official test of the machine which is to take place to-morrow before the Contest Committee of the Aero Club of America for the Scientific American Trophy.

(Signed) T. SeIfridge.

To Charles T. Thompson,
Supt. Associated Press, N.Y.

Hammondsport, N.Y., July 4, 1908---- The Aerial Experiment Association's Aerodrome No. 3, Curtiss' "June Bug" to-day earned the right to have its name the first inscribed on the Scientific American Trophy, by making an official flight of 1 kilometer in a straight line measured from the point where it left the ground. After passing the flag marking the finish, the machine flew 600 yards further and landed at the extreme edge of the field near the railroad track, after crossing three fences and describing the leter S, 2000 yards in all in 1 minute 42 1/2 seconds at a speed of 39 miles per hour. This followed a 900 yard flight in 56 seconds.

The machine never behaved better and the long flight could have been continued at the will of the operator had he cared to rise over the trees which bounded the field. Though quite possible it was not deemed wise to attempt it at present stage of the aviator's development. There was hardly a breath of air starting during either flight. This trial is really of the utmost importance as it is the first official test of an aeroplane ever made in America and there are only two other machines which have traveled further in public;

Farman's and Delagrange's. The Wrights though have undoubtedly far outflown it in private so that American is not so very far behind France as might be supposed. The last flight to-day was the 15th made by the machine, all having occured under far more adverse conditions than those encountered by the French machines.

It is hoped that there will be several other names on the cup before the new year. In order to possess it, this trophy must be won at least once in three separate years. The rules being changed and made more severe after each trial. It is always open for competition upon due notification being made to the Contest Committee of the Aero Club of America to whom it was presented by the Scientific American in the Spring of 1907.

There are about 1000 witnesses among them being Messrs. Hawley, Post, Herring, Manley, Guy and Beach of the Aero Club.

(Signed) T. Selfridge.

To Charles T. Thompson,
Supt. Associated Press, N. Y.

Hammondsport, N.Y., July 5, 1908---Before the departure of the judges and Aero Club Committee to-night, G. H. Curtiss before a crowd of several thousand people made an ascension in the June Bug and for the first time in the series of trials made a turn and faced directly toward the starting point. After covering 5/8 of a mile toward the starting point, it was necessary to fly over a vineyard and fearing disaster owing to the fact that he was flying low he brought the machine down with slight damage to the front control and right wing. Mr. Curtiss was uninjured.

The flight and the manoeuvers were considered a great success, it being the first attempt to describe a circle. The members of the Aero Club Committee expressed great satisfaction at the outcome of this trial. The aerodrome will be repaired to-night and experiments will be continued to-morrow. A number of the New York and Washington parties remained for the events to-morrow.

(Signed) T. Selfridge.

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OTHER TELEGRAMS.

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

Hammondsport, N.Y., July 9, 1908--- Mr. Cameron came yesterday. Made half mile flight for him last night. He finds several patentable features.

(Signed) G. H. Curtiss.

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

Hammondsport, N.Y., July 9, 1908--- Mr. Cameron here for few days. Thinks we have severable patentable features. Had flight last night three-quarters of a mile. Its becoming an old story now. Will attempt complete circle to-night coming back to starting point.

(Signed) J.A.D. McCurdy.

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

Hammondsport, N.Y., July 10, 1908--- Made short flight to-night - distance one mile. Attempted to turn and land at starting point, but valley proved too narrow to accomplish this feat as yet.

(Signed) J.A.D. McCurdy.

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LETTER FROM MR. G.H. CURTISS.

Hammondsport, N.Y., July 11, 1908--- I enclose a description of the "June Bug", especially its differences from the "White Wing", and the eight sets of prints - also the table of the eighteen flights I have made showing the distance covered, time, cause of stopping, etc.

(Note:- The description of the "June Bug" will appear in a subsequent issue of the Bulletin. The table of eighteen flights is appended below, A.G.B).

*** We have number 4 well under way. We have some good improvements in sockets for the struts and turn-buckles. The running gear seems to be pretty good - we have not broken it, although we have broken the front wheel twice. These were my only two bad landings. Made a mile flight last night, going around the hickory tree in the lower hayfield.

As I wired you, Mr. Cameron was here and found a number of patentable features, including the tip controls, three wheel running gear, the combination steering of the ground wheel and rudder, and the shoulder movement which controls the wing tips. He has taken the data back to Washington and will submit report soon. (Signed) G.H. Curtiss.

AERODROME NO. 3, CURTISS'S JUNE BUG.

18 Flights by G.H. Curtiss.

No.	Date	Dist. in yds.	Time in Sec.	Cause of stop	Breakage.
1	June 21	152	11.0	Aviator's lack of skill	None
2	June 21	139	9.0	Aviator's lack of skill	None
3	June 21	422	25.5	Voluntary	None
4	June 24	40	3.0	Too much wind	None
5	June 24	100	6.0	Too much wind	None
6	June 25	725	41.0	Voluntary	None
7	June 25	1140	60.0	Boundary of field reached	None
8	June 27	400	24.0	Voluntary	None
9	June 27	540	33.0	Voluntary	None
10	July 2	30	2.5	Too much wind	None
11	July 2	150	14.0	Voluntary	None
12	July 3	30	2.5	Voluntary	One wheel & wing broken
13	July 3	1300	68.5	Boundary of field reached	None
14	July 4	900	56.5	Wrong tail adjustment	None
15	July 4	2000	102.5	Stopped to avoid trees & railroad	None
16	July 5	1500	75.0	Too short turn attempted	Front wheel & few struts broken
17	July 8	800	41.0	Voluntary	None
18	July 10	1760	90.0	Made complete turn	None

LETTER FROM MR. G. H. CURTISS.

Hammondsport, N.Y., July 14, 1908:---I thank you very much for your letter of July 5th. I am greatly pleased myself that we were successful in accomplishing what we set out to do. I am satisfied that our machine is equal, if not superior, to any of the foreigners. I note in Mr. Farman's contract that he specifies absolutely smooth fields, with no fences, or ditches and with grass cropped short. We have been working at a considerable disadvantage in this respect so that if we can fly a mile at a time, picking our way as we do, we could surely make a good showing over a perfect course where landing could be effected anywhere.

I am glad that we are to build another machine as it will give us a chance to try out the twin propellers which we wanted to use on the No. 3, but which was given up to avoid delay. The twin propellers are what should be used on the tetrahedral where the greatest obtainable thrust will be needed.***

(Signed) G.H. Curtiss.

(Above letter was addressed to Mrs. Bell, A.G.B.).

PLANS FOR AERODROME NO. 4:
by J.A.D. McCurdy.

Extract from letter to Dr. Bell.

Hammondsport, N.Y., July 17, 1908:---As regards the new machine: It was demonstrated so clearly in the June Bug that non-porous cloth was so important that we have decided to cover our frames with the material used by Captain Baldwind for his balloon in the Government contract. He is making up a special order for us which will be absolutely air-proof, and very light.

Mr. Curtiss thinks from his flights that the tip controls are not sensitive enough, and so we are planing to give the machine greater lateral extension than in former cases.

The front control will also be further out, about 15 feet from the front edge of the plane.

We are also doing away with those jack-joints and using turn-buckles on every wire so that we can adjust each separately.

We think that perhaps the surfaces ought to have an angle of incidence of 9 degrees instead of 7 1/2 degrees or 8 degrees, as in former cases. However, the point is not decided upon yet.

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WINNING THE SCIENTIFIC AMERICAN TROPHY JULY 4, 1908:

by Mrs. David G. Fairchild.

Extract from a personal letter to Dr. Bell from his daughter Mrs. Fairchild.

***In spite of all I had read and heard, and all the photographs I had seen, the actual sight of a man flying past me through the air was thrilling to a degree that I can't express.

We all lost our heads and David shouted, and I cried, and everyone cheered and clapped, and engines tooted. Mr. Post was there, and Mr. Hawley, Vice-President of the Aero Club. Mr. Herring and his sister, Mr. and Mrs. Manley, Captain Baldwin, Mr. Lake of Sub-marine interests, Mr. Guy, Mr. Mott, Mr. Jones, Mr. Lyon, and Mr. ---------- a very nasty, grumpy individual who, however, was not able to interfere with any ones enthusiasm.

The banks were crowded with spectators but the flights on the 4th for the trophy were not as well attended as the one on the 5th as the weather was so uncertain. It showered and blew at intervals all day until about seven, when it cleared and ideal flying conditions prevailed. Before that the time was taken up with measuring off the course. No very pleasant task through wet meadow, ploughed potatoe patch and swamps. David started off immaculate in his white clothes and came back a sorry sight. All sorts of pictures were taken too, and the air was full of the click click of shutters. There were moving picture cameras and kodaks of all sizes from David's baby to eight by tens.

At the first flight I was at the corner of the vineyard nearest the road with Douglas, and David was at the starting line. The machine rose beautifully and flew by us but didn't quite make the kilometer. It was flying pretty high and Mr. Curtiss wanted to bring her down a little but she didn't answer her control quickly, and when he got her down he could not get her up again. Nothing was hurt, however, and all hands towed her back to the starting point for the second flight. David and Mrs. Curtiss, and I chose our stand on an old log at the far side of the potatoe patch. The first flight had raised excitement to boiling point, and as Mr. Curtiss flew over the red flag that marked the finish and way on towards the trees, I don't think any of us quite knew what we were doing. One lady was so absorbed as not to hear a coming train and was struck by the engine and had two ribs broken.

Mr. Mason took me right in town to telegraph the glad news to you, and it was about half past nine when the last of the party straggled in.***

***Mr. ---------was especially enthusiastic over tetrahedral construction which he believes is going to be a great feature in flying machines. He has promised to call us up over the long distance telephone to invite us to his preliminary flights at Atlantic City. It was interesting to hear the opinions about him. Mr. Curtiss says he's the authority on all kinds of aeroplanes, but they all without exception (the ones I talked to) were uncertain as to whether he is a genius or a fool. They are reserving judgment till after the

Fort Myer trials.

On Sunday the town gave us a boat ride and lunch, and on our arrival in town the band turned out to greet Mr. Curtiss and the boys carried him ashore on their shoulders.

About seven that evening there was another beautiful flight, though Mr. Curtiss was not able to come back to the starting point as he had hoped. He circled, but the machine, as I understand, slid off on the air and he landed with a broken tip and bent wheel. ...

(The above letter was dated July 6, 1908, A.G.B.).

WINNING THE SCIENTIFIC AMERICAN TROPHY
JULY 4, 1908:- by G. H. Curtiss.

Extract from letter to Dr. Bell dated Hammondsport, July 7, 1908.

The affair of July fourth went off very nicely. There seemed to be some question, especially with the ------ representatives if we could fly the kilometer; and when we fell short on the first trial, Mr. B-----who represented the --- seemed to be pleased rather than disappointed.

The machine was not flying as it should, and we discovered that the tail, which had been attached and detached a great many times, had gotten into a slightly negative angle which made it necessary to depress the forward plane to keep the machine on an even keel. This so greatly increased the resistance, that when it became necessary to slow the engine to prevent going too high the speed was slackened to such an extent that landing was necessary. In this trial, about half a mile was covered.

After making the adjustment of the tail, she flew like a real June Bug; and just on account of Mr. B-----, who was standing at the finish with a camera to photograph the machine in case I fell short on the distance, I flew the machine as far as the field would permit, regardless of fences, ditches, etc.

We gave the Committee and Aero Club members a little outing on the Lake Sunday with the local band in attendance.

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WINNING THE SCIENTIFIC AMERICAN TROPHY
JULY 4, 1908:- by J.A.D. McCurdy.

Extract from letter to Mrs. Bell dated Harmondsport, July 8, 1908.

It was a dark day and the papers predicted rain, and it certainly did rain all through the morning, but towards three or four o'clock showed signs of clearing up.

The Pleasant-Wine-cellar people kindly threw open their doors to us and our visitors, and prepared a sumptuous lunch as one means of passing the dreary hours of waiting. Everybody was just as nice as they could be, and the crowd was most patient and sympathetic.

About six the time seemed propitious, and the machine brought out of the tent, and the tail attached, the motor run, and everything carefully looked over. Manley measured the course in a straight line running right through the vineyard. Mr. Curtiss took his seat and the machine was rolled round to its starting point.

After a few moments the motor was started, and the signal given to let go, amid a breathless silence on the part of the crowd, The June Bug sped down the track, and made a beautiful start, flew well, but short about four or five hundred yards. No damage was done however, so she was brought back and carefully looked over.

This time we changed the angle of incidence of the tail slightly, making it more positive, we also re-wired the front-control. This time everything went serenely and not

only did the June Bug reach the flags which marked the

finish, but, amid the rush and cheering of the throng flew six hundred yards or more further, to the limit of the field and made a beautiful landing on a smooth spot, absolutely unhurt in every respect. Everybody was almost crazy, and even Mr. H---------- appreciated the effort of the A.E.A. to fly.

The town did all in their power to entertain our guests, and they all were delighted with their visit, and went back to New York with very happy thoughts of the visit which they will have every cause to remember.

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WORK OF BEINN BHEACH LABORATORY:-
Report by Wm. F. Bedwin, Supt.

Since my report of July 13 in Bulletin No. 1, we have been steadily engaged at the Laboratory on the following work:-

Carrying along construction of the new catamaran structure, the two boats for which are all finished and set up in place with the deck-timbers on them and nearly ready for the decking. The present condition (July 23) is shown in the accompanying photograph.

Have finished the one hundred 50 cm triangles.

Have put, in the three kites A,B,C, mentioned in last report, a set of guy wires on the keel stick at a point 50 cm back from front edge of kite extending to ridge pole. Have also made attachment points on keel stick every 25 cm from the end of the bow, so that flying line can be readily shifted to any desired point from the extreme bow to a point 50 cm back on kite.

Experiments have been made at the Laboratory on the following dates:-

1908. July 7, Ring-Kite tried (See Bulletin No. 1).

1908. July 10, Final experiments with Ring-Kite. Kites A,B, and C tried. A number of anemometer readings were taken. Wind Velocity: Ten observations.

1908. July 11, Flew kites A,B, and C separately and together; also took readings of anemometer, inclinometer and dynamometer. Wind velocity 11 observations; angular altitude 30 observations; pull 96 observations; total 137 observations.

We also tried the empty Frost-King kite photographs of which appeared in Bulletin No. 1.

1908. July 16. Experiments made with a gyrostat. Flew kite A observing indications of anemometer, inclinometer, and dynamometer. Wind velocity four observations; angular altitude 10 observations; pull ten observations. Total 24 observations.

1908. July 17 Made four complete series of experiments with kites A and B. 8 series altogether. Anemometer, inclinometer, and dynamometer read simultaneously. Wind velocity 29 observations; angular altitude 80 observations; pull 80 observations; total 189 observations.

We have men at work making aluminum castings for tetrahedral cells.

We have repaired and ready a small pilot kite of the Frost-King form for general purposes. 12 cells on top, 6 cells high, and 6 cells deep. Total 182 cells full construction.

We have moved the dark room up to the Western side of Annex and fitted it up with water supply, and also put on a large veranda on which to do our printing.

In connection with our photo department we have made a new dating board with letters and figures painted on pieces of tin which can be slipped in and out of a groove in the board. So far as possible the dating board will be photographed on the same plate or film with the apparatus or experiment illustrated so as to preserve the date of the photograph on the film itself.

The use of the dating board will be observed on the accompanying photograph illustrating the catamaran structure. It shows the date upon which the photograph was taken.

We have made and filed three copies of photos of work done to the number of 42; and have also made a large number of blue prints for Bulletins and other purposes. We are making a printing-frame large enough to take the plans of the Cygnet, Red Wing, and others of which we want blue prints.

In connection with work done last winter would say that we saved about two hundred dollars worth of silk from the wreck of the Cygnet at a cost of twelve dollars to us. This is a very low price for the work involved, and I am advised by the contractors that it could not be done again for the same money.

On July 13 there arrived at Beinn Bhreagh the auxiliary boat "Pemiuk" with party of Yale Students on board, who are taking boat down to Dr. Grenfell at Labrador. At Dr. Bell's request, we went on board to try and help them with their engine, which they could not get to run. We took engine partly to pieces and made several new joints, and tightened and cleaned things up generally, and succeeded in getting engine to run very satisfactorily for them. The engine is a two cylinder 15 H.P. Meiter-Weitz kerosene fuel made in New York. We gave the ship a good supply of Beinn Bhreagh water, and all the assistance we could; and they sailed on the 15th at noon for Battle Harbor.

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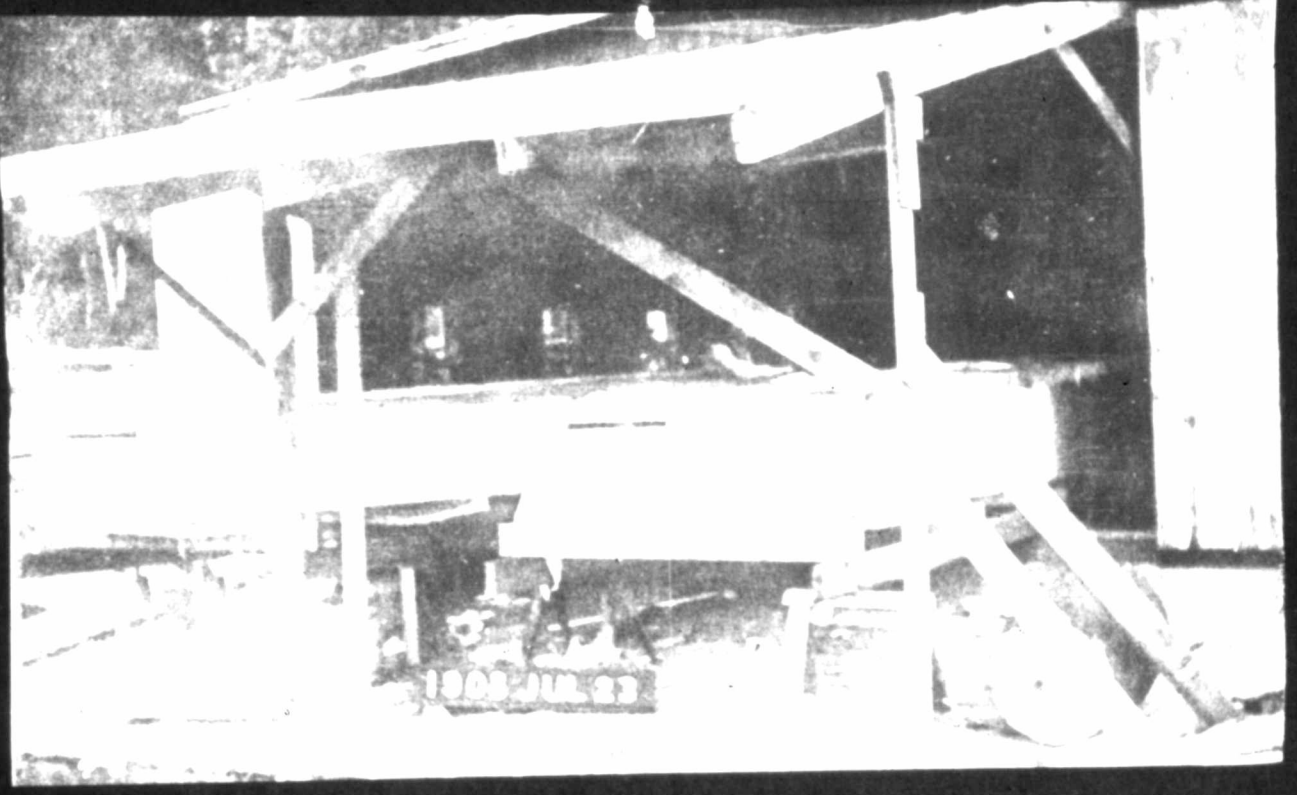

SPECIFICATION OF KING-KITE:
by Wm. F. Bedwin.

As used July 7, 1908.

As shown in accompanying drawings kite is made of tetrahedral cells and surfaces are separated the vertical height that two 25 cm cells make.

The outer line of cells is made with regular 25 cm cells; and the inner line is of cells 25 cm on all sides, except the cross-sticks that connect inner points of outer line of cells: These sticks are only 22.4 cm long.

The upper and lower planes are made separately and false triangles are put on to connect the free points of cells, and then the planes are connected together by tying at junction points with string, making an X cross-section as shown. Around the inner and outer corners is placed a small angle beading making a continuous corner to glue surface to. The silk surface is next put on both the upper and lower planes, and is fastened to the light beading with glue, and is also caught up with thread at the center points of cells. A heavy beading is then run round on all four corners as shown in the X section, and tied well every 25 cm to the inner small beading.

A keel stick is tied on at any point as shown, projecting a short distance both inside and outside the lower plane. Four braces placed diagonally running from upper to lower surface are then put on at the section where the keel stick is placed.

As used July 10, 1908.

Same specification as above applies to the Ring-Kite as used July 10, 1908 with the following changes:-

The diagonal bracing is carried all the way around the kite on both the inside and outside faces; and the heavy beading is put on the outer upper and lower corners only.

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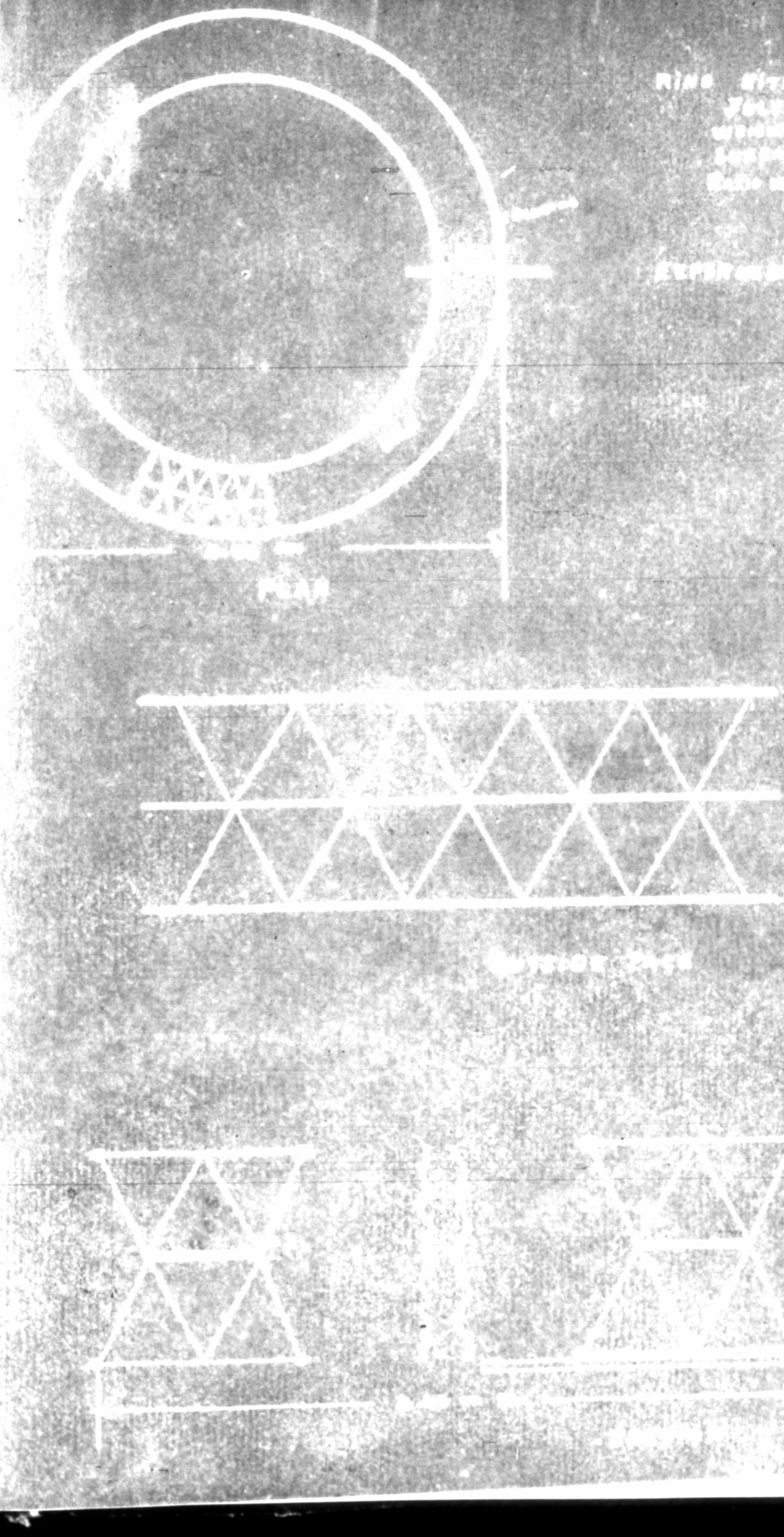

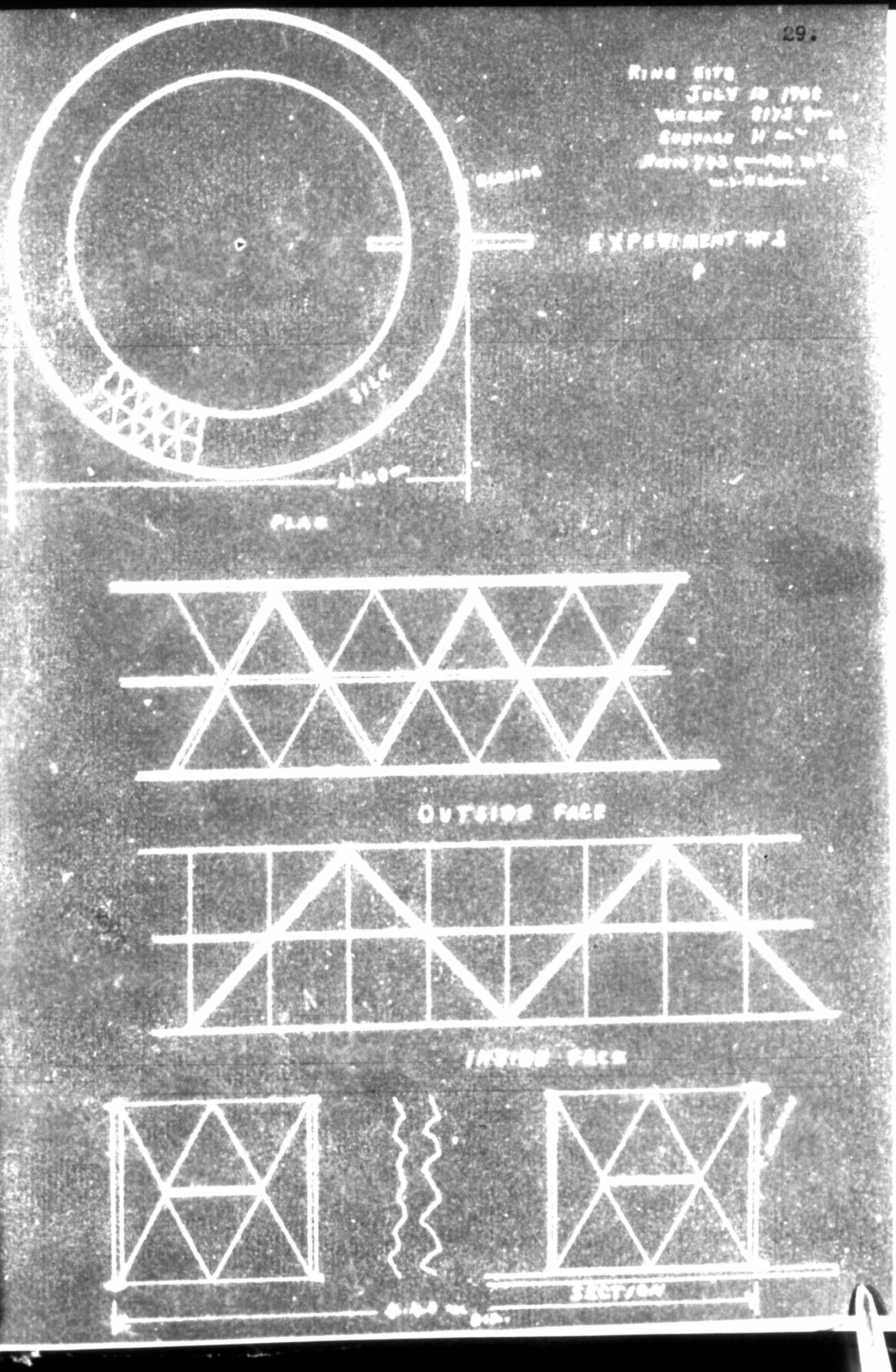
RING SITE
JULY 10 1906
EXPERIMENT No 2
PLAN
OUTSIDE FACE
INSIDE FACE
SECTION

FINAL EXPERIMENTS WITH THE RING-KITE JULY 10, 1908: by Alexander Graham Bell

After the experiment with the Ring-Kite, July 7, 1908, noted in Bulletin No. 1, the kite was strengthened by beading connecting the lower and upper aeroplanes. To offset this additional weight the inner rings of beading on the two aeroplanes were removed, with the net result that the kite was lighter as well as stronger than before. For details of construction see Mr. Bedwin's article in this Bulletin.

The Ring-Kite in its improved condition was tried July 10, 1908. The wind velocity during the experiment was not noted, but later in the afternoon when the wind conditions had not materially changed ten readings of the anemometer were taken yielding a mean result of 10.72 miles per hour.

The Ring-Kite, with the flying line attached to the front edge of the lower aeroplane, rose very steadily and gracefully into the air. Two photographs of the kite in the air are appended in illustration. One of these was taken July 7, the other July 10. No measurements of angular altitude, or pull were made. The flying line was held in the hand instead of being attached to a cleat, because it was found that the pull was slight, inspite of the size of the kite, and the fact that there was considerable wind. At its highest elevation the kite seemed to fly very steadily although a slight swaying motion was observed. There was nothing remarkable about this, however, as the wind was constantly fluctuating in strength. Upon the whole the behavior of the kite

in the air was satisfactory, and it was brought down easily and gently, by over-running the flying line, without any injury to the structure.

The point of attachment of the flying line was then changed. It was fastened to a bridle attached to the front and rear edges of the front aeroplane so that it came practically midway between them. The kite then rose to a higher elevation than before, but did not fly so steadily. The swaying motion formerly observed was greatly increased, and the kite moved about from side to side like a bear pacing backwards and forwards in his cage.

During one of these oscillations the kite slid off the wind to one side and began to fall edgeways towards the ground. The strain on the flying line was immediately relaxed but the kite showed no signs of recovering its equilibrium. It continued to slide down hill, almost in a straight line, until it struck the ground. Its side was crushed in by the impact, and the experiment - and the kite - came to an end. A photograph of the kite falling through the air is appended.

Conclusions.

This disaster only confirms the impression left by numerous experiments with other forms of kite, that horizontal aeroplanes without vertical surfaces or their equivalent to steady them, are essentially unstable in the air, and are liable at unexpected moments to slide off to one side and come down edgeways to the ground. The Red Wing and White Wing both came to an end in this way; and it should be recognised that aeroplanes of this character constitute a

dangerous feature in an aerodrome.

It is somewhat remarkable that the Ring-Kite showed no tendency to right itself when released from the strain of the flying line. We know it would have done so had there been no upper aeroplane.

With the lower aeroplane alone and the empty framework above it, without any upper aeroplane at all, we would have had conditions comparable to those existing in the gliding models with whose antics in the air we have become familiar.

From our past experiments with these models we know that a single aeroplane with its supporting framework above it always steers itself up when thrown edgeways down hill, its pathway gradually forming an ascending curve; Whereas an aeroplane with its framework below it, slides down hill in a descending curve. In the case of the Ring-Kite the path pursued in falling formed almost a straight line, there being very little indication of a curvilinear path, and there was certainly no tendency to a recovery of position. The altitude reached when the sliding movement began was quite sufficient to have developed a sensible curve had there been any marked tendency to deviate from a rectilinear path, but there was very little indication of deflection, and certainly none in the upward direction. The flying line was 100 meters long, and when the sliding began, the kite was probably at an altitude of about 30 meters in the air.

It is probable that in this case the tendency of the empty framework to steer the lower aeroplane up when the

kite dived to one side, was neutralised by an equal tendency of the framework to steer the upper aeroplane down. This has an important bearing upon the behavior of aerodromes with superposed aeroplanes under similar circumstances.

A single aeroplane, or "moneplane", usually consists of a surface stretched upon some sort of framework, so that the framework appears on one side of the aeroplane only. When projected edgeways through the air such an aeroplane does not pursue a rectilinear path, for its motion is constantly deflected to one side; and the direction of the deflection is towards the framework-side of the aeroplane.

It may be that the deflection is caused by the resistance of the framework to the air, which would make it act like a rudder to steer the aeroplane to that side. Other causes may also be present, such as a difference of atmospheric pressure on the two sides of the aeroplane. What ever may be the true cause however, the effect is there, and in unmistakable form.

It would be well then in aerodromes of the moneplane class to place the aeroplanes below the frameworks upon which they are stretched, thus imparting to them a tendency to rise when propelled; rather than place the surfaces above the frameworks, which would give them a tendency to dive.

Moneplanes with their supporting frames above them, possess one important advantage over superposed aeroplanes with the framework between:- Upon sliding down hill they will slide up again after a while; Whereas there seems to be little if any tendency to recovery in the case of superposed aeroplanes under similar circumstances. This at least is

one of the conclusions suggested by the fate of the Ring-Kite and the first two aerodromes of the Aerial Experiment Association.

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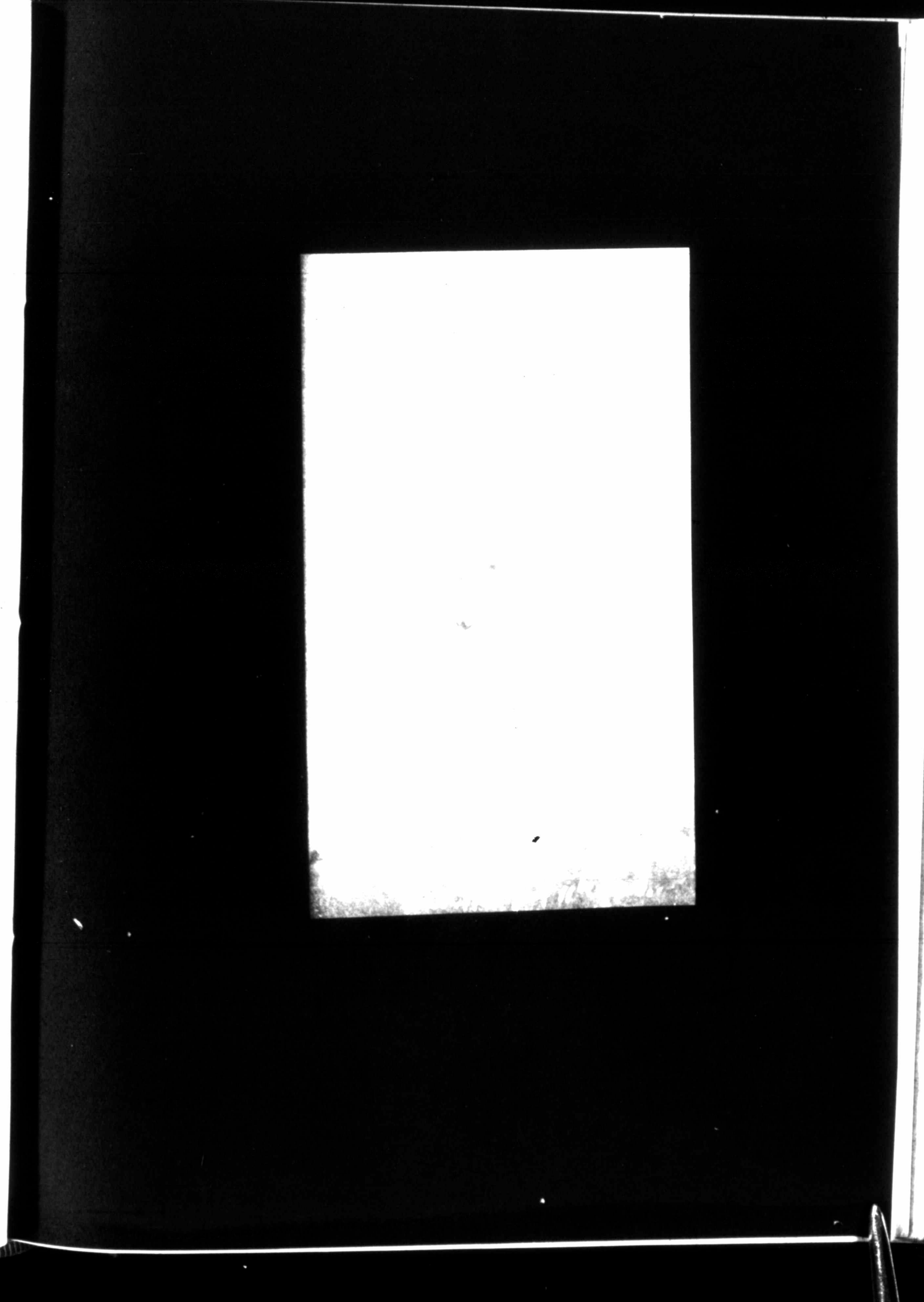
20 Taken 1908 July 10th and
Dev. 1908 July 11th and.



ON THE GYROSCOPIC ACTION OF PROPELLERS:
by Alexander Graham Bell.

In the course of a discussion with Mr. J. A. D. McCurdy last May concerning the nature of the torque produced in an aerodrome by the rotation of its propellers, Mr. McCurdy refeered to Brennan's Mono-Rail Car System as an illustration of the powerful gyroscopic action of fly wheels. This led to the consideration of the gyroscopic action of propellers; and we consulted the Encyclopedia Britannica, Vol. XI, p.352 to see whether we could work out, from the descroption of the gyroscope there given, what would be the effect upon an aerodrome of the gyroscopic action of its propeller, and we came to the following theoretical conclusions.

With a right handed rotation of the propeller the machine, when steered to the left or port side, would tend to rise at the bow until the bow pointed vertically upward. When steered to the right, or starboard side, the machine would tend to dive until the bow pointed vertically downwards.

With a left handed rotation of the propeller opposite effects would be produced; the machine tending to dive when turned to port, and tending to rise at the bow when turned to starboard.

The general conclusion reached was that both the horizontal and vertical steering of an aerodrome with a single propeller would be seriously affected if the propeller exerted any sensible gyroscopic action.

This theoretical result has been amply verified by experiments made here July 16, 1908, with a gyrostat constructed after the plans of the late Lord Kelvin.

The gyrostat consists simply of a thin metallic case enclosing a heavy wheel which can be set in rapid rotation by means of a string coiled round one end of the axis.

In order to imitate the action of the propeller of the June Bug the concealed wheel was given a left handed rotation (against the hand of a watch). I then held the gyrostat in my hand with one axis pointing forward, so that considering this end of the axis as the bow or front end of an aerodrome the wheel represented the propeller. Then to represent the forward flight of the aerodrome I walked forwards with the gyrostat in my hand. I then imitated the action of steering the aerodrome by turning to the right. Instantly the bow end of the gyrostat turned upwards with considerable force. Upon turning to the left it turned downwards. Then to represent the act of steering downwards with an aerodrome, I depressed the bow end of the gyrostat with the result that the bow tried also to move to the right or starboard side. Upon elevating the bow of the gyrostat to represent steering upwards with an aerodrome, the bow of the gyrostat was deflected to the left.

With a right handed rotation of the wheel of the gyrostat opposite effects were produced.

The effects were so marked as to indicate that the gyroscopic action of a rapidly rotating propeller in an aerodrome should be studied and allowed for in the steering of the apparatus. The following contains a summary of the observations made:-

GYROSCOPIC ACTION OF A PROPELLER.
(Summary of Observations)

Right Handed rotation.

Steering to right sends bow down.
Steering to left sends bow up.
Steering down sends bow to left.
Steering up sends bow to right.

Left Handed Rotation.

Steering to right sends bow up.
Steering to left sends bow down.
Steering down sends bow to right.
Steering up sends bow to left.

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AERODROME TRUSSING:
by F.W. Baldwin.

A radical difference in function between a bridge and an aeroplane truss has apparently been largely if not quite lost sight of by those who have copied bridge designs and applied them without modification to aeroplanes.

In the first place a bridge is not built to be driven through the air. It is not particularly designed to offer as little resistance as possible to the wind. Lightness and strength, in other words economy of material, is the criterion of bridge design.

Not so with the aeroplane truss however. In this, one truss may be heavier than another, of equal strength, and yet be much more desirable. From data well established experimentally, we know that it is of prime importance to give what is known as a "fair form" to all parts of an aerodrome. It is obviously an advantage then to let each member of a truss be deep from fore to aft and narrow sideways.

If a strut of this cross-section be subjected to compression it is obviously weak one way, and superfluously strong the other. Having a greater moment of inertia about a lateral than a fore and aft axis, it will buckle laterally long before its strength is taxed in a fore and aft direction.

In bridge design economy is obtained with symmetrical compression members, but in aeroplane work it should be obtained with members of un-symmetrical cross-section, and this alone calls for an entirely new system from that employed in bridges.

To secure compression members against this deflection is then the problem with which we are confronted.

Take for example the simple Pratt truss (Fig. 1) which has been very generally used as an aeroplane truss. This with its long unsupported vertical posts would seem to be a poor form to build, if we are to make it of material fish-shaped in cross-section.

The Howe truss (Fig. 2) has one great advantage over the Pratt:- It has no long unsupported compression-members. The diagonals, which are the compression-members, intersect, and thus afford support against lateral deflection in the planes in which it is needed.

The Howe truss, however, has a greater aggregate length of compression-members than the Pratt, and this is clearly disadvantageous.

For this reason then, if we adopt the general form of truss with upright compression-members, the problem resolves itself into one of securing these vertical posts against lateral deflection. This can be done in a variety of ways.

First of all struts can be run across the truss horizontally supporting the vertical posts at their centers. These struts could be themselves supported at their central points by the diagonals, and a very rigid construction obtained (Fig. 3).

The introduction of more compression-members is to be avoided, however, as these offer greater resistance than do the comparatively fine wires that can be safely used to

take up tension. A more economical bracing which would give the same support at the central points of the vertical posts can be obtained by a horizontal tie-wire branched at the outside panel to the upper and lower cords of the truss (Fig. 4).

Another way to obtain excellent lateral support for the uprights could be secured by the diagonals being of the double inter-section type (Fig. 5), or even triple intersection might be used to advantage.

The bow-string method by which lateral support was given the verticals in the Red Wing truss has been described elsewhere (paper read May 17, 1908, which will appear in a forthcoming Bulletin), and attention need only be drawn to the fact that it has proved a wonderfully efficient truss of no great weight and of low head resistance (Fig. 6).

The Tetrahedral truss affords perhaps the greatest opportunity of all to embody this principle of lateral bracing. If large cells are used they can be easily braced to give a very rigid truss with fish-shaped material so thin as to reduce enormously the head resistance of the whole structure (Fig. 7).

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Fig. I

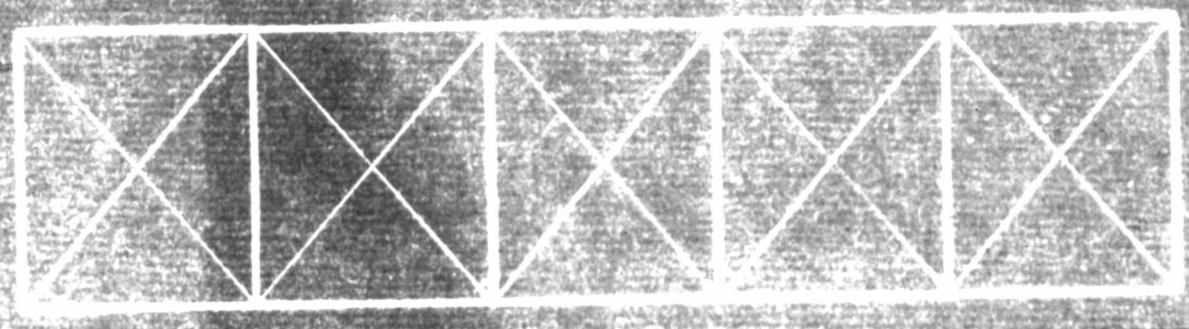
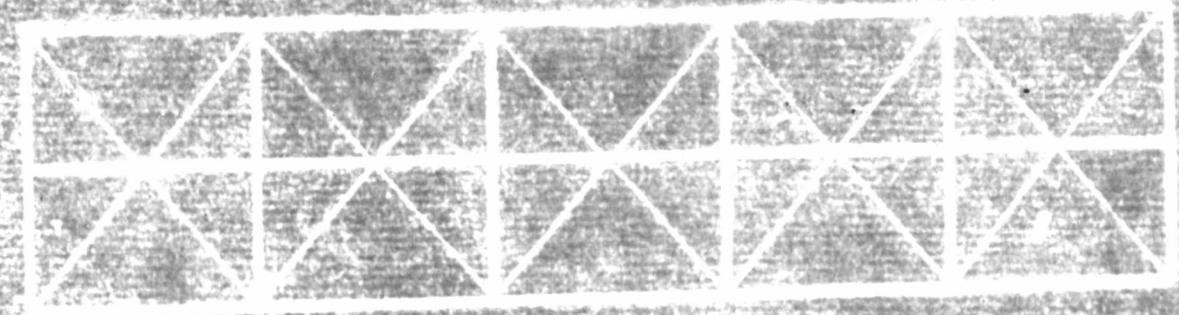


Fig. III

Fig. II



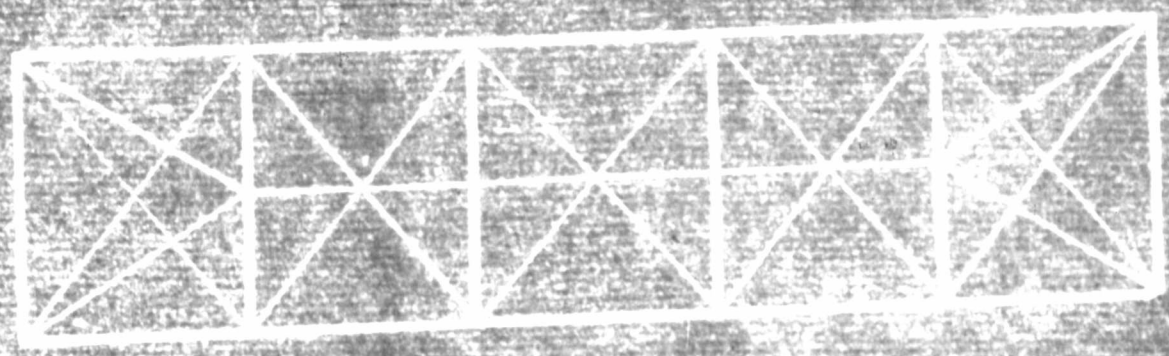


Fig V

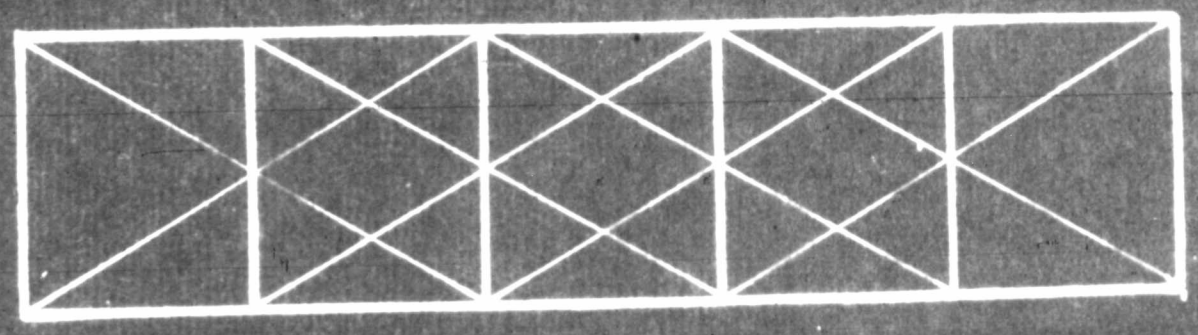


Fig VI

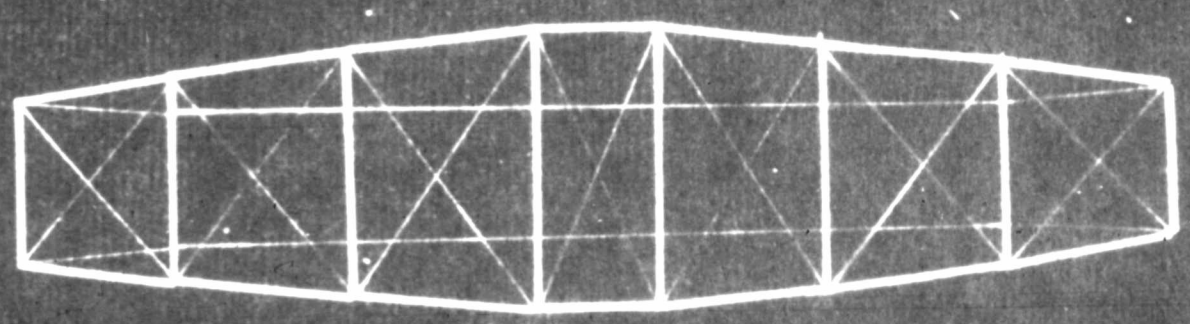
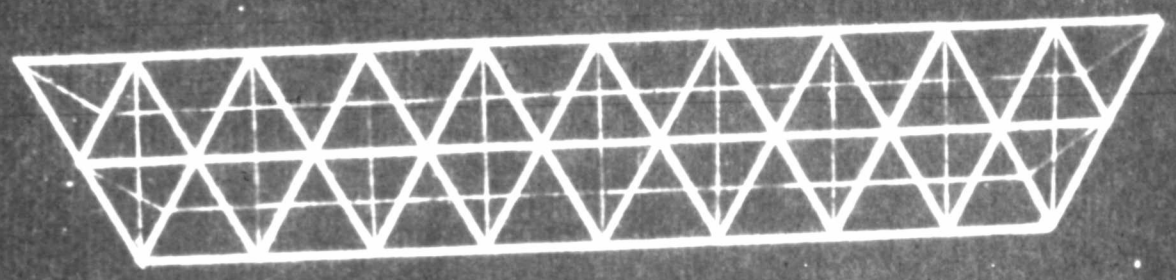


Fig VII



IMPROVEMENT IN THE METHOD OF CALCULATING WIND VELOCITY:

By F. W. Baldwin.

Take the reading of the anemometer in feet for 68 seconds. Move the decimal point two places to the left, and the result will be miles per hour correct to one decimal place.

Example: 1007 feet in 68 seconds or 10.07 miles per hour. The correct answer to one decimal place is 10.1 miles per hour.

THE RUDIMENTARY WINGS OF FLIES AND THEIR SIGNIFICANCE:

By A. G. Bell.

Few people, excepting entomologists, are aware of the fact that flies, and other two-winged insects, possess another undeveloped pair of wings behind the first, known as "balancing organs". The presence of these rudimentary organs shows that the two-winged insects (diptera) are descended from a four-winged form.

Does this indicate that two wings are preferable to four for the purposes of flight?

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REPORT UPON FRENCH MOTORS:
by W. Rupert Turnbull.

Letter to Dr. Bell.

R.M.S. Empress of India, June 30, 1908:--- I am just returning from a trip to Europe where I saw and heard much of interest in aeronautic matters. In accordance with my promise of last October I will try to give you a few notes on French Aeronautic Engines.

I had an interesting talk with Farman, and he told me that he did not use any radiator with his water-cooled "Antoinette", but simply carried a small quantity of water in the water-jackets etc., and allowed this to boil away, thus his runs were necessarily short.

He is not finishing his "flying-fish" at present, simply because there is no really satisfactory engine on the French market, apparently all the French motors (particularly the air-cooled ones) give their rated horse-power only for about ten minutes, and then the H.P. rapidly falls off as the engine over heats.

I did not investigate the "Renault" engine, but I do not think Farman found it as sastisfactory as the "Antoinette"

Farman seems to think that the "Pelterie" is the best of the air-cooled engines and certainly the principle, as far as cooling goes, is rather pretty, but I visited the factory and it struck me that the engine was too complicated and delicate.

The "Parcot" engine (from the catalogue) is something like the "Renault", but I doubt if Parcot has the capital or facilities for making the engine he advertises and I do not

think it would be safe to order from him.

In my opinion the best aeronautic engine I saw was the Duteil and Chalmers (81 Ave d'Italie, Paris). They have patented a system of cooling, which seems to me promising. There copper-jackets surround the cylinders, and the gasoline vaper (on its way to the combustion chamber) is passed through these, and thus keeps the cylinders cool enough. They also make air-cooled cylinders, but seem more ready to give a guarantee on the vaper-cooled type. My only objection to their engines is that they only have two cylinders (opposed), but the makers claim the engines are perfectly balanced and run without vibration.

If you decide to order any French engines, of any make I would strongly advise that they be made on a strict contract requiring a certain guaranteed brake horse-power delivered continuously for not less than half an hour, and at a certain weight, including all accessories.

With kind regards to your associates, I am

Sincerely yours,

(Signed) W. Rupert Turnbull.

Rothesay, N.B.