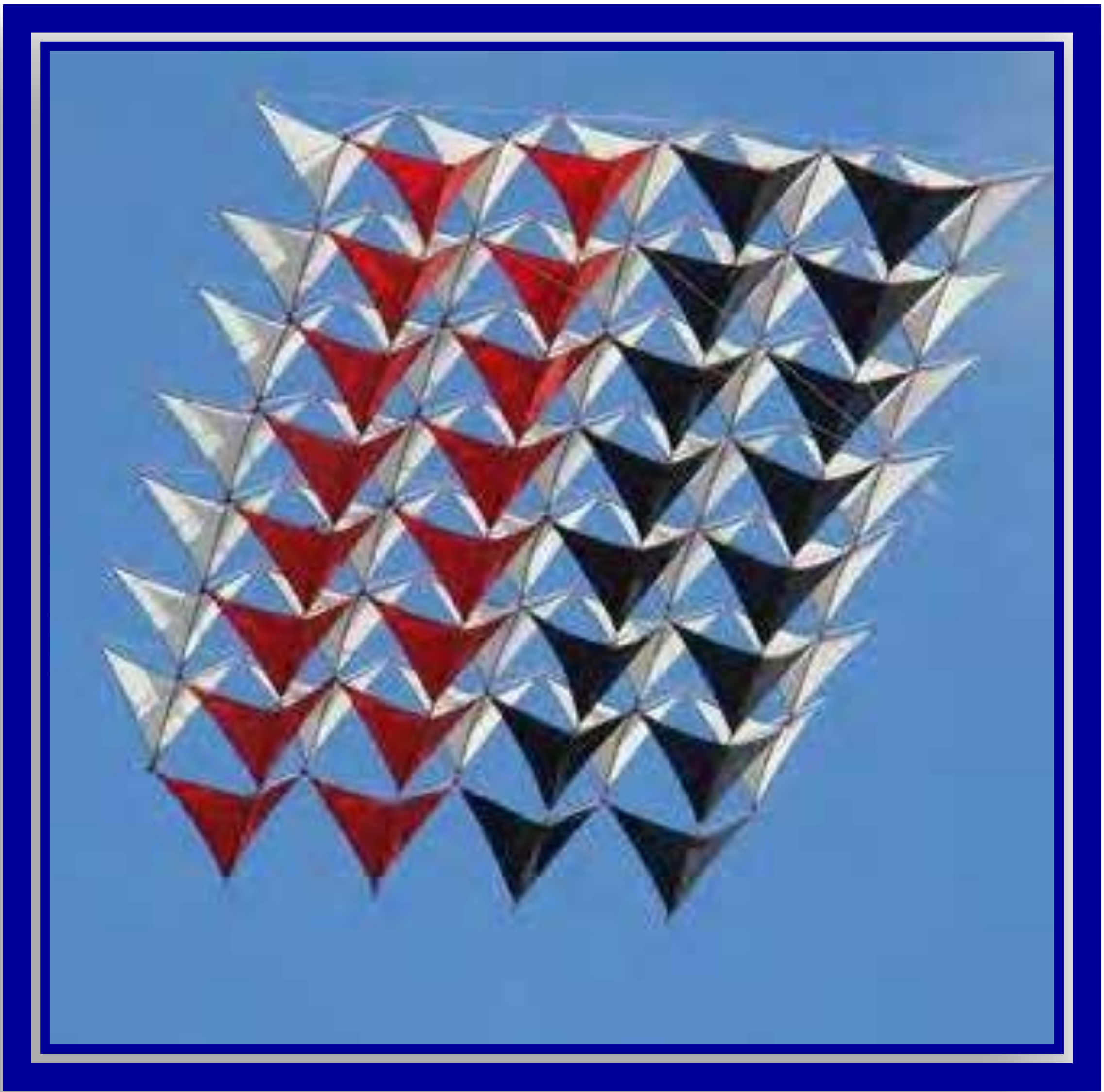
MKF@NEWS

ELECTRONIC NEWSLETTER OF THE
MIDLANDS KITE FLIERS OF GREAT BRITAIN

JANUARY 2016



INFORMATION

CLUB FLY-INS

We hold club fly-ins each month (winter included) at various sites. These are informal events and are a great way of meeting other MKF members.

MEMBERSHIP CARDS

Your membership cards can obtain you discounts for purchases from most kite retailers in the UK, and gain you entry to events and festivals free or at a reduced cost. Please keep them safe.

PUBLIC LIABILITY INSURANCE

All fully paid up members are covered by Public Liability Insurance to fly kites safely for pleasure anywhere in the world. If you injure anyone whilst flying your kite the injured party may be able to claim on the club insurance for up to **£5,000,000**. The club has Member-to-Member Liability Insurance. A claim may be refused if the flier was found to be flying a kite dangerously - e.g. using unsuitable line, in unsuitable weather; flying over people, animals, buildings or vehicles. This insurance does not cover ... or theft of membe...

BUGGIES, BOAR...

Unfortunately ... these activities within the clubs insurance policy.

CONGRATULATIONS ON YOUR NAME CHANGE!**

'MKFNEWS' DEADLINES FOR 2016+

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16	24th June 2016	Mid July 2016
17	24th September 2016	Mid October 2016
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GO FLY A KITE!
WITH THE MIDLANDS KITE FLIERS OF GREAT BRITAIN

THE TETRAHEDRAL KITES OF DR. ALEXANDER G. BELL

By GILBERT H. GROSVENOR,
EDITOR OF THE NATIONAL GEOGRAPHIC MAGAZINE.

I have been asked by the editor of The Popular Science Monthly to write an article for that journal describing the tetrahedral kites of Dr. Alexander Graham Bell. I am glad to comply with his request, especially as I have had the good fortune for several summers past to watch the marvellous kites which Dr. Bell has been building in his laboratory at beautiful Baddeck, Nova Scotia. In this brief article there is not space to describe all the experiments that have been made, and I shall endeavor to explain, therefore, only the more important principles that I have seen evolved.

Dr. Bell began building kites in 1899. He was led to experiment with them because of his interest in the flying machine problem and his belief that a successful kite will also make a successful flying machine. A kite that will support a man and an engine in a ten mile breeze will probably also support the man and engine when driven by a motor at the rate of ten miles an hour. This proposition has not been actually proved, but there can be little doubt that it makes no difference whether the kite is supported by the motion of the air against it or by its own motion against the air.

In a calm a kite rises when it is pulled by a man or horse, because of its motion through the air; there is no reason to believe that it would not also rise when urged through the air by propellers. A kite then can be changed to a flying machine by hanging a motor and propellers to it and dropping the string which attaches the kite to the ground.

The first kites that Dr. Bell built for his experiments were of the Hargrave box type, which had been the standard kite since its invention by Mr. Laurence Hargrave, of Australia, in 1892. Small Hargrave box kites flew very well, but their flying ability became poorer as their size was increased; a gigantic Hargrave with two cells as big as a small room would not sustain itself in the air, and experiments showed that only a hurricane could make it fly. To obtain much lifting power with box kites it was necessary to send up a number ofthem hitched on one line. But Dr. Bell's object was great lifting power in one kite and not in a team of kites. He realized that he was

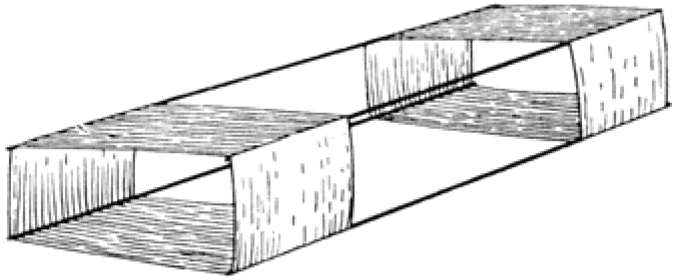


Diagram 1. Hargrave Box Kite.

thwarted at the very outset by an old law, which was recently formulated by Dr. Simon Newcomb and which has made many believe that the flying machine is impossible without the discovery of a new metal or a new force. This law is that the weight of kites or machines built on exactly the same model increases as the cube, when all the dimensions are increased alike, while the supporting or wing surface increases as the square. A Hargrave box kite two meters on a side weighs eight times as much as one that is one meter on a side, but it has only four times as much sustaining or wing surface; the weight is tripled, while the

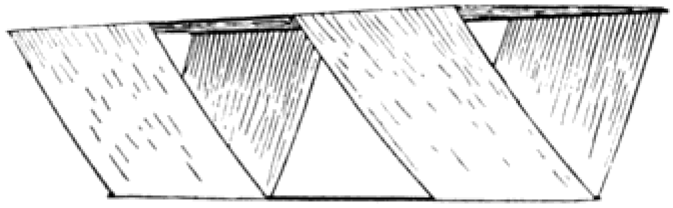


Diagram 2. Triangular Cells.

wing surface is doubled; hence as the size of a box kite is increased a point soon comes when the weight is so great that the wing or supporting surface will not lift the weight. Dr. Bell then set to work to see if he could not outwit this law by devising a new form of kite which he could enlarge indefinitely without the weight increasing faster than the wing surface. He saw that if he could get a large kite by combining many small kites instead of by increasing the dimensions of his model the weight would not 'increase faster than the wing surface. He decided, therefore, to combine many small cells into one large kite instead of using two large cells each as big as a barn door. The Hargrave box cell however did not lend itself to combination. Two box cells fly well, but when a number

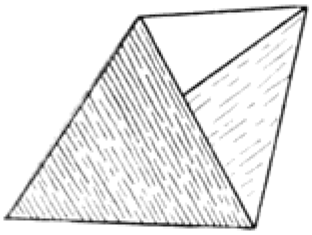


Diagram 3. Regular Tetrahedral Winged Cell.

of them are tied together they do not act with the same harmony. A box cell is structurally weak in all directions and requires a great deal of bracing to keep it from being twisted in a strong breeze; this bracing adds to the weight and makes head resistance to the wind; the more cells combined together, the more bracing required proportionally. Furthermore, the cells must be grouped in two sets at a distance from each other, and as the sets tend to pull apart, the framework connecting the two sets has to be very strong and heavy. As a result the experiments showed that neither

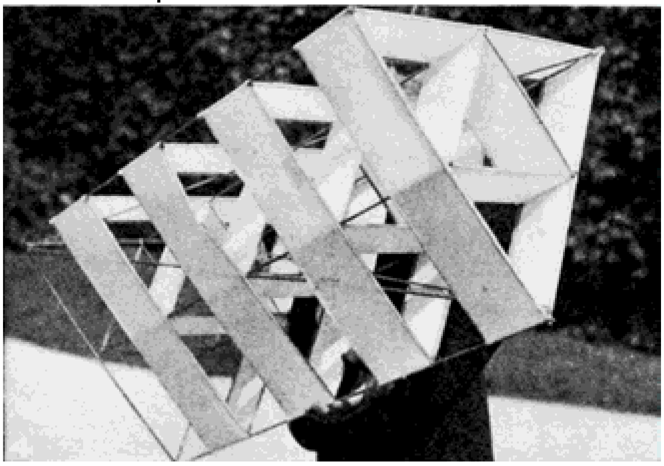


Fig. 1. Kite built of Twelve Triangular Cells. It is formed of two triangular kites, one inside the other.

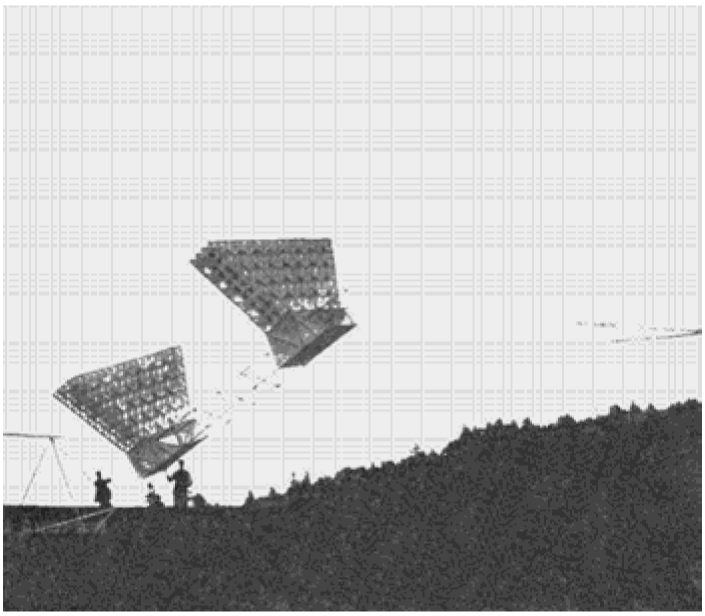


Fig. 2. Giant Kite built of Triangular Cells. The superstructure consists of seventy kites, like the one in Fig. 1, tied together at the corners and arranged in two sets of thirty-five kites each. Each of these kites was tested individually before being combined and found to fly well by itself. There are a total of 840 triangular cells in the giant kite. The total length of the kite is 29.5 feet. The picture shows the kite rising into the air.

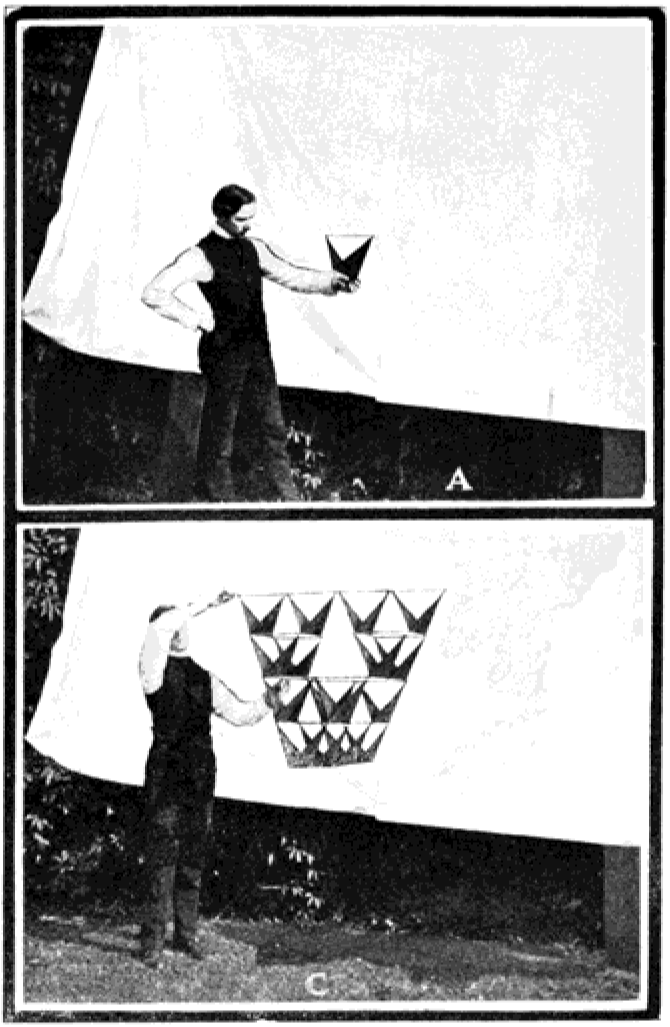


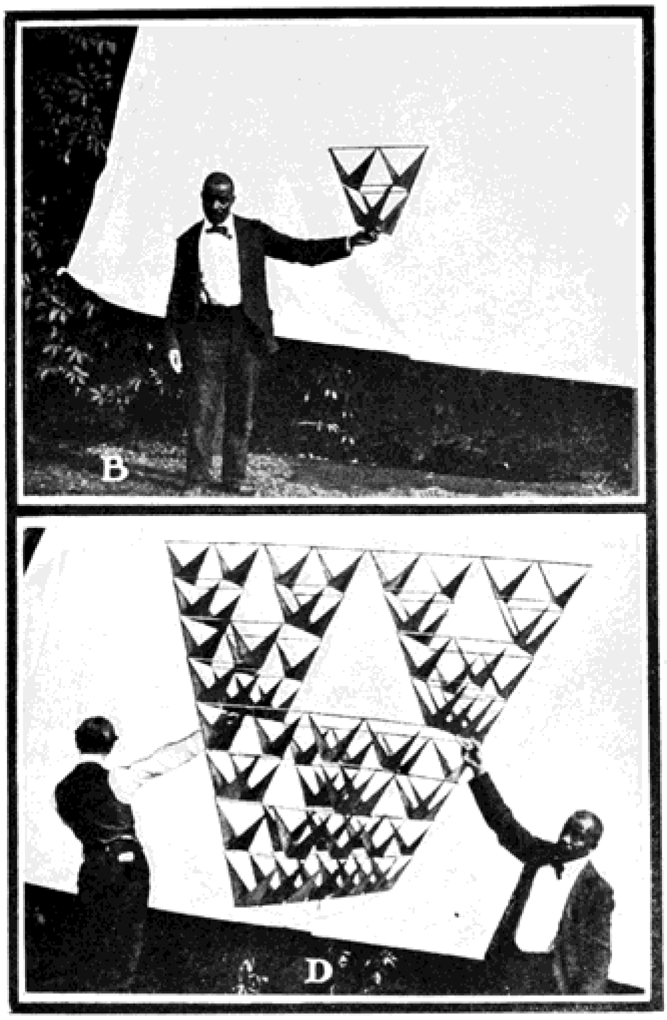
Fig. 3. *A.* A Winged Tetrahedral Cell. *C.* A Sixteen-celled Tetrahedral Kite.

The Method of Building up Kites with Tetrahedral Cells. The four-celled kite *B*weighs four times as much as one cell and has four times as much wing-surface ; the sixteen-celled kite *C*has sixteen times as much weight and sixteen times as much wing-surface; and the sixty-four celled kite *D* has sixty-four times as much weight and sixty-four times as much

the efficiency nor the size of a kite could be increased by using many small Hargrave box cells instead of two large box cells.

The problem was then to invent a new cell, one that could be used

in combination. Circular cells, polygonal cells of six, eight and



B. A Four-celled Tetrahedral Kite.
D. A Sixty-four-celled Tetrahedral Kite.

wing-surface. The ratio of weight to surface, therefore, is the same for the larger kites as for the smaller. In the middle of the kites there is an empty space, octahedral in form, which seems to have the same function as the space between the two cells of the Hargrave box kite. The tetrahedral kites that have the largest central spaces preserve their equilibrium best in the air.

twelve sides, and cells of various other shapes were devised, tried and thrown away.

Finally the triangular cell was hit upon. It immediately proved an immense advance over the rectangular Hargrave, being stronger in construction, lighter in weight and offering less head resistance to the wind.

Diagram 2 shows a drawing of a kite built of two triangular cells. The triangular cell needs bracing in one direction only, on its fiat surfaces; in a transverse direction it is self-braced, so that internal bracing, which causes head resistance, is unnecessary.

By tying a number of kites built of triangular cells corner to corner, as shown in Fig. 1, Dr. Bell was able to construct a giant kite, Fig. 2, in which the ratio of weight to wing surface is not much more than that of the smaller kites of which it is composed. Combinations of

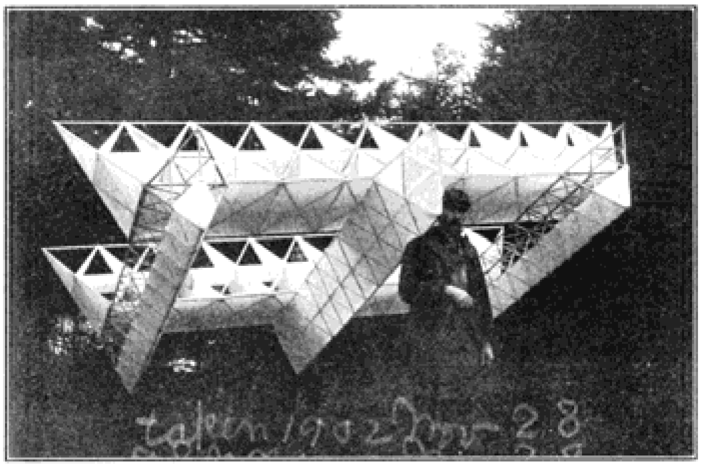


Fig. 4. Floating Kite built of Tetrahedral Cells.

triangular kites, however, must be arranged in two sets with a powerful connecting framework as shown in Fig. 2. The larger the two sets, the farther apart must they be, and, therefore, the connecting frame becomes exceedingly stout and heavy. This connecting framework is of course dead weight; it is a very serious handicap and soon limits the size of kites that can be built of triangular cells.

By his invention of the triangular cell Dr. Bell was able to build larger kites than he had been able to build before. The old limit of size was stretched considerably, but a limit remained none the less.

The principal improvements of the triangular cell, greater lightness and strength, are due to the cell being self-braced in a transverse direction, from side to side. Longitudinally fore and aft, it is, however, very weak, like the box cell. Dr. Bell reasoned that a cell could be made self-bracing in every direction by making it triangular in all directions or tetrahedral in form.

Accordingly a number of regular tetrahedral cells, Diagram 3, were built in the laboratory. The experiments made with these cells have given startling results:

First.—A tetrahedral cell has astonishing strength even when composed of very light wooden sticks. As Dr. Bell has expressed it: "It is not simply braced in two directions in space like a triangle, but in three directions like a solid. If I may coin a word, it possesses 'three-dimensional' strength; not 'two-dimensional' strength like a triangle, or 'one-dimensional' strength like a rod. It is the skeleton of a solid, not of a surface or a line."[2]

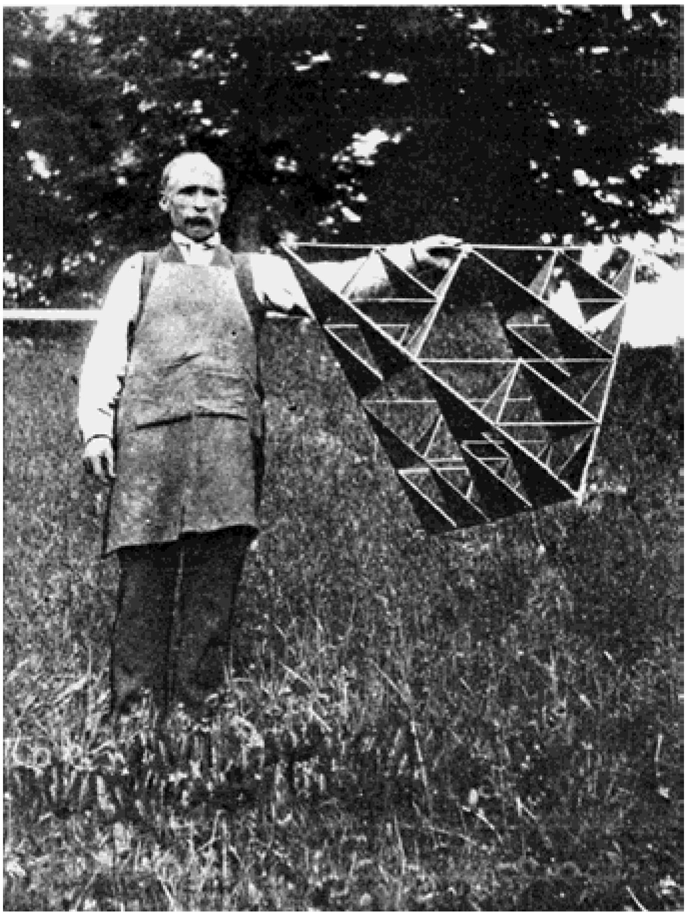


Fig. 5. Sixteen-celled Tetrahedral Kite.

Second.—A large kite constructed of tetrahedral cells is as solid as a small one, for it is likewise self-braced in all directions.

Third.—A kite built of tetrahedral cells is an almost perfect flier; it is steady in squalls, a good 'lifter' and flys almost directly overhead. Tetrahedral cells when combined do not interfere with each other in the least or hurt each other's flying ability as box or triangular cells do when combined. *Fourth.*—By the use of the tetrahedral cell it is possible to build kites unlimited in size and in which, however gigantic the kite, the ratio of supporting surface to weight remains the same as in a small kite.

The successive doubling in size of the kite shown in Fig, 3 may be carried on indefinitely without the weight increasing faster than the wing surface. The cells all act in harmony; no part of a kite built of tetrahedral cells has to be strengthened to counterbalance an opposing force or a weakness in some other part of the kite; no weight is thrown away.

By his invention of the regular tetrahedral winged cell, Dr. Bell thus got around the old law which said you can build kites up to a

Fig. 6. Sixty-four Celled Kite composed of Four of Preceding. 'Red Flier.'

certain size, but no greater. The adherents of that law have always admitted that the law might be circumvented if a kite could be combined of many small models, but they have denied or at least doubted that a working combination of small models effective enough to carry a man, and to be called a flying machine, could be made. With his tetrahedral cell Dr. Bell has, however, been able to build kites of tremendous power, strong enough to carry up several men. One of his first kites lifted two men off their feet in a squall, and they only saved themselves from an undesirable ascent by instantly dropping the rope. Later this same kite (Fig. 4) snapped its rope, a three-eighth inch new manila rope, as quickly as a thread. Kites much more powerful than this one have since been built and prove beyond a question that a practical, efficient and powerful method of combination of small forces has been discovered.

Dr. Bell has been building during the past summer thousands of tetrahedral cells varying in size from 25 cm. to 1 meter. Some of them are covered with light red silk weighing about 40 grams to the square meter and others with nainsook, very fine cotton, about as light as the silk. Some of the earlier cells were covered with cheesecloth, but the cheesecloth weighed so much—over 100 grams to the square meter—that Dr. Bell has discarded it. The framework of the cells is usually of black spruce, which is light and strong.

To make a tetrahedral cell, take six sticks of equal length and place three of them on a table so as to make an equilateral triangle.

Erect one of the three remaining sticks at each corner of the triangle

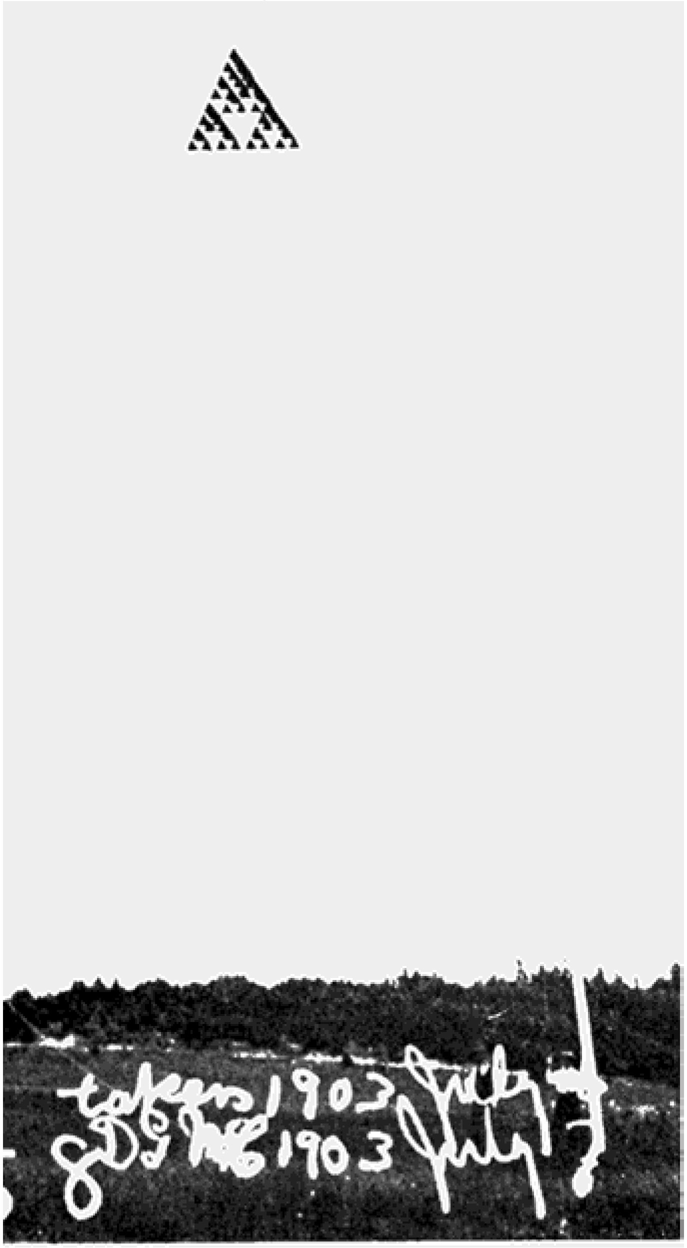


Fig. 7. 'Red Flier' in the Air.

and bring the tops together. It is the old-fashioned puzzle of making four triangles with six matches. Then cover any two sides and you have a tetrahedral winged cell.

A number of cells outlined against the sky look like a flock of birds; for instance look at Fig. 18; the wings of a cell are also like a bird's wings in that they are not rigid like a board; the silk covering yields somewhat to the pressure of the wind as the feathers of a bird's wing.

Hundreds of tetrahedral cells are now being made in which the frame consists of hollow aluminum tubing. The aluminum weighs very little more than the spruce wood hitherto employed and gives much greater strength to the frame.

Using these cells just as a mason uses bricks to build houses of many forms, he has been constructing kites of every shape that a fertile brain could devise. Steadiness in the air and lifting power have been the main object in all. Some of his combinations are gigantic, exceeding twenty-five feet in length and twelve and fifteen feet in height and width, but in spite of their strength all are so light that his trained assistants send the giant kites up into the air as easily as the little fellows.

The kite shown in Fig. 5 is tetrahedral in form and built of sixteen tetrahedral cells. This was the first tetrahedral kite constructed by Dr. Bell. It is a wonderful flier, darting up from the ground with a shrill whistle and climbing to extraordinary heights. It is a pretty sight to see the operator bring the kite in after the experiment is over.

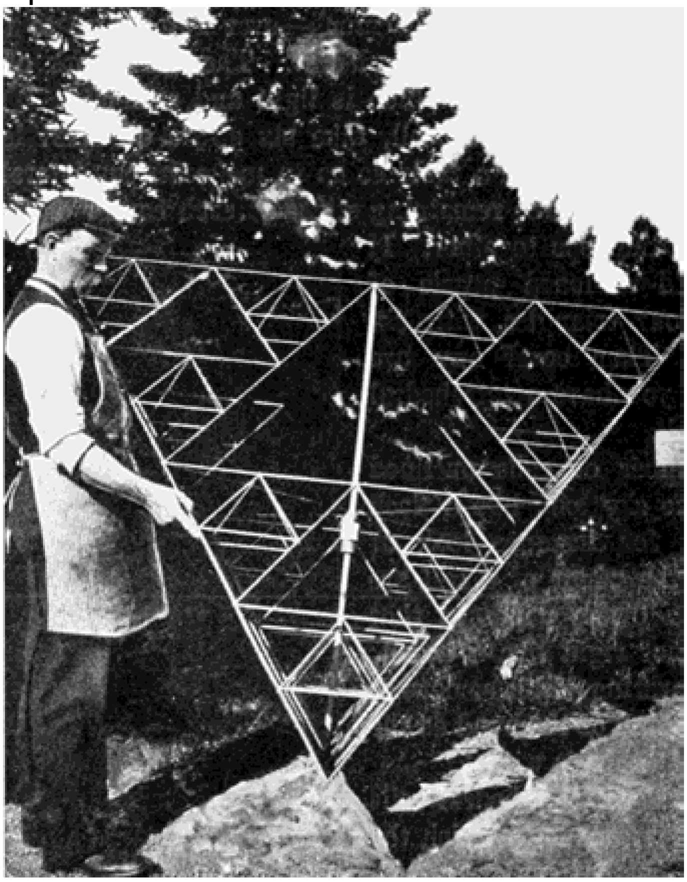


Fig. 8. Sixteen Large-celled Kite carrying five pounds of lead.

The kite flies steadily without a turn or quiver as the line is reeled in and finally alights on his hand as gently as a bird. Figs. 6 and 7 show a sixty-four-celled kite made of four kites like the preceding. The kite is two meters on a side. The most remarkable feature of this kite, aside from its perfect equilibrium and steadiness in squalls, is its ability to fly almost directly overhead. Even in the lightest breeze I have rarely seen it flying at an angle of less than eighty degrees. The kite is admirably adapted for meteorological observations at great heights, as it can carry considerable weight with the greatest ease.

Fig. 8 shows a kite of the same size but with sixteen cells instead of

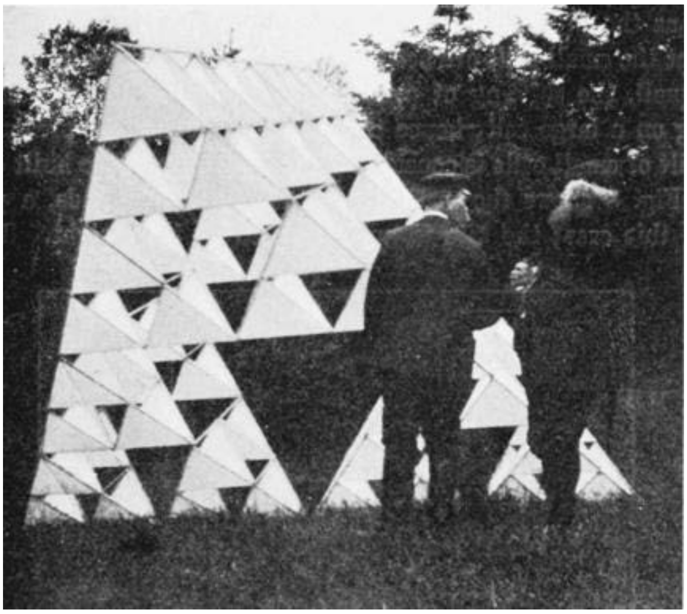


Fig. 9. Sixty-four Celled White Flier resting on its Keel.

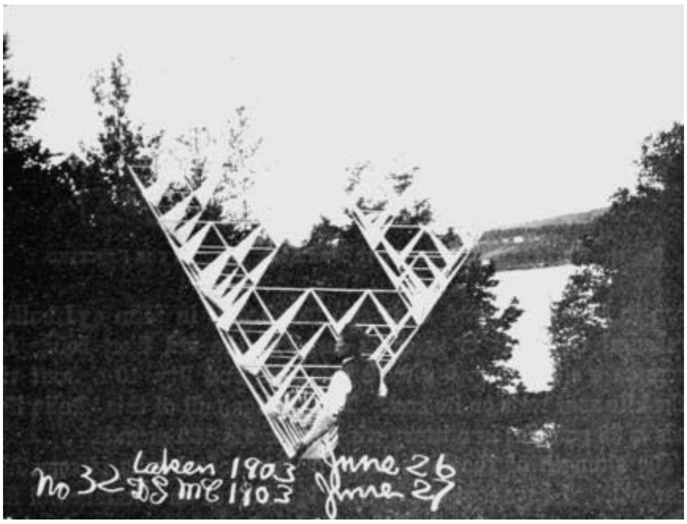


Fig. 10. White Flier. (Front View.)

sixty-four, the cells being four times as large. The kite is not as successful as the preceding one. Dr. Bell's experiments have convinced him that the small cells are better; when the wind varies in strength as in a squall, the shifting of pressure on a small cell is less than the shifting on a large cell; hence the resultant shifting of pressure on a kite built of small cells is considerably less than on a kite built of large cells. Fig. 8 shows the method of attaching five pounds, a piece of lead in this case; the kite is not disturbed by the weight. The kite

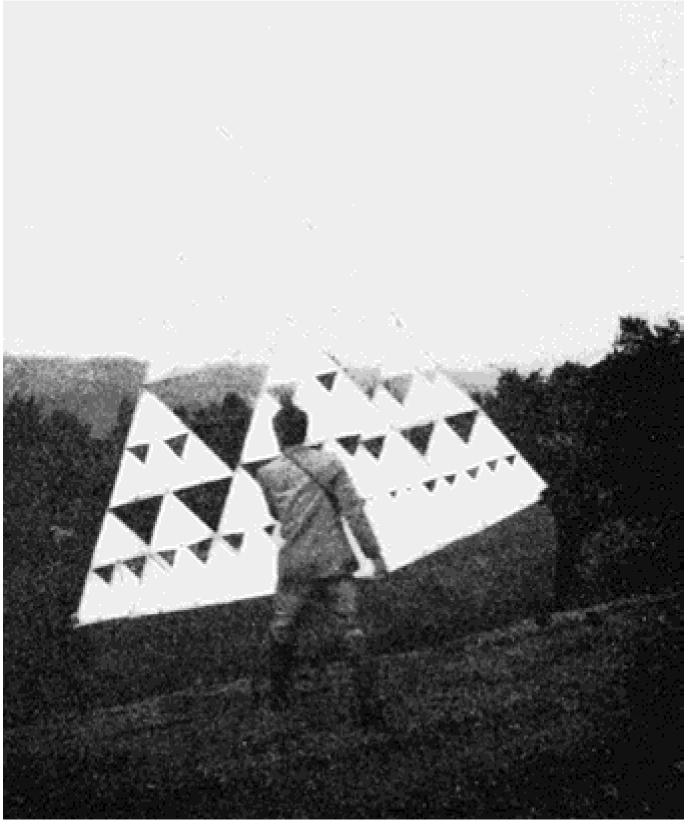


Fig. 11. White Flier. Carrying it off the Field after the Experiment.

shown in Figs. 9, 10 and 11 is also tetrahedral in form and built of tetrahedral cells. It is twice as large as the red flier, being four meters on a side. Fig. 9 gives a side view and Fig. 10 a front view of the kite as it rests on its keel. The average pull of this kite in light winds is 80 pounds; in a heavy wind it exceeds 150 pounds.

The strength of the kites made of tetrahedral cells is something remarkable. I have seen one of these kites towed on a tetrahedral float for more than a mile on the bay at a speed of eleven or twelve knots without breaking, though one end was dragging one foot under water all the time. As I saw the kite pulled along I expected to see it shattered to pieces, but beyond a few broken sticks it was as well and strong at the end of the journey as when it started.

The big tetrahedral kites, twelve feet and more on a side, look like awkward things to travel with or to store away, but they may be packed as handily and in as small compass as blankets or rugs. Each kite is made in collapsible sections, which open and then fold up, as shown in Fig. 12. Half a dozen large kites can in this way be carried in a trunk from place to place and put together in a few minutes.

The more recent experiments made have been to obtain a giant manlifting kite, or flying machine, that will rise from the surface of a lake. Any one who has ever watched a heavy bird rise from the

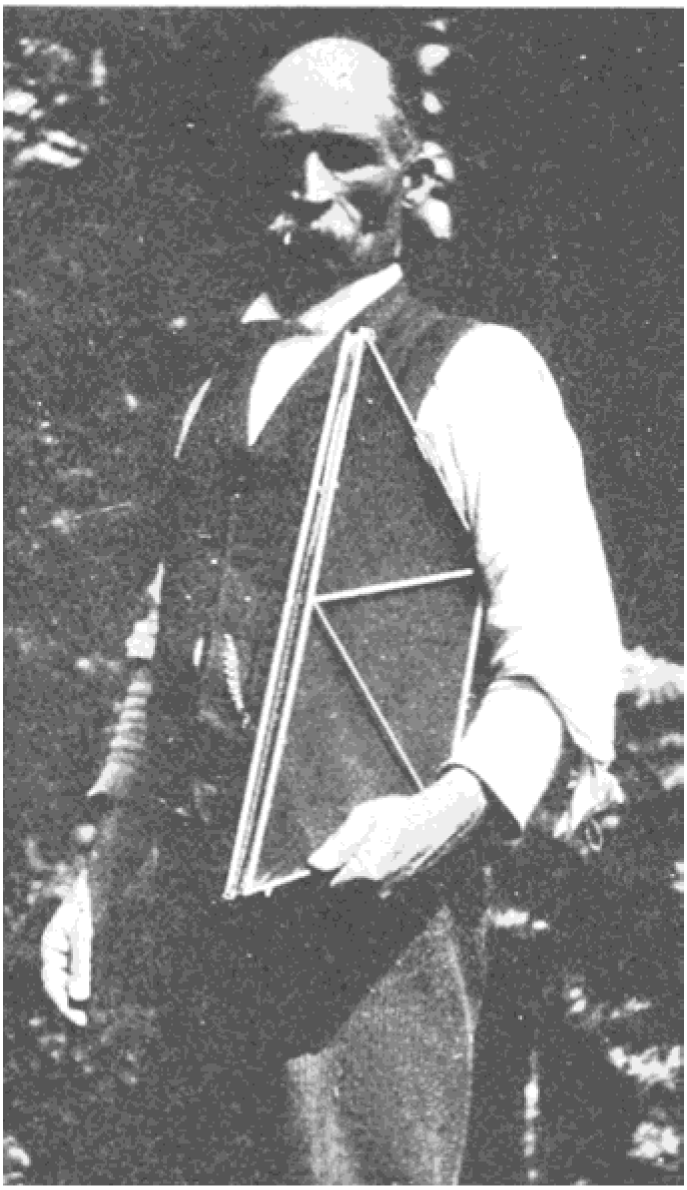


Fig. 12. A Section of a Kite folded up for Packing.

ground has doubtless noticed that it runs along the ground for a few feet before it rises—the bird must acquire some momentum before its wings can lift its heavy body into the air. The natives of certain parts of the Andes understand this fact very well and by means of it catch the great Andean vultures. A small space is shut in with a high fence and left open at the top. Then a lamb or piece of carrion is placed on the ground inside. Presently a vulture sees the bait and swoops down upon it; but when once he has lighted on the ground inside he can not get out for he has no running space in which to acquire the momentum that is necessary before his wings can lift him. In the same way the first difficulty of all flying machines is to acquire the first momentum that will lift the machine into the air. To overcome this difficulty the flying machine inventor usually shoots his machine from a high platform which makes it necessary for the machine to rise immediately. But if the flying machine can not start in a natural way the chances are its method of working is not right and it is doomed to failure. And even if a machine could fly perfectly after it had been started how could it get up again if it came down for food or fuel at some point where there was no platform and startingapparatus? In a word the solution to the whole flying machine problem if to get a machine that will start of itself without being shot off as if from the mouth of a cannon. The successful machine in rising will probably have to imitate the start of a large and heavy bird—that is glide along the ground or surface of a lake for some distance with constantly increasing speed until it rises of its own momentum.

A little kite, such as that shown in Fig. 5, darts up from the hand if there is the least breath stirring. The larger kite, shown in Figs. 6 and 7, is equally nimble, but in a faint breeze, to raise the large White Flier, shown in Figs. 9 and 10 and which is more than twelve feet on a side, the operator has to run a few yards towing the kite behind him.

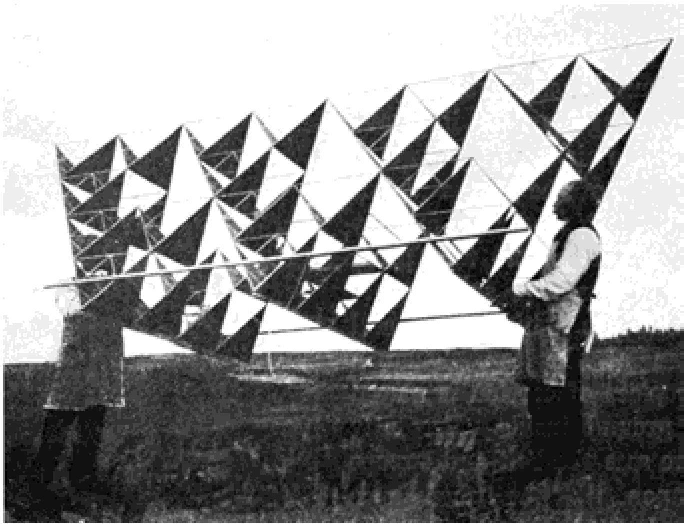


Fig. 13. Model of Mabel II.

Kites larger than the White Flier Dr. Bell sends skyward by tying the rope to the collar of a fast horse and then sending the steed galloping down the field. Of course, when a good wind blows all these kites soar upward as easily as the little fellow.

But to raise the giant kite Mabel II., shown in Fig. 15, Dr. Bell found a more serious problem. It would be difficult for a man or horse to pull the great frame so steadily as to keep her from being dashed against the ground and smashed before she could rise.

The kite has power enough to lift several men, but how was Dr. Bell to get her up into the air? If he could raise Mabel II. naturally, like one of the smaller kites, he could be pretty sure that she would go up when a motor, with propellers, was suspended to her. A pull or a push would be identical in its effect. In a word, if Dr. Bell could get this great man-lifting kite into the air by towing, as he did the smaller kites, lie would succeed in obtaining a successful form for a flying machine.

There are two ways in which Mabel II. might be towed—on wheels along a track or on floats on the surface of a lake. Dr. Bell preferred to try the second method first, as it is simpler and easier.

With tetrahedral frames he built three long boats and covered them with oilcloth to make them watertight. The boats possess great strength, and yet, because of their tetrahedral structure, are so light

Fig. 14. Testing one of the Boats of Mabel. II.

as not to overweight the kite. The three boats were then ranged parallel to one another and the whole structure placed upon and securely fastened to them.

Fig. 15 shows Mabel II., just before she was launched. This figure and Figs. 16 and 17 give an excellent idea of the construction of the kite. Across the floats extend two bridges, built of tetrahedral cells. Resting on the bridges are four large kites, like the one shown in Fig. 8. The spaces between the four kites are filled with smaller tetrahedral cells. In all there are 272 cells in the structure.

Fig, 18 shows the kite floating merrily on the water waiting to be put to the test. With her tiers of red wings above and white wings below she was a beautiful sight. But would she fly? A small model of Mabel II., shown in Fig. 13 had flown beautifully on land. The flying weight of this model was greater than the flying weight of Mabel II., and Dr. Bell had therefore every reason to believe that Mabel II. would also fly if he could raise her.

When everything was ready Mabel II. was towed out to the center of the bay and her flying line cast aboard the steamer which Dr. Bell had engaged for the experiment. The flying line was made fast to a cleat on deck and the steamer started ahead at full speed, twelve or thirteen knots an hour.

But Mabel II. was working under two bad handicaps—first, a

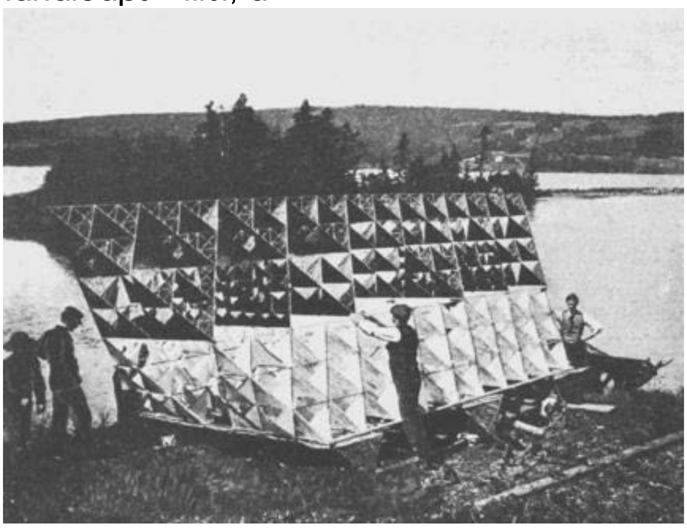


Fig. 15. Mabel II. before Launching.

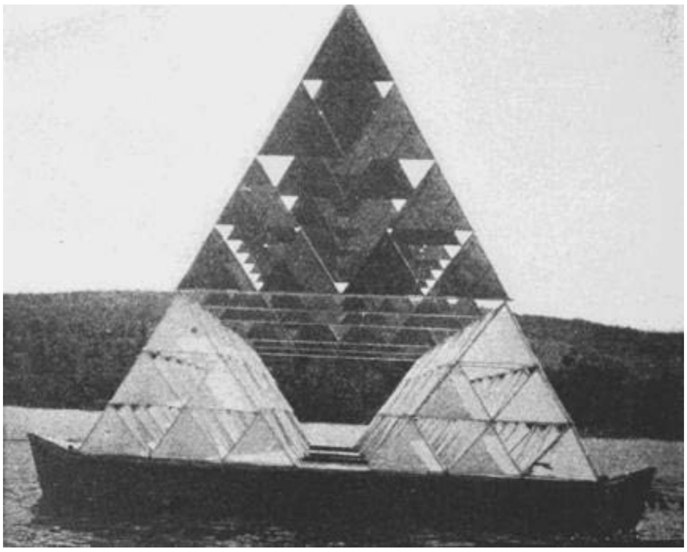


Fig. 16. End View of Mabel II.

heavy downpour had begun some minutes before the start and had thoroughly drenched the kite, making her so heavy that every one but Dr. Bell urged that the experiment be postponed (when Mabel II. was

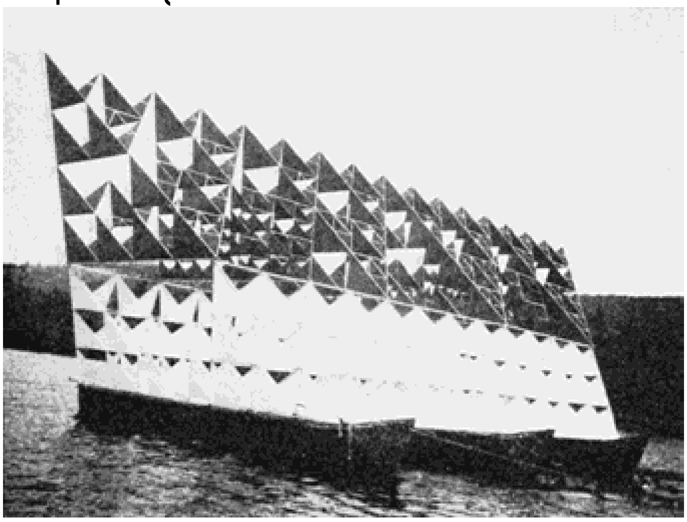


Fig. 17. Front View of Mabel II.

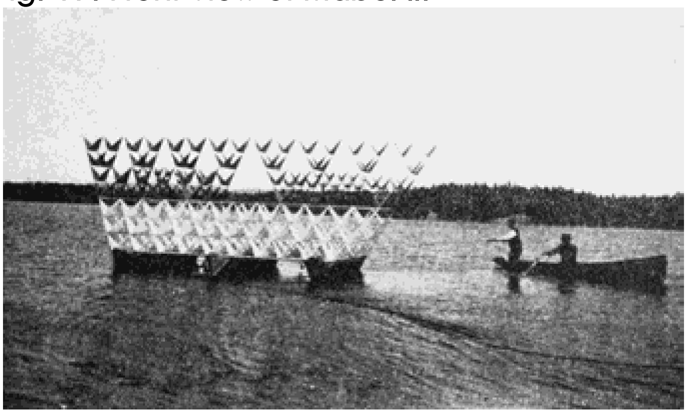


Fig. 18. Mabel II. Outlined against Sky showing Bird-wing Effect.

weighed after the experiment it was found that the rain water and leakage in the boats had increased her weight by sixty-four pounds); second, the operator on the deck of the steamer had given Mabel II. too short a Hue, so that she was blanketed by the big hull of the steamer and therefore received but a small fraction of the wind of motion.

In spite of these two serious disadvantages, however, as the steamer gathered headway, the great kite first trembled for a few moments, and then rose gracefully from the water and flew steadily the full length of her line.

Fig. 19 shows the kite as she rose from the water after being lowed a short distance. The rain was pouring down in such torrents at the time that my other pictures were not successful.

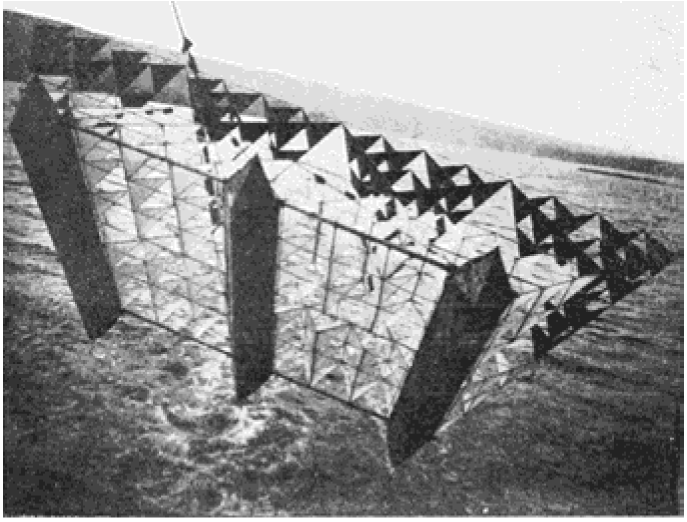


Fig. 19. Mabel. II. rising into the Air.

The experiment was thus a success, and showed conclusively that Dr. Bell has obtained a man-lifting kite, or flying machine, that will rise of itself. If a pull will make the kite rise, there is no reason to doubt that an equally powerful push, such as propellers would give, would be equally successful in causing the kite to ascend.

Though the tests have proved that Mabel II. can easily carry a man and engine, no actual ascents have been made this summer. When ascensions are made the man will sit in the center of the open space between the two bridges (see Fig. 16).

One of the beauties of Dr. Bell's models is that in every one there is a large roomy space in the center where the operator and his passengers can sit. This position is much safer and more comfortable than sitting in a chair suspended some yards below the machine. As the ultimate machine will probably be of tougher material than wood and silk, in time of war the operator and the motor would be protected as well as hidden, instead of being a splendid target for every shot from below.

Kites that are tetrahedral in form, as the red and white fliers shown in Figs. 6 and 9 and those used to form the superstructure of Mabel II., have perfect equilibrium, but because of their small resultant area of horizontal or sustaining surface, their lifting power, though considerable, is not as great as Dr. Bell is satisfied to obtain. His

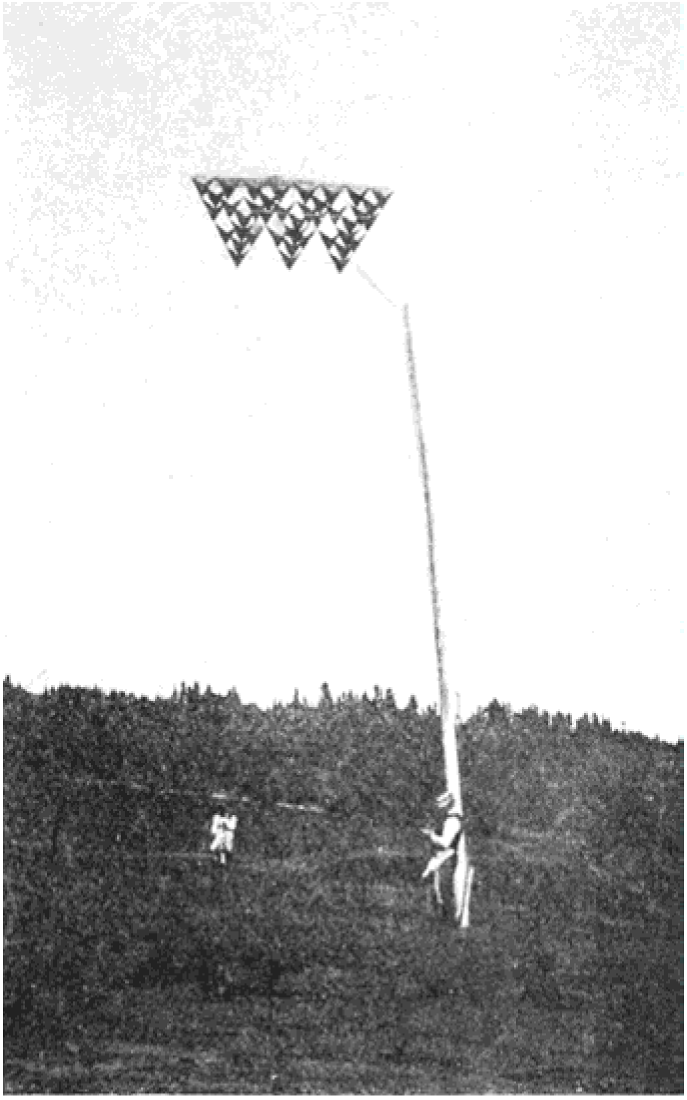


Fig. 20. Model of Mabel II. in Air.

latest combinations have, therefore, been made in the hope of obtaining greater horizontal surface, and thus greater lifting power. In Figs. 21 and 22 is shown a new form of kite, Victor I., which is undoubtedly the most wonderful kite ever devised and put together.

This great H-shaped kite rose from the hand, without running, in a breeze so light that a flag on a pole fifty yards away hung limp and motionless. It glided up and up until it was flying six or seven hundred yards high, steady as a table top. The breeze at that elevation was perhaps five or six miles, though on the ground the movement of the air was so light as to be imperceptible even on the grass or trees. In a breeze of fifteen miles it flew as steadily as before, but nearer the perpendicular and with a tremendous pull.

A glance at the photographs will readily explain what makes the kite such a remarkable flier. The cells of the two wings are reversed, the keels of the cells pointing up instead of down, and the tips pointing down instead of up, while above each tier of cells stretches a wide aeroplane. This wide expanse of sustaining surface helps the winged cells tremendously and at the same time does not interfere with their working. Victor I. is three meters long, three meters wide and one meter deep and weighs only twelve pounds. The flying weight is only three hundred and fifty grams to the square meter of horizontal surface. A smaller kite of similar model has been constructed whose flying weight is about two hundred grams. The wonderful lightness of this model will be better understood when we realize that it carries twenty-five square feet of supporting or horizontal wing surface to one pound of weight, while a wild duck

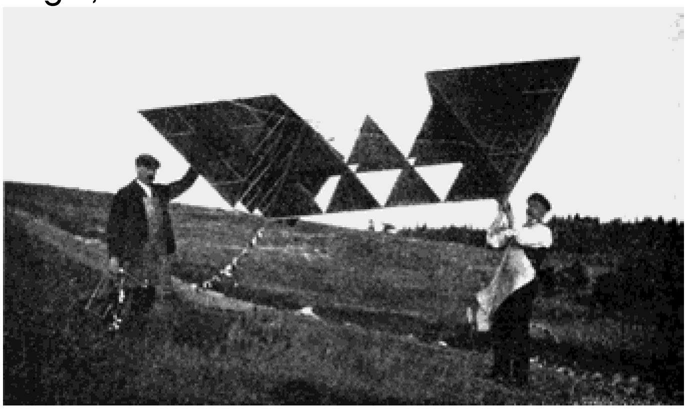


Fig. 21. Victor I.

has only one half of one square foot of wing surface to one pound of weight. The model almost rivals a mosquito in lightness—one pound of mosquitoes represents an area of wing surface of forty-nine square feet.

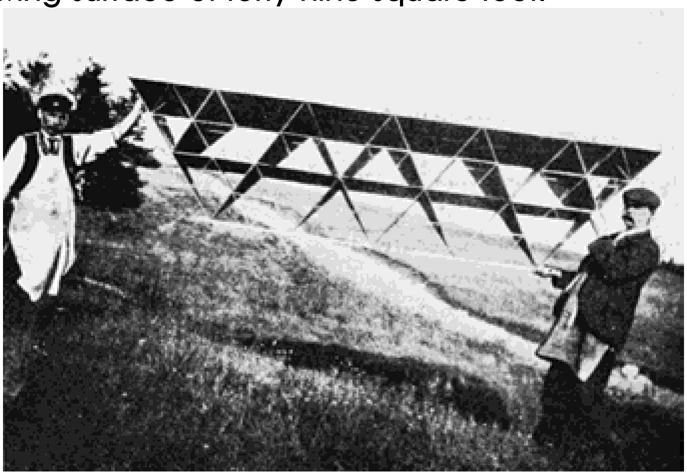


Fig. 22. End View of one of the Cells of Victor I.

Dr. Bell is now making a wind boat on this model, and it would not be surprising if this new wind boat should eclipse even the redoubtable Mabel II.

The framework of this latest model is also strong enough to support a man, and yet its flying weight is, as I have said, only 200 grams to the square meter of supporting surface. When we consider that the flying weight of other machines in which the greatest lightness has been striven for is nearly one hundred times as great as in this kite, we realize the tremendous advance made by Dr. Bell in at least one direction^ — a marvelous combination of lightness and strength.

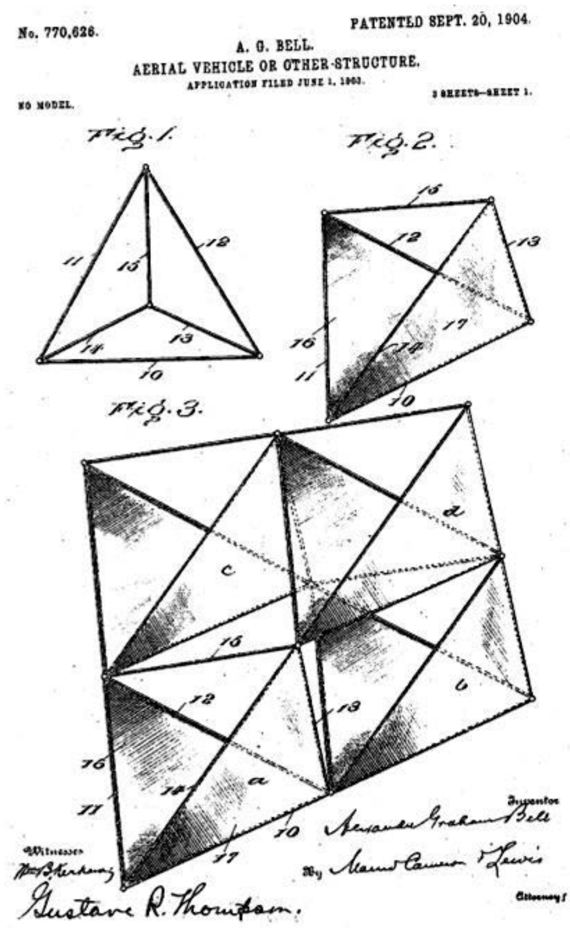
In not one of the successful kites of Dr. Bell has the flying weight exceeded 500 grams to the square meter of supporting surface, whereas in various other machines the ratio exceeds 10,000 grams to the square meter.

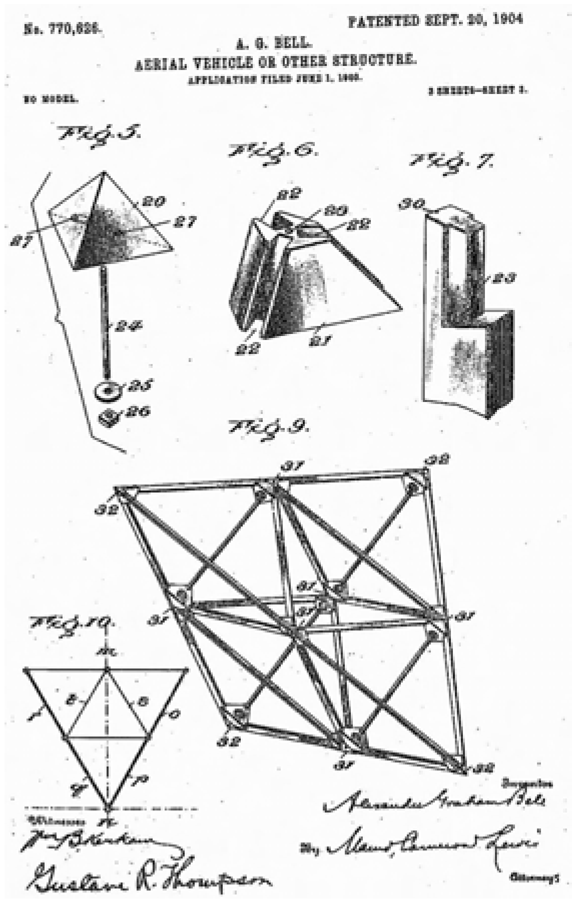
Dr. Bell has thus constructed one form of successful flying machine, Mabel II. Another form, which may be even more successful and of which Victor I. is a model, is nearly completed. To obtain the form of a flying machine has been the principal problem to solve ; the matter of a motor is comparatively simple.

The next step is to place a motor on Mabel II., or an enlarged Victor I., with a propeller extending from each side of the kite like an aerial paddle wheel. Strong and light motors are in the market and to be had easily. Then, as the operator sits inside with spinning propellers he can drive the kite up and down the surface of the bay testing how to control and steer her. Later, with the propellers going faster, he can send the kite skimming along a few yards above the surface and continue the experiments at this small height above the water without danger to life.

Finally, by still further increasing the speed of his propellers he can shoot upward and leisurely proceed wherever he may desire. Great speed is not Dr. Bell's object. Ten or fifteen miles an hour is enough to start with.

Dr. Bell has now reached the point where the flying machine is no longer problematical. It is simply a question of time necessary to put things together. Whether the first flying machine carrying a man is built by him at his laboratory in Beinn Bhreagh is probably immaterial to him, but the chances are that if some one else does not build a suc- cessful machine within the next yea,r or two he will have a flying machine of his own by that time.*


No. 770,626.
PATENTED SEPT. 20, 1904.
A. G. BELL.
AERIAL VEHICLE OR OTHER STRUCTURE.
APPLICATION FILED JUNE 1, 1903.
NO MODEL.
Fig. 1.
Fig. 2.
Fig. 3.
Witnesses
Inventor
Alexander Graham Bell
By Mauro, Cameron & Lewis
Attorneys
Gustave R. Thompson.


No. 770,626.
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AERIAL VEHICLE OR OTHER STRUCTURE.
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NO MODEL.
Fig. 5.
Fig. 6.
Fig. 7.
Fig. 9.
Fig. 10.
Witnesses
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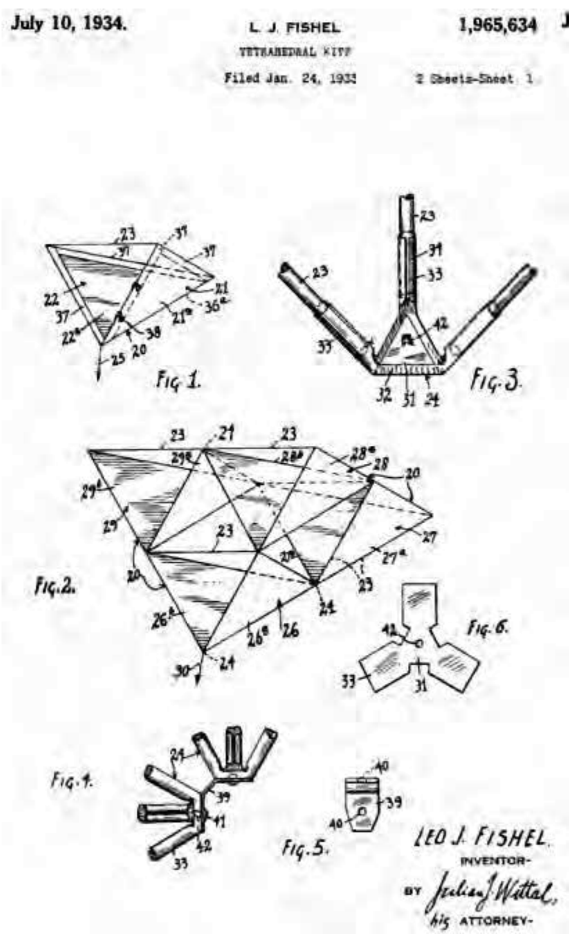
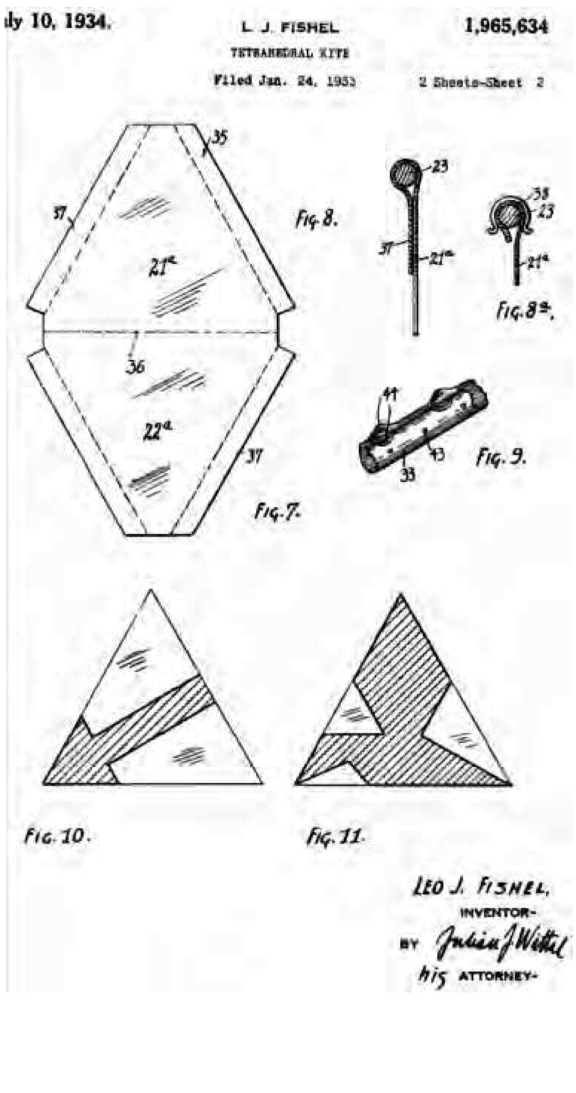
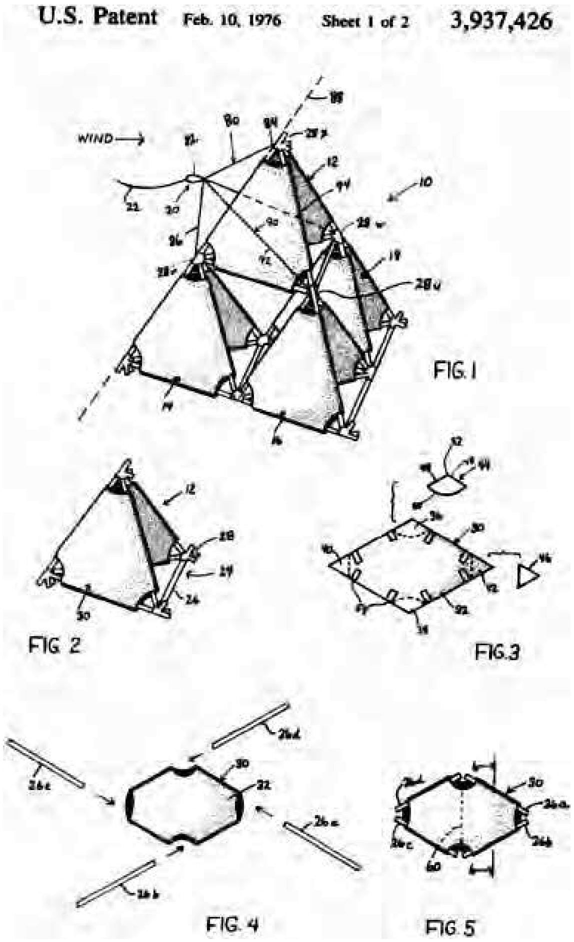
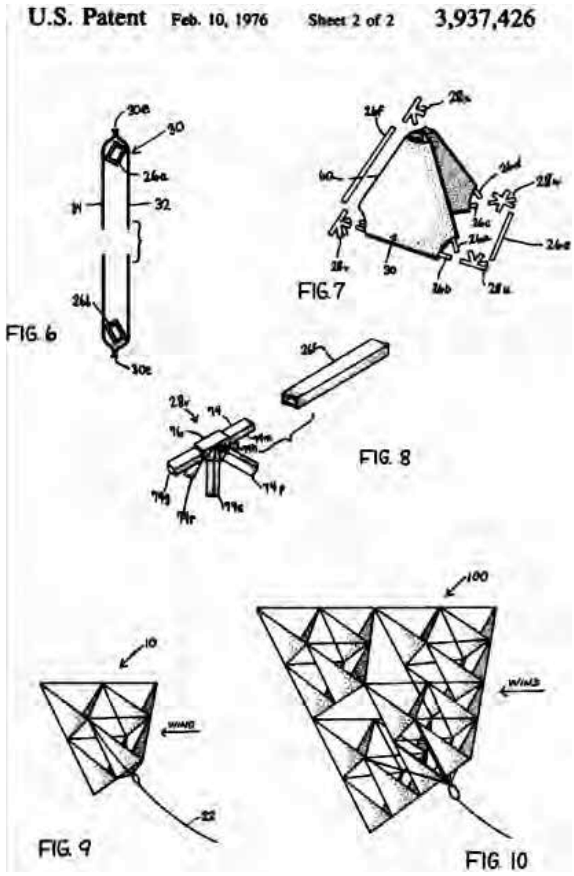
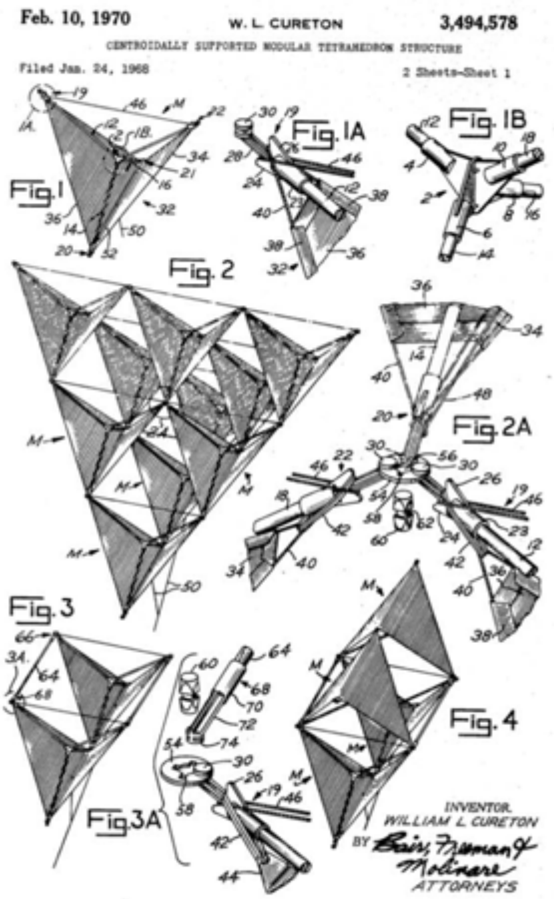
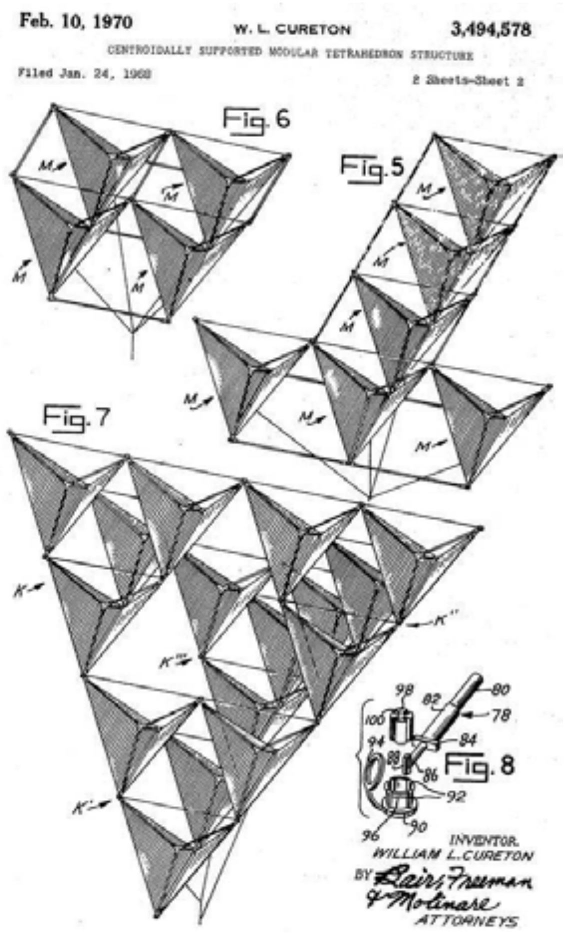

July 10, 1934.
L. J. FISHEL
1,965,634
TETRAHEDRAL KITE
2 Sheets-Sheet 1
Fig. 1.
Fig. 3.
Fig. 2.
Fig. 6.
Fig. 4.
Fig. 5.
LEO J. FISHEL
INVENTOR-
BY Julian J. Wittal,
his ATTORNEY-


L. J. FISHEL
1,965,634
TETRAHEDRAL KITE
2 Sheets-Sheet 2
Fig. 8.
Fig. 8a.
Fig. 7.
Fig. 9.
Fig. 10.
Fig. 11.
LEO J. FISHEL,
INVENTOR-
BY Julian J. Wittal
his ATTORNEY-


U.S. Patent Feb. 10, 1976 Sheet 1 of 2 3,937,426
WIND
FIG. 1
FIG. 2
FIG. 3
FIG. 4
FIG. 5


U.S. Patent Feb. 10, 1976 Sheet 2 of 2 3,937,426
FIG. 6
FIG. 7
FIG. 8
WIND
FIG. 9
FIG. 10


Feb. 10, 1970
W. L. CURETON
3,494,578
CENTROIDALLY SUPPORTED MODULAR TETRAHEDRON STRUCTURE
Filed Jan. 24, 1968
2 Sheets-Sheet 1
Fig. 1
Fig. 1A
Fig. 1B
Fig. 2
Fig. 2A
Fig. 3
Fig. 3A
Fig. 4
INVENTOR.
WILLIAM L. CURETON
BY Bair, Freeman & Molinare
ATTORNEYS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CENTROIDALLY SUPPORTED MODULAR TETRAHEDRON STRUCTURE
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2 Sheets-Sheet 2
Fig. 6
Fig. 5
Fig. 7
Fig. 8
INVENTOR.
WILLIAM L. CURETON
BY Bair, Freeman & Molinare
ATTORNEYS

BUILD A D-STIX TETRAHEDRAL KITE!

By Jeff Duntemann
jeff@duntemann.com

When I was a junior in high school I became obsessed with the geometry of the fourth dimension. I later turned that obsession into an award-winning science/math fair project, but at 16 it was just a weird fun thing to be enthusiastic about. In the process of reading books like *The Fourth Dimension Simply Explained*, I learned about three-dimensional projections of four-dimensional solids, and (without taking a lot of time to tell you precisely what that means here in an article about kites) went from there to building geometrical models out of straws and balloon sticks. I made models of the more interesting regular solids, including the tetrahedron, octahedron, and dodecahedron.

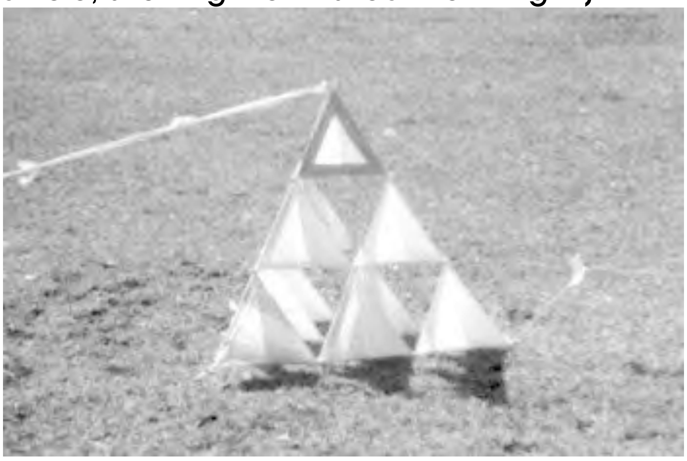
Using sticks or straws, this was a lot of work. However, I soon discovered that over at the American Science Center store at Nagle and Northwest Highway in Chicago, they sold a very neat geometry-oriented construction set called D-Stix. The set consisted of a large number of 1/8” thick wooden sticks dyed various colors, and a collection of soft plastic connectors into which you could insert the sticks. (Left.) There were connectors with five, six, and eight sockets. (The connector shown above with three sockets was originally a six-socket item, with three sockets snipped off.) It worked beautifully, and I could construct the regular solids in a matter of minutes. However, something intriguing was also included with the kit: Instructions for building an unusual sort of kite using D-Stix as a frame and tissue paper for the sails. On a folded piece of paper in the kit was a template for cutting out the sails. All you needed to do was cut sails from sheets of paper using the template, and then glue or tape the sails to the D-Stix frame.

The summer I turned 17 I built the D-Stix tetrahedral kite, and in August I asked my new girlfriend Carol to go out and fly it with me. (I had met her only two weeks before.) The kite flew reasonably well, if a little wildly. In looking back from 40 years of further experience, I'd say that the wind was a little strong that day for this kind of kite, and caused it to crash. Some of the sticks broke and others popped out of their connectors, which is why the kite in the old photo looks wrong. (Carol took the photo when we were about to throw everything in the car and head home.)

That was the summer of 1969. Almost forty years later, Carol is still with me (we have been married now for 32 years) and when my little margarine dish full of D-Stix connectors turned up recently in a box of packed oddments, it occurred to me that I could re-create the kite we had flown together during the Summer of Love. Here's what I did and how I did it.

The Overall Design

A four-cell tetrahedral kite consists of four tetrahedrons stacked in a three-sided pyramid, which is in turn a tetrahedron. The four cells have tissue paper glued to two of their surfaces. Each cell is thus something like a bow kite with a sharp bend down the front edge rather than a gentle bow. When gluing the sails to the skeleton, make sure that the leading edges of the covered cells all face the same way. (See the photo of the kite at the top of this article, showing the finished kite in flight.)



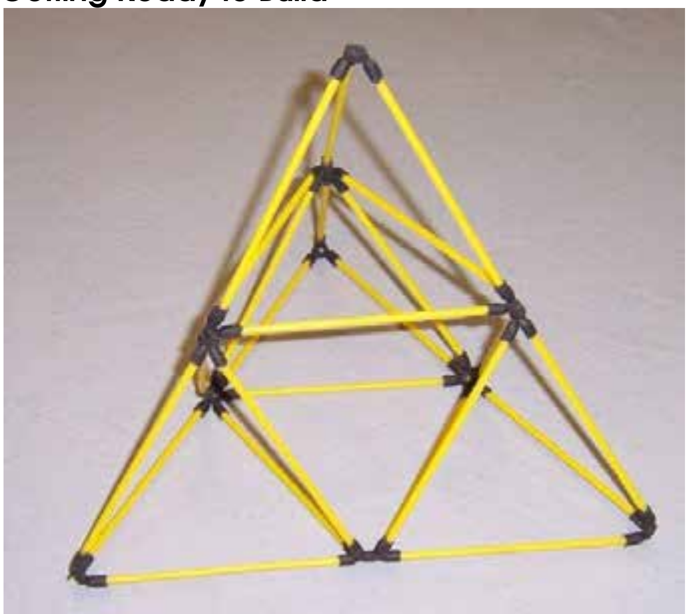
You can make tetrahedral kites with more than 4 cells, and I have made the next "bigger" size, which is ten cells. It seems to me that the more cells the kite has, the better it will fly, assuming it isn't too heavy. D-Stix are not suitable for making larger kites than the one I'm presenting here. The connectors are too heavy, and the 1/8" dowels are not stiff enough. The kite shown above was made with 36" hardwood dowels. The dowels forming the 4 outer edges were 1/4" in diameter. The other dowels were 1/8". The kite was a little heavy, but it flew well with a tail. (The photo shows it lying on the grass upside-down.) Without the convenience of D-Stix connectors, tying and gluing all the sticks together was a *huge* amount of work!

It's important to note here that there have been two general "eras" of D-Stix kits. The ones dating from the 1960s used dyed wooden sticks and yellow plastic connectors. These are the sets that I had in high school. Later kits (dating to the mid-1970s) used colored plastic sticks and black rubber connectors. I bought a set of the plastic/rubber D-Stix on eBay in 2007 and found them, well, *awful*. The plastic sticks are quite smooth and do not grip the connector sockets like wooden sticks do. Worse, the black rubber connectors are fragile and tear easily, and do not grip even wooden sticks as well as the older yellow plastic connectors do. If all you have is one of the newer plastic/rubber D-Stix kits, I'd recommend cutting your own wooden sticks from 1/8" dowel stock, and putting a drop of plastic cement in each socket before inserting the sticks. This requires, obviously, that you know which sockets get which sticks—so assemble the skeleton *without* glue first to make sure you have it right!

After years of looking, I've begun to see new-build D-Stix sets available online, mostly from teacher supply stores. Google around for "D-Stix set"; many places sell them. I have not bought one of these and I'm not sure how good the connectors are. They aren't the awful black rubber that was being sold in the 1970s. The sticks look like plastic, and I still recommend that you use unfinished wooden dowels.

One thing you won't get with the new D-Stix sets is the paper template for the cells' sails. I had it easy: All I had to do was trace the outline onto sheets of colored tissue paper and cut them out. You're going to have to do a little drafting, as I'll explain shortly.

Getting Ready to Build

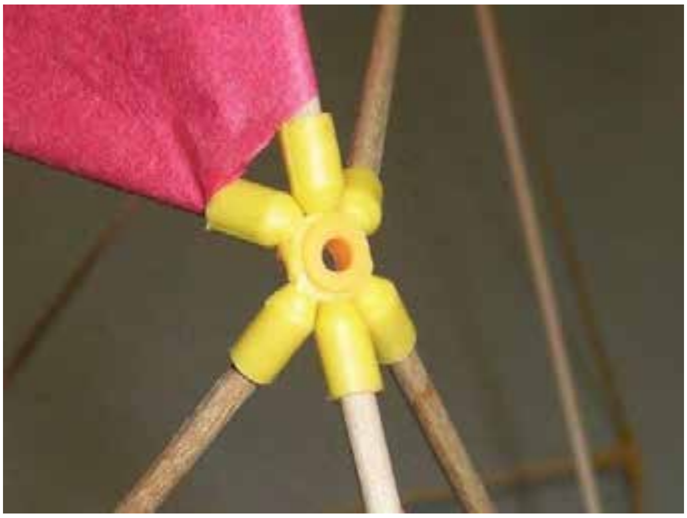


Take a look at the model shown above. This is a small version of the kite skeleton, using 4" sticks. It's far too small to be a kite, obviously, but it will show you the general way that the D-Stix connectors and sticks go together. For the real skeleton you will need 24 identical 10" sticks. The sticks should ideally be unpainted wooden dowels 1/8" in diameter. I no longer have the sticks from my original D-Stix kit, but found unpainted 1/8" dowels in 36" lengths at Home Depot. I have also seen them at craft stores like Hobby Lobby and Michael's.

In my kite I made the sticks 10" long. Why 10"? From the few fuzzy photos I have of my original 1969 kite, that seems to be the length I used. A 1970s vintage D-Stix kit I bought also has 12" sticks, but after some experiments I found that at 12", the kite is a little too flexible. Smaller than 10" makes the kite too heavy for the sail area it would have. 10" is about right.

Cutting the dowels can be done with a fine-toothed coping saw, but I had good results simply snipping them to length using a pair of diagonal pliers. Be reasonably careful to make the length the same for all sticks, but one-sixteenth inch variations or less won't hurt.

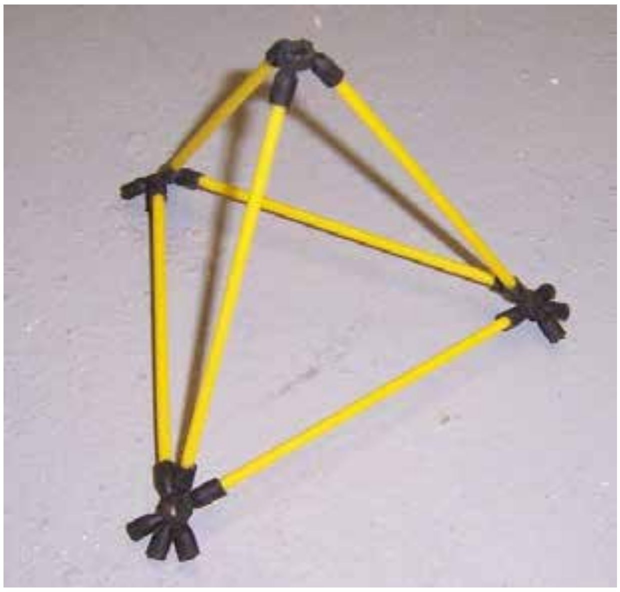
You will need ten D-Stix connectors for the kite: four connectors with three sockets, and six connectors with six sockets. The D-Stix kit does not include a three-socket connector, but you can easy snip three ears from a six-socket connector using diagonal pliers. You can use the 6-socket D-Stix connectors for the six-stick joints, but I found that modifying an 8-socket connector by snipping off two sockets with a wire cutter works better. (Below.) The angles are a little more natural for the connector, and there's less stress tending to pull the sticks out of their sockets.



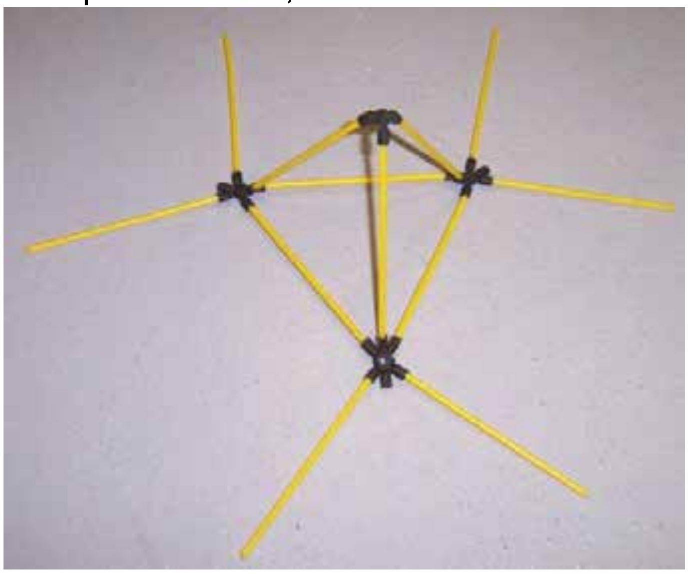
The way the skeleton goes together is much easier to show you in photos than to explain here in the text. I'll be using the yellow model rather than the actual skeleton, but the arrangement of the sticks and the connectors is precisely the same.

Assembling the Skeleton

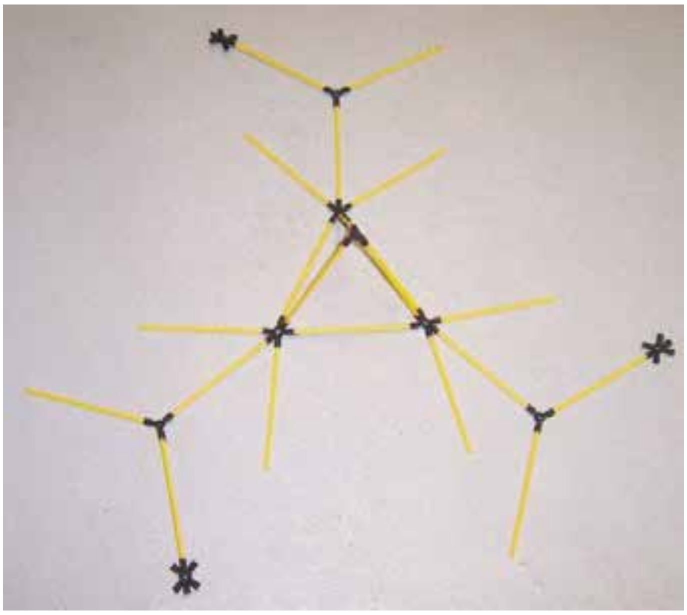
Begin by building the top tetrahedron. Use a 3-socket connector for the top vertex, and 6-socket connectors for the other three vertices:



Add six more sticks to the lower three vertices of the top tetrahedron, as shown below:

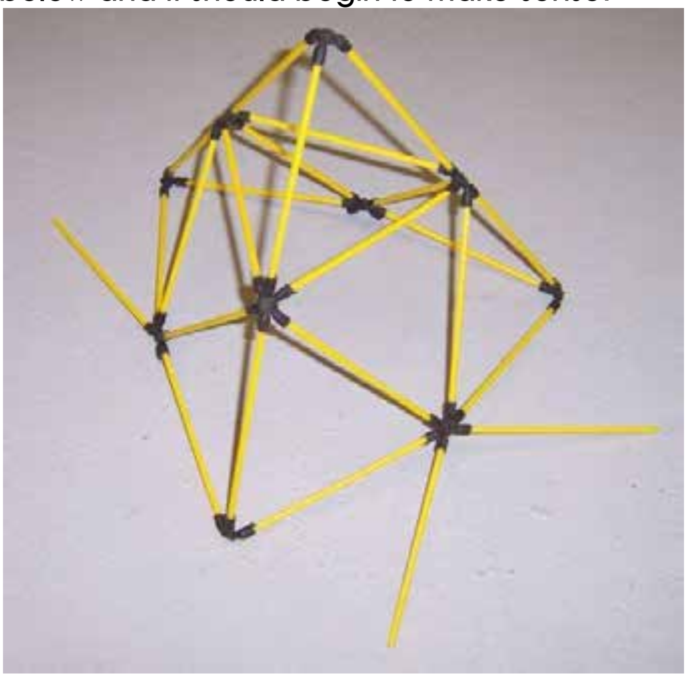


The next step is a little more complicated. Look carefully at the photo. We're adding the rest of the connectors to the lower vertices, plus all but three of the remaining sticks. Build this step flat on the table or floor, as shown here.

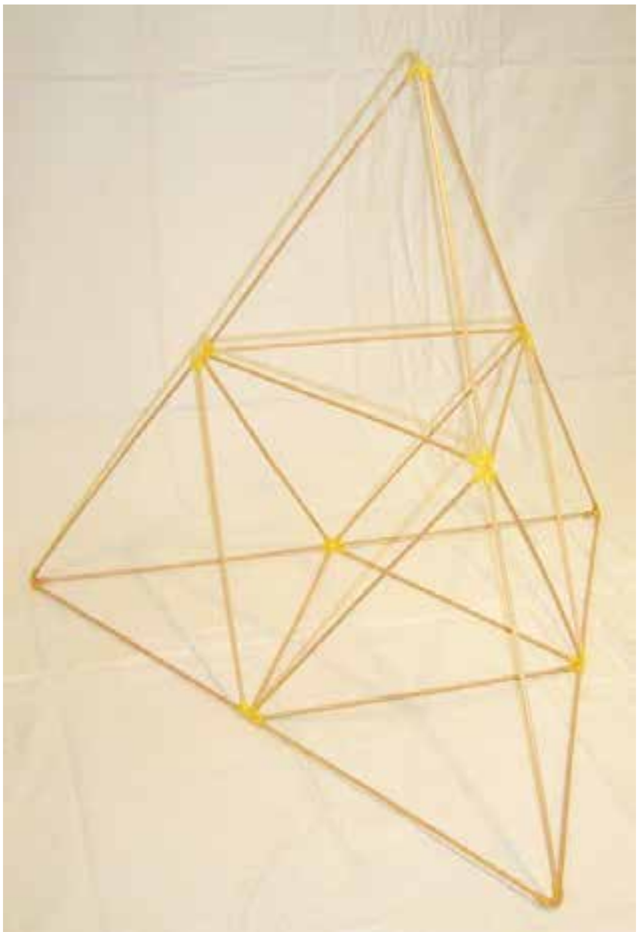


The next step is to "fold up" the sticks and connectors now lying flat on the table to form the lower three tetrahedrons. Three sticks will still be missing; these are the sticks that lie on the bottom of the kite. Short of taking a movie, there's no easy way to explain this. I suggest taking one of the three "dangling" 6-socket connectors and working counterclockwise, plugging in the loose ends of the sticks to form the lower tier of three tetrahedrons. (Look ahead to the next photo.) You may make a couple of mistakes, but they will very quickly be seen as mistakes, and the nice part about D-Stix is that you can yank them out again without damage to the parts.

The final step is to add the three last sticks and connect them across the bottom face of the overall tetrahedron. Look closely at the photo below and it should begin to make sense.

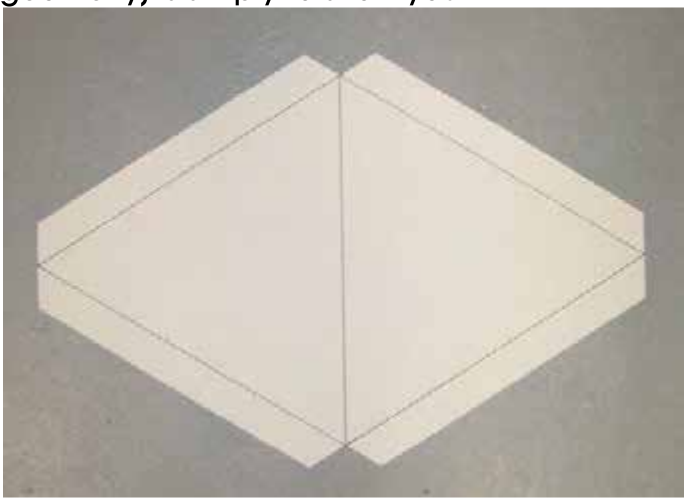


The photo below shows the finished skeleton of the full-sized kite:



Drawing the Sail Template

Each of the four cells has an identical sail. The sail consists of two 10" equilateral triangles joined at one edge, with 1" glue flaps extending beyond the unjoined edges. The best way to explain this (as with a lot in geometry) is simply to show you:



I drew the template on a sheet of thin Hobby Lobby posterboard with a felt marker, a steel rule, and a quaint piece of ancient technology known as a "drafting triangle." Although I'm an old guy and that's how I learned to draw in the 1960s, I would have drawn the template in a drawing program like Visio if I had a printer that would print something that large. I don't, and you probably don't either. If you do, it might save you some time.

Art stores and craft stores (like Hobby Lobby) still carry drafting triangles, and you want one with a 60° angle. (The other common type has two 45° angles and a 90° angle, and that will not help you here, though it's a good thing to have in your kitemaking kit.) The two faces of each cell in the kite are equilateral triangles, and all the angles in an equilateral triangle are 60°.

Draw the joined equilateral triangles first. Then extend the edges as shown to form the flaps. The flaps are 1" wide, and are cut such that when you fold them over for gluing, they will not overlap.

After you've drawn all the lines, cut the template out of the posterboard so that it looks like the one in the photo. Use a paper cutter to cut the long edges if you can. You want the edges to be straight and smooth so you can trace the sail shapes onto the paper you use to build your kite. The notches you can cut with a craft knife.

Cutting Out the Cell Sails

Choosing a paper for any kite is tricky. Tissue wrapping paper usually comes in some very nice colors and patterns, but it's a little thin to use single-ply. Christmas wrap is often very fragile (it's for ripping, after all!) and kraft paper is a little too heavy for a kite that has a lot of sticks, as all tetras do. What I did now (and did in 1969 as well) is to use a double thickness of tissue wrapping paper that I bought in a package of several colors at Hobby Lobby.

The best way to cut the sails from a double thickness of tissue paper is with a sharp craft or mat knife. (I use an Exacto knife.) Unfold the doubled-up tissue onto a craft cutting board or a piece of scrap plywood and smooth it out flat. Tack the corners down with thumb tacks, doing your best to flatten out all creases. Lay the cardboard template over the tissue paper and carefully cut out the cell sail with a craft knife. Keep one hand on the template so that the tissue remains flat while you're cutting. Creased tissue has a tendency to remain creased, and it's important to keep the creases "spread out" and the tissue as a whole flat on the board.

It's possible to trace the template with a pencil or marker and then cut out the cell sail with a scissors, but remember that you're working with two layers of tissue paper, and they must remain aligned while you cut! This is much trickier using a scissors with the paper in your hands than with the paper flat on a board, cutting with a craft knife.

Although I've never tried it (I like paper for kites!) it's certainly possible to use the template to cut out sails from plastic trash bags or Hobby Lobby mylar wrapping sheets. Mylar is a good kite material and I've used it in other designs, but it doesn't glue easily, and when using Mylar you should use plastic tape to fasten the flaps.

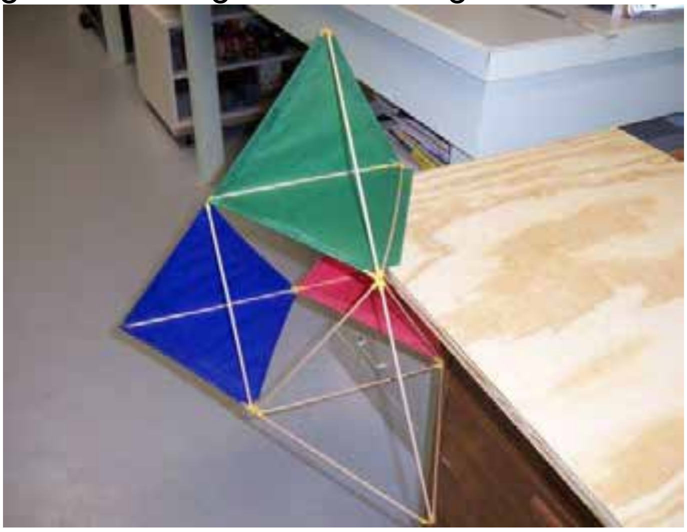
Remember that metallized Mylar is a no-no for kites, as it conducts electricity.

Gluing the Sails to the Kite Skeleton

Remember that you're gluing two separate sheets of tissue paper that must remain completely aligned with one another. You need a liquid glue that will permeate the top sheet and bond it to the bottom sheet. Glue sticks will not do this! The two sorts of glue I have used successfully in tissue paper kite work are Elmer's Glue (or any similar liquid casein glue) and mucilage.

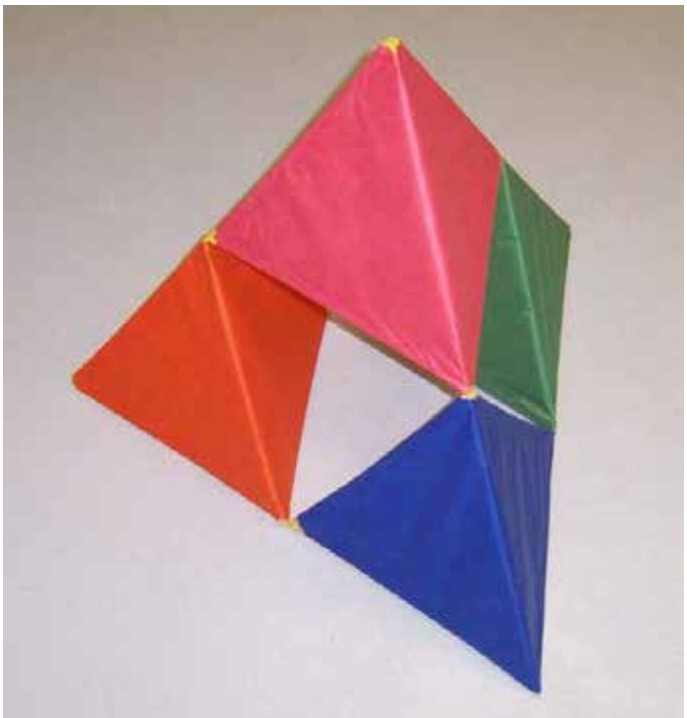
Mucilage was once available in any dime store but is now very uncommon. You can find it in some larger art stores or online. (Ross still makes it; google on "Ross mucilage" to find dealers.) I like mucilage less because of the glue than because the bottles it comes in have a soft rubber "nose" with a flat face that makes it easy to spread a film of glue onto paper. It's nontoxic, has no odor, and the applicator makes it a lot less messy than spreading Elmer's Glue around with your fingers!

It's easiest to glue the flaps when the cell face you're working on is lying flat. Place the kite on a table or on the floor with the working face down, spread glue on each flap in turn, and fold it over, smoothing with your fingers. Remember that you're dealing with two layers of tissue, and make sure there's enough Elmer's glue or mucilage to soak through the tissue.



Gluing the flaps on the "interior" faces is a little trickier, because there's no way to make the interior sail faces lie flat against the table. I put a piece of scrap plywood on the table so that one corner stuck out a few inches, and then laid the interior face partly on the protruding corner of plywood, as shown above. Be careful handling the kite during the gluing operation, as very little of it is supported by the plywood.

When all the flaps are glued, the kite proper is finished.



Attaching the Bridle

The bridle points are the two ends of the lead edge of the kite. I tied the string through the center holes of the connectors at those two ends. As with most kites, finding just the right point to attach the flying string to the bridle takes some cut-n-try. Start by attaching the string about one-third of the way down the top of the bridle. Ideally, use a knot that will allow the flying string to be pulled up or down the bridle for adjustment. There's some finesse here: You have to tie the knot tight enough so that the pull of the kite will not change the attachment point, but not so tight that you break the bridle string while pulling the flying string up or down the bridle!

To Tail or Not to Tail

The original D-Stix instructions, and most of the kite literature I have read, insist that tetrahedral kites fly well without tails. Well, that certainly hasn't been my experience. The original 1969 kite required a tail, and when I launched my new D-Stix tetra earlier this year I remembered why: It has a tendency to "lean" in one direction or another, and will eventually dive or loop if the wind gusts a little. I've had this same problem with other tetrahedral kites I've made over the years, and I can't quite explain it, but I think that the kite's weight has something to do with the problem. Tetras have a lot of stick in them and are quite heavy for their surface area, compared to simple bow kites. I think that this makes them more sensitive to small violations of balance. Or something.

Nonetheless, you should be ready with a good length of tail when you first take your kite out into the field. If you make good light "bow-tie" tail, even 8' of tail will not bog the kite down too much, and it will make for much less, er, lively flying. See my separate article on making kite tail for details and suggestions.

Flying the Kite

It's good to remember that tetras have more in common with box kites than with bow kites, and I've found that they fly more like box kites too. They pull hard, they lean, and they respond aggressively to gusts. They have a tendency to dive, and that was the end of my original 1969 D-Stix tetra. At some point it turned over and headed for the ground at speed, and when it hit, it hit hard. One of the sticks broke, and there was much ripping of tissue. I intended to fix it, but, well, I had a new girlfriend, and suddenly kites were much less an obsession with me than they had been for the previous six or seven years.

It's important to get the kite above erratic ground winds as quickly as possible. This is not the sort of kite you can launch alone by simply throwing it into the air. Have an assistant, if possible. Send the kite back with your assistant at least fifty feet. Have him/her hold the kite up high, lead edge forward. Wait for a steady breeze and turn the kite loose. Walk back sharply to make it rise quickly. Once it gets above the shattered drafts near the surface it should settle down.

If it leans and looks like it may turn over, walk toward the kite until it rights itself. If it does too much of that, you may need to (carefully!) bring it down and add a little more tail, or wait for a day with a slightly lighter breeze.

So here it is, on its first flight in Colorado Springs, on a gorgeous fall day against a brilliant blue sky. It's a good kite that takes some skill to fly, and may well provide some adrenaline rush on a blustery day. It crashed on me later that day, but repairing it was no more difficult than plugging in two sticks that had popped out of their sockets and taping a small tear in one cell. That's the magic of D-Stix: The joints flex a little, and the kite can bounce pretty hard without breaking any sticks. Tissue is cheap (I cut out two spare cells from tissue when I made the kite, which is a good idea) and I will replace the torn cell before next summer.

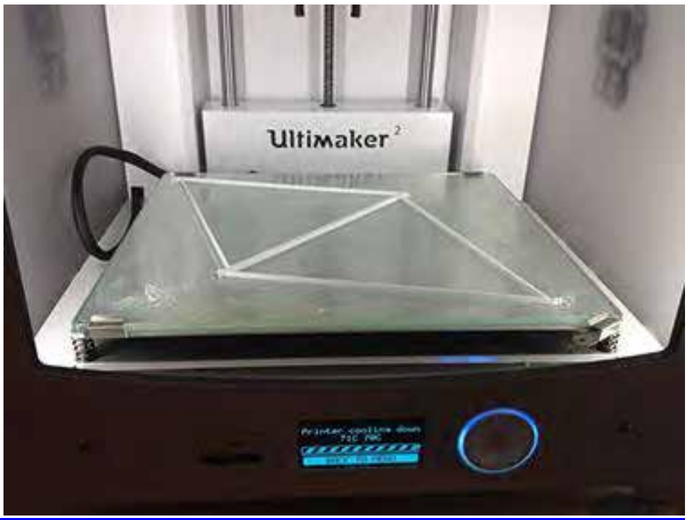
Next summer is significant, because in August 2009 it will have been forty years since I asked a beautiful 16-year-old girl to come fly a kite with me. We have a new kite, and some of the parts were in that original tetra from 1969. Carol and I will take it out to the field and be kids again, for at least a little while. Kites are good that way.

SEHUN OH DESIGN

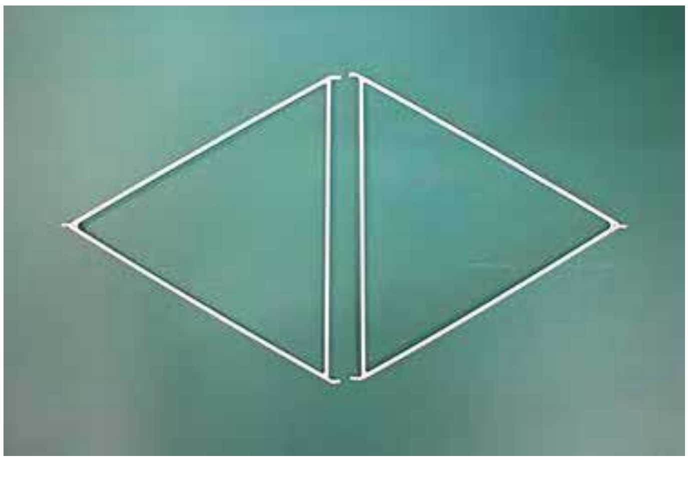
OPEN KITE (2015)
: open source collapsible tetrahedral kite
featured projects

The project brief was about designing a product for play. While I was trying to explore the world of play, I was fascinated by *Little Shining Man* (Heather & Ivan Morrison, 2011), a huge cube shape kite which consists of hundreds of tetrahedral cells. Originally, Alexander Graham Bell invented this type of kite as a form of airplane about a hundred year ago (*Frost King*, 1904) and Heather & Ivan Morrison translated Bell's invention into a flying sculpture. I decided to explore this intriguing architectural structure. When I tried to build my early versions of prototypes according to the instructions on the internet, I realised that building tetrahedral kites with drinking straws and tissue papers is quite labour intensive especially when I made it in bigger scale with many cells. So, I tried to simplify the building process and designed several types of 3d printable components with various detail shapes and sizes to test the strength of the structure and also to check the flying ability according to the weight to area ratio.

I have made 10 versions of tetrahedral kites so far. I kept repeating the make-test-improve process each time to understand the relationships among structure strength, weight, size and flying ability so that I could optimise the design. I also tested existing kite products such as a box shape kite and a power kite which can be controlled by 4 lines to understand the virtue of current kiting products. Recently I also changed the component shapes to make the design more suitable for personal desktop 3d printers as an open source project. People can download the component data for free from my homepage, 3d print them and build their own kite. Frost King and Little Shining Man were not made for personal kiting. Frost King was a prototype for an airplane development project. Little Shining Man was built as a sculpture. I think I translated this tetrahedral flying structure into a product for play. I tried to simplify making process by designing specific components. Collapsibility is another major factor that makes it accessible by people. People can build it at home, unfold and bring to the flying location, fold it for kiting and then they can unfold it again to return home and store it under their beds.
HOW TO BUILD YOUR OPEN KITE
Material Preparation (4 cell kite)
3D Printing : 4 pairs of Wing components, 4 gap filler Rings, 2 quick tying Plugs. (You can download the STL files for 3d printing from the link on the right side)
Other materials : 5 drinking straws (4mm diameter, 160~200mm length), Light rip-stop nylon fabric (or thin plastic film), Fishing line (or similar thread), 1.2mm diameter stiff aluminium wire, Thin super glue, Bindig wire for floristry.
Tools : Long nose plier, Cutter.



STEP 1
Download openkite.zip file, unzip it for the Wing, the Ring and the Plug STL files and 3D print them. ABS material is recommended than PLA because it is less brittle according to my experience. I haven't succeeded in printing more than a pair at once for the Wing component, because it was not strong enough when it is printed vertically. If you find some better ways, please let me know.

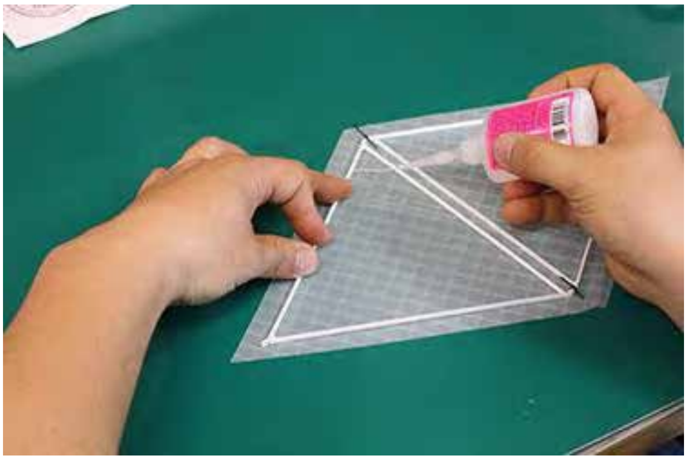


STEP 2

Left and right side Wing components are the same but one side should be flipped to be assembled together. You can click on the left images to have a closer look.

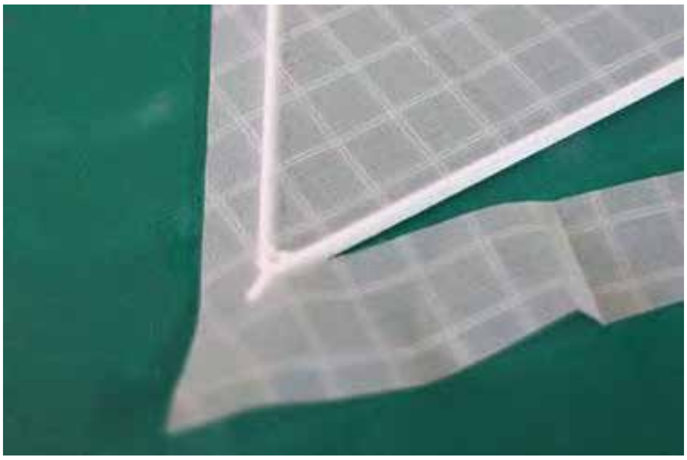
STEP 3

Tie both wings together temporarily with short biding wires before gluing them with fabric. You have to keep consistency for wing component directions for later assembly. So keep putting the right wing up if you started so.



STEP 4

Glue the tied wings with a piece of light fabric or thin film. Be careful not to use the glue too much, otherwise the 2 wing components will stick together.

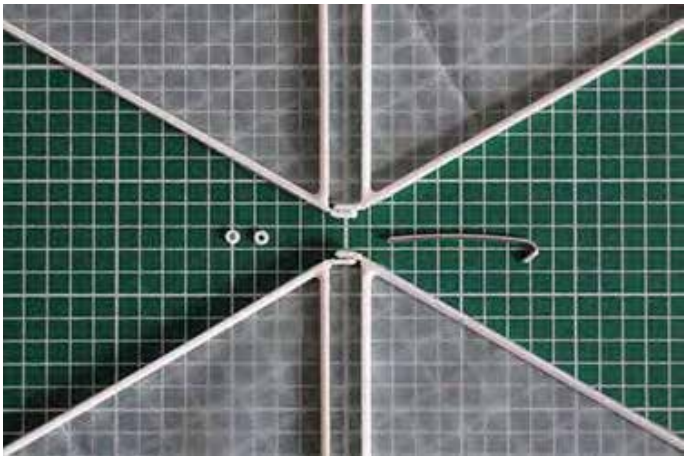


STEP 5

Cut the glued fabric from the fabric side to prevent the un-dried glue from permeating down to the table and hindering the making process.

Fabric needs to be cut inside at the corner not to prevent the wing folding and the fishing line penetration.

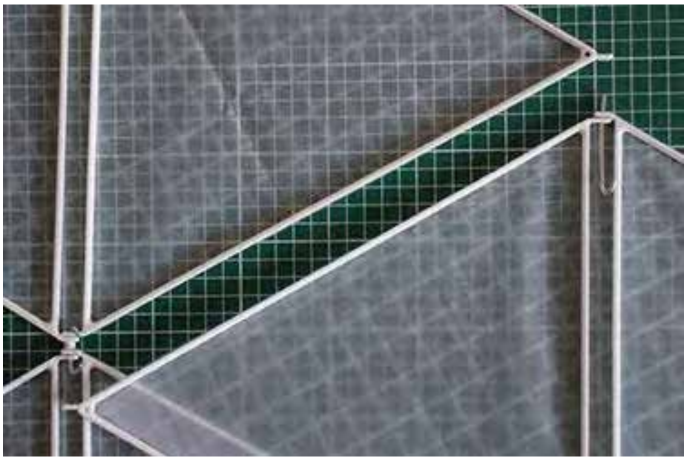
Even plastic bags can be used for the wing surfaces.



STEP 6

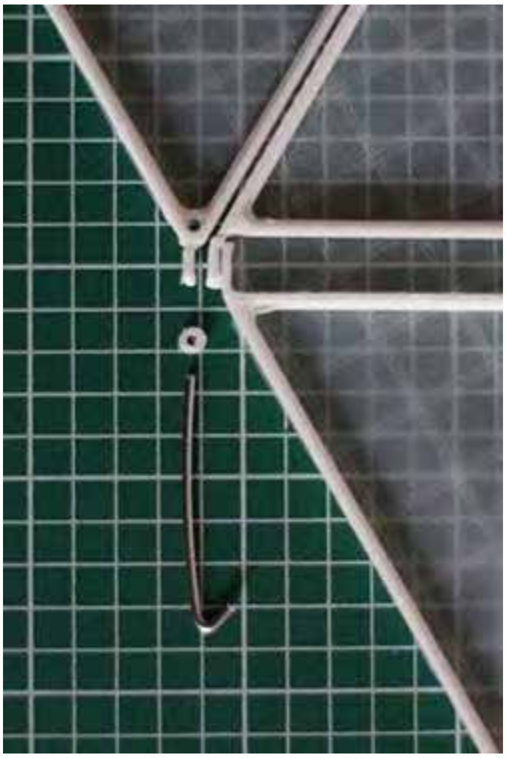
Connect 2 cells vertically. Cut aluminium wire into short pieces and bend one end to use as folding shafts. Complete connection is made of 6 layers of shaft holes, so use the filler Rings if there are gaps in between the necessary cells.

Hold, bend and trim the other end of the wire with a long nose plier after penetrating the shaft holes.

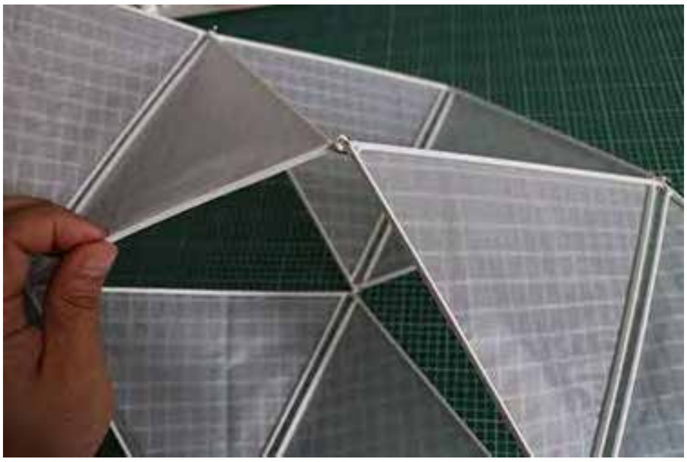


STEP 7

Connect side cells' top and bottom with the wing ends of the centre cells.

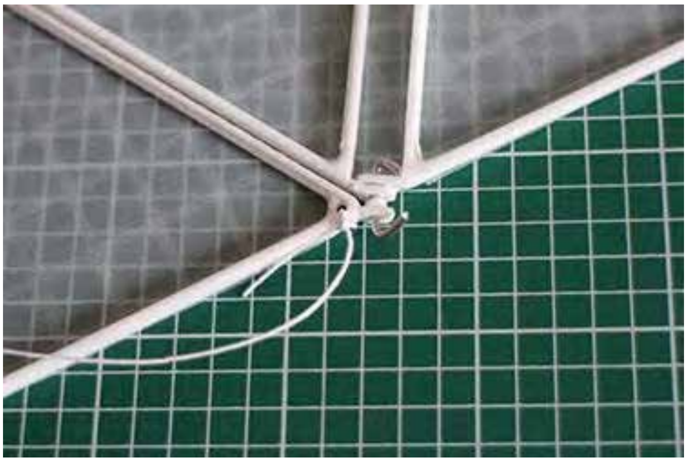


Use the gap filler rings when they are required. Connect the other side cell in the same way.



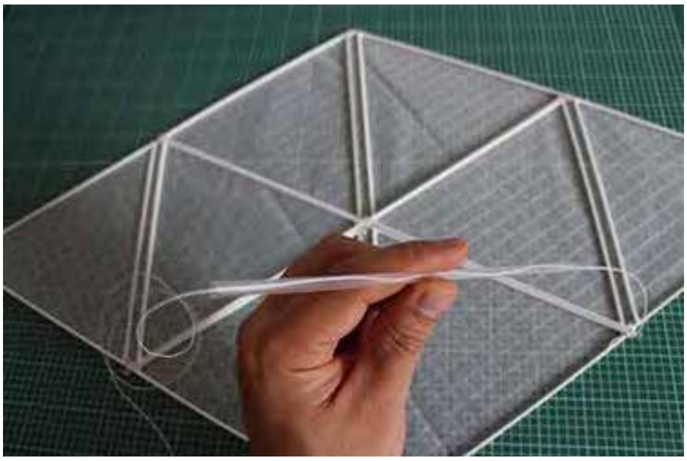
STEP 8

Connect the centre side wing ends of the side cells together. Also fix the top and bottom of the centre cells with wire shafts.

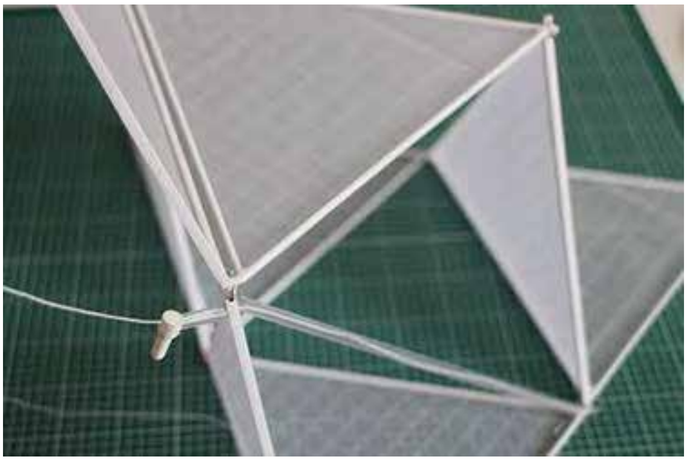


STEP 9

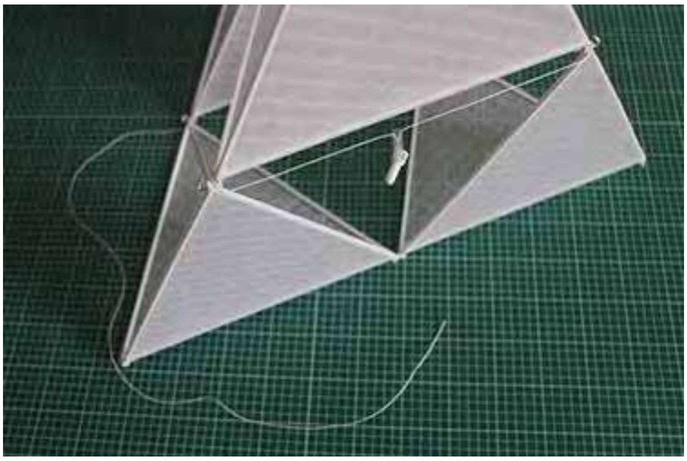
Next step is making folding structure with thread and straws. At first, tie thread at a wing end hole of a centre cell.



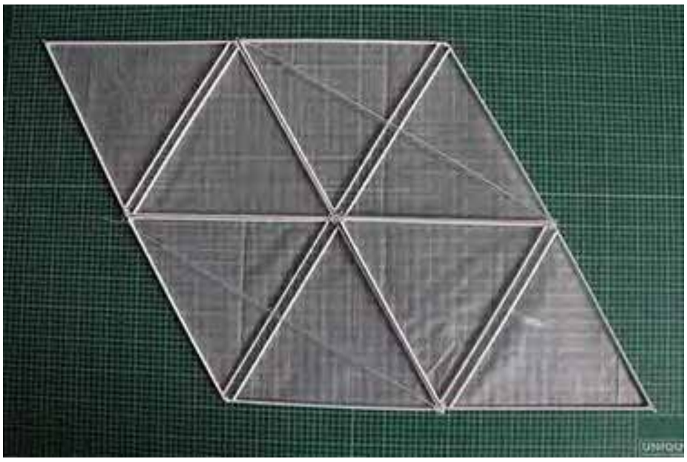
Penetrate the thread through a straw. You can control wing angles with the straw length. If you use 160mm straws, the cells will be a regular tetrahedron. If you use 200mm straws, the wing angle will be 90 degree and you can make cube kite with many cells.



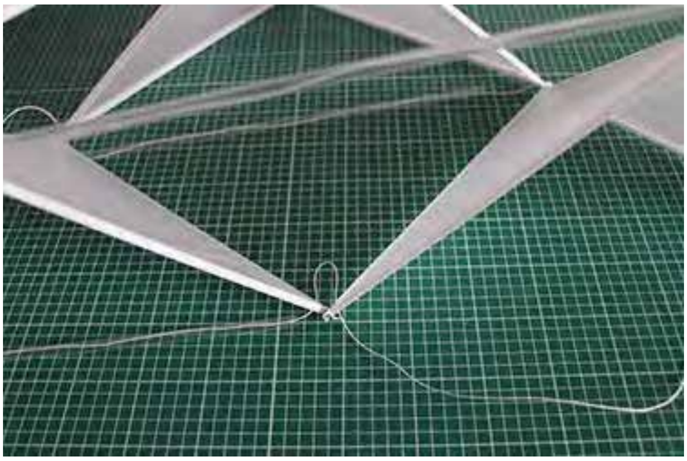
Cut a straw and make 2 pieces of 15mm length plug holders. Penetrate the thread through the other wing end hole, the plug holder and the plug.



Penetrate the thread through the plug holder again and keep going for the other centre cell.

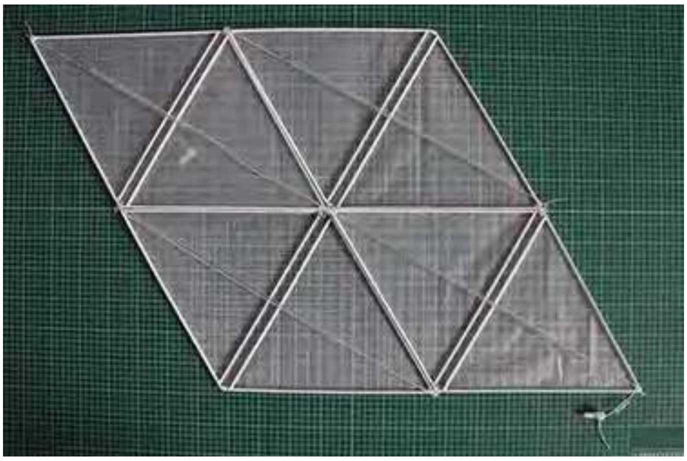


Unfold the structure and tie the other end of the thread as well.

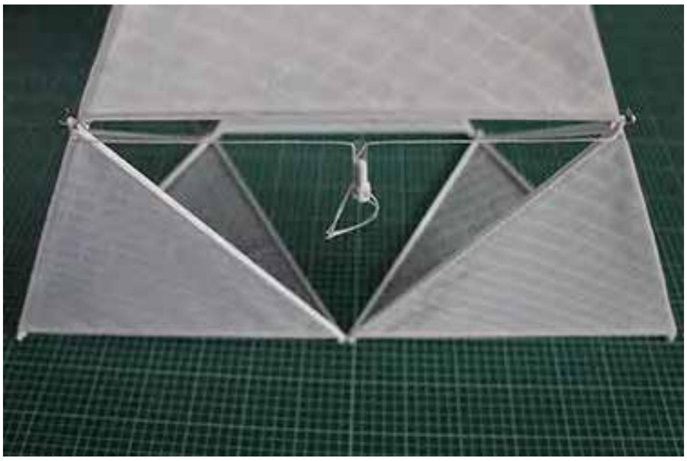


STEP 10

Connect the thread and straws for the side cells as well.



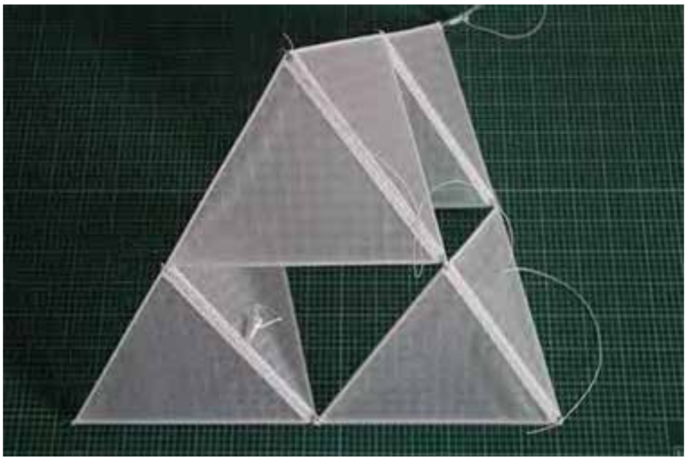
This time there are no more holes to go through after a plug, so the other end should be tied at the plug.



Now you can pull the plugs and then push it into the plug holders to fold and hold the structure.

STEP 11

Tie a loose bridle from the top to the bottom of the kite. You can adjust the pulling point of the bridle when you fly it.



Ready to Fly

Just go outside and enjoy it! Once you make and fly this basic tetrahedral kite, then you can expand this structure and apply for your own kite design.

If the rear straw braces are not rigid enough when you fly bigger kite in strong wind, you can reinforce by overlapping them with thicker diameter straws. Good luck!

#OPENKITE

Please use the hashtag #openkite when you post about your versions of OpenKite on the SNS for sharing experience with each other.

Cubic Kite Sculpture Takes Flight

THURSDAY, JANUARY 5, 2012

Snow just started to accumulate here in the Cleveland area but somehow I'm already picturing myself embracing the spring breeze, like jogging in my shorts or flying a kite in the lake park. [Ok, I lied. I don't fly kites, not since I was a little kid. Maybe that's why I was attracted to this weighty-looking cubic kite created by artists Heather and Ivan Morison.] How did they manage to do it?

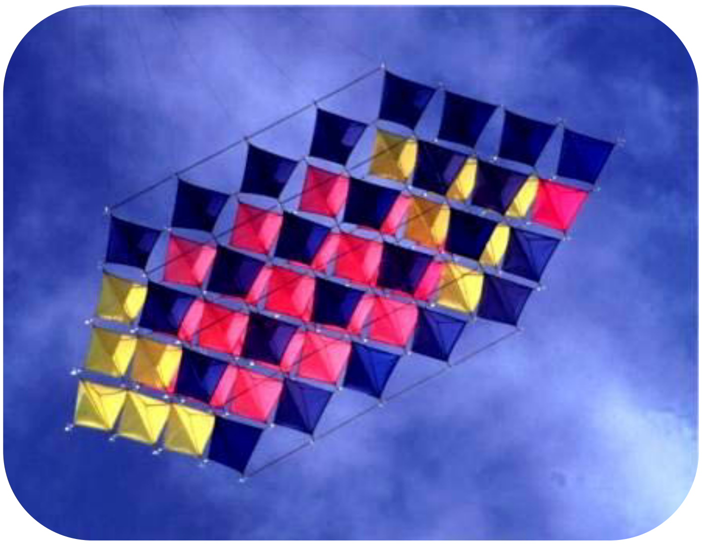
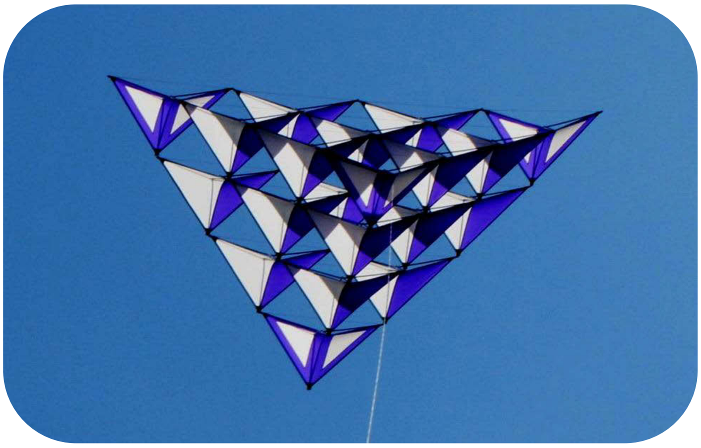
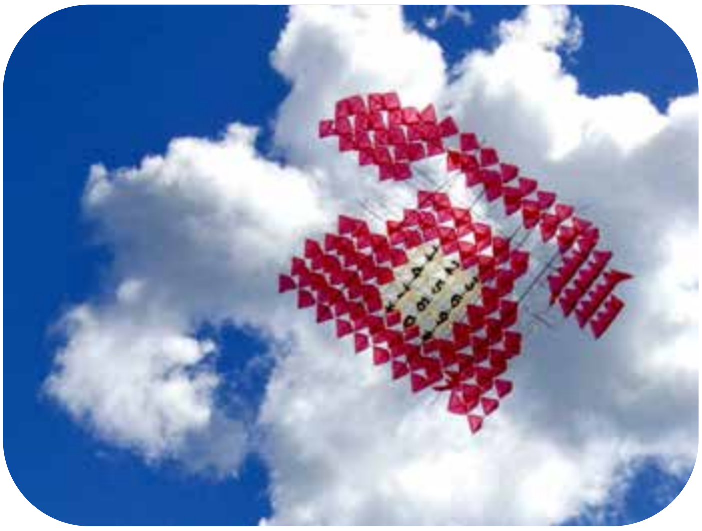
This type of 3D kite that actually flies has a bit of history and it was originally called Tetrahedral Kite when first developed. In 1903, innovator Alexander Graham Bell published an article in National Geographic magazine proving that large-scale kites are possible. Instead of constructing one big wing, he built a kite in a tetrahedral structure with a number of small wings. The more small wings it has, the stronger the kite becomes because the surface to weight ratio is optimized.

Today, Heather and Ivan Morison recreated the tetrahedral kite with a modern name, the 3D-Printed *Little Shining Man Kite*. They used carbon fiber rods, nylon connectors, and Cuben Fiber to "achieve the perfect combination of strength and weight". The final sculpture would be comprised of three such structures and expected to fly once a year in the Jersey bay area.

The deceptive visual effect of *Little Shining Man* reminds me of how our team works with systems of delicate surfaces and technologically advanced LED lighting, creating structures that appear effortless once complete. Just like flying the 3D kite, we are looking forward to changing the impossible to the possible on more of our projects in the new year, and reminding ourselves to infuse our work with a bit of playfulness!

Image Credits: vms3d.com



GIANT KITE SCULPTURE INSPIRED BY ALEXANDER GRAHAM BELL

Wednesday, 24 March 2010

Cygnet II was one of Bell's experimental aircraft

A group of artists fromCardiff have created a giant kite sculpture in the Vale of Glamorgan based on Alexander Graham Bell's experimental aircraft.

The New British Art collective were inspired by the pyramid-shaped box kites devised by the man most famous for inventing the telephone.

People are invited to view the sculpture at an aircraft hangar at Picketstone near St Athan on Saturday.

The artists will attempt to fly the giant kite in May.

The Blue Bell Hangar project is named after the aircraft hangar where the sculpture is housed.

Most famous as the inventor of the telephone, Alexander Graham Bell was also involved in innovations in a wide variety of fields including aeronautics.

Becky Whitmore of New British Art said Bell was an inspiration.

"As a collective we want to create work in the same spirit of endeavour and experimentation that Bell and his team adopted," she said.

"Working together on this project has enabled us to pool our individual expertise and energies to create such a large artwork."

Bell experimented by creating tetrahedral box kites and wings. His creations called Cygnet I, II and III were flown between 1907-1912.

The creators of the sculpture, New British Art, are a group formed from a wide range of artists, sculptors, painters, print-makers and film makers. They are supported by Welsh public art consultancy Safle.

The sculpture has been created from 1604 'tetrahedral modules' each one shaped like a pyramid. The sculpture measures 12 metres (40 ft) by 3.5 metres (12 ft).

The artists are inviting people to see their work at the Bluebell Aircraft Hangar in Picketstone on Saturday 27 March between 4pm and 8pm.

Ms Whitmore said they would attempt to fly the sculpture in May at an event to be recorded by Bafta-winning film maker John Minton for a documentary of the project.

"If the sculpture doesn't fly we won't consider this a failure but another stage in the life of this piece of work," she said.

See the New British Art website for more details..

BLUE BELL HANGAR PROJECT

Check out the pdf download.......Ed.

Alexander Graham Bell
- The Man –
Born Edinburgh, 1847
Died Nova Scotia, 1922

When Bill Souten told me he was devoting an issue to AGB, I wondered to myself 'what sort of a man was the guy who invented the telephone' - was he arrogant, self-indulgent, did it make him rich in his lifetime, many other questions!

I decided to leave the important matter of the kite related inventions to Bill, (and the small matter of inventing the telephone) and seek out information about his life and family.
He was a 'middle child', born Alexander Bell. However at the age of 11 he picked his own middle name 'Graham'…it's possible he was tired of being the 3rd Alexander Bell in the family, sharing that name with his father and grandfather. One of his father's former students, Alexander Graham, was his inspiration for the name. In his family, though, he remained known as 'Alec' or 'Aleck'!

From his early years, Bell showed a sensitive nature and a talent for art, poetry, and music that was encouraged by his mother. With no formal training, he mastered the piano and became the family's pianist. Despite being normally quiet and introspective, he revelled in mimicry and "voice tricks" akin to ventriloquism that continually entertained family guests during their occasional visits. Bell was also deeply affected by his mother's gradual deafness, (she began to lose her hearing when he was 12) and learned a manual finger language so he could sit at her side and tap out silently the conversations swirling around the family parlour. Bell's preoccupation with his mother's deafness led him into an early interest in the problems of communications with those with hearing loss (something his father was very interested in, too).

His school record was undistinguished, marked by absenteeism and poor grades. His main interest remained in the sciences, especially biology, while he treated other school subjects with indifference, to the dismay of his demanding father. Upon leaving school, Bell travelled to London to live with his grandfather, Alexander Bell. During the year he spent with him, a love of learning was born, with long hours spent in serious discussion and study. His grandfather took great efforts to have Bell learn to speak clearly and with conviction, attributes Bell would need to become a teacher himself. At age 16, Bell secured a position as a "pupil-teacher" of elocution and music, in Weston House Academy, at Elgin, Moray, Scotland. His father had developed Visible Speech - a system of phonetic symbols, and Bell used this with deaf students to help them learn to talk and improve their diction.

Sadly, his two brothers died young, both of tuberculosis. Bell's health was failing, too, partly through exhaustion, and his father had also borne a debilitating illness, though he had recovered. His father convalesced in Canada, and made a decision to move his wife and Alec over there, purely on health grounds. However, Bell worked and lived, for a number of years in and around Boston, USA, where he taught a great many deaf students. In Boston, Bell became a well regarded teacher, working at Boston School for Deaf Mutes. Indeed, he married one of his students, Mabel Gardiner Hubbard in 1877. Mabel's father became one of Bell's benefactors and supported his work on inventions. He remained committed to supporting education for deaf children throughout his life, and established the Association for Promotion of Teaching Speech to the Deaf.

Alec and Mabel had four children, Elsie and Marian, and Edward and Robert. Sadly the two sons died in infancy. The Bell family home was in Cambridge, Massachusetts, until 1880 when Bell's father-in-law bought a house in Washington, D.C., and later in 1882 bought a home in the same city for Bell's family. Bell was a British subject throughout his early life in Scotland and later in Canada until 1882, when he became a naturalised citizen of the United States.

The Bells had a vacation on Cape Breton Island in Nova Scotia, spending time at the small village of Baddeck. In his final, and some of his most productive years, Bell split his residency between Washington, D.C., where he and his family resided for most of the year, and at Beinn Bhreagh, his property in Nova Scotia.

He always loved to invent…one of their children had died from respiratory failure, and he invented the predecessor to the iron lung. When President James Garfield was shot, Bell invented a surface device for locating the bullet, then a probe, but sadly the President died as the bullet was too deep to be removed (an early metal detector, in fact!) It is said that he often went to bed voraciously reading the Encyclopædia Britannica, scouring it for new areas of interest in the field of inventions!

Bell was also a professional photographer. His father in law was a founding member of the National Geographic Society. Bell was the Society's second President and is credited with starting off the wide range of photos inside, which has carried on to this day.

Bell was described as a large, handsome man! He was rich, but still worked hard. Obviously, he was noted for scientific achievements, but also for his humanitarian qualities. It was said that he dominated any room he entered, but not from an overbearing point of view, more that he had a great presence.

It was due to his mother's, and wife's, deafness that he devoted so much of his time to inventions concerning 'hearing', and speech, and that is what is thought to have lead to the invention of the telephone. However, Bell considered that object an intrusion on his real studies, and refused to have a telephone in his study!

Bell used a primitive form of air conditioning in his own home, in which fans blew currents of air across great blocks of ice. He also anticipated modern concerns with fuel shortages and industrial pollution. Methane gas, he thought, could be produced from the waste on farms and in factories. At his estate in Nova Scotia, he experimented with composting toilets and devices to capture water from the atmosphere. Shortly before his death, he reflected on the possibility of using solar panels to heat houses, recorded in a magazine interview.

He knew fame in his lifetime, receiving numerous honorary degrees from colleges and universities, to the point that the requests almost became a burden, it was said. He also received dozens of major awards, medals and other tributes, including statuary monuments, notably the Bell Telephone Memorial erected in his honour in the Alexander Graham Bell Gardens in Brantford, Ontario.

Bell died of complications arising from diabetes on August 2, 1922, at his beloved estate in Nova Scotia, at age 75. He had also been afflicted with pernicious anaemia. His last view of the land he loved was by moonlight. While tending to him after his long illness, Mabel, his wife, whispered, "Don't leave me." By way of reply, Bell traced the sign for "no" in the air — then, sadly, passed away. HIs coffin was constructed of pine from his estate, by his laboratory staff, lined with the same red silk fabric used in his tetrahedral kite experiments. To help celebrate the happiness of his life, his wife asked guests not to wear black, in those days, an unheard of request. During Bell's funeral, "every phone on the continent of North America was silenced in honour of the man who had given to mankind the means for direct communication at a distance".

Dr. Alexander Graham Bell was buried atop Beinn Bhreagh mountain, on his estate where he had resided increasingly for the last 35 years of his life. He was survived by his wife Mabel, his two daughters, Elsie May and Marian, and nine of his grandchildren.

In completion, here are a few of his quotations, which I like a lot…and reflect on Bell, his life, I and his enquiring mind!

"In scientific researches, there are no unsuccessful experiments; every experiment contains a lesson. If we don't get the results anticipated and stop right there, it is the man that is unsuccessful, not the experiment."
"We are all too much inclined, I think, to walk through life with our eyes closed... We should not keep forever on the public road, going only where others have gone; we should leave the beaten track occasionally and enter the woods. Every time you do that you will be certain to find something that you have never seen before…."
"To ask the value of speech is like asking the value of life."
"Self-education is a lifelong affair. There cannot be mental atrophy in any person who continues to observe, to remember what he observes, and to seek answers for his unceasing hows and whys about things."

Sara Lyth

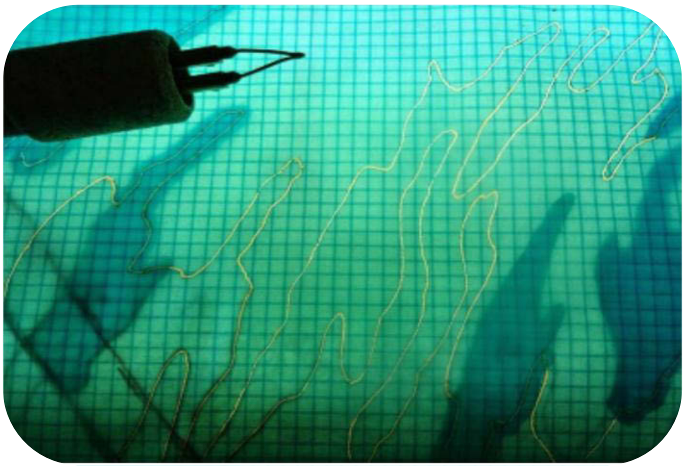
TARANIS
a kite is born

It was toward the end of the last century, an image in an airbrush magazine caught my eye (Taranis Celtic god of thunder), very strong, very powerful and I imagined how much better it would look on a kite.
Many thoughts went into how this should be constructed, how the appliqué should be done, and what size the finished kite would be to accommodate the necessary detail.
The image was scaled up using a grid, square for square it was enlarged,
until…
Taranis was born.
I envisioned a kite made out of three circles containing ten panels, this design being something completely new, at least for me…Having cut out and sewn two of the panels,Taranis went into hibernation… the time was not right, other things took priority.

Now, it is the year 2014…resurrection, time for Taranis to come out of hibernation, the moment is right!

Having found all the drawings, and then getting an overview of the thought processes that I had at that time, I found that the enlargement from days gone by were not complete. This is something to be considered at a later date, there was still enough to begin.

Colours to be cut out…



Pieces to be put together…

Pieces to be sewn…

Getting the missing drawings completed

… and the back cutting…

Panels have to be joined…

more sewing…

... almost done, just a few tails to be sewn…

... and… a bit of sleeving…

.. and the date is… **05.09.2014!**

Tomorrow, Gayle and I drive to Dieppe, Capital du Cerf-volant, one of the world's largest kite festivals. Okay… "Bound to be able to find some corner to get the rest done"… I thought, hopefully.
After a nine hour drive, we met up with friends in Dieppe, got our hotel room sorted, had a few beers and a bit of chill time. The Sunday started, after The Full Croissant, with the parade of the kiters through the streets of Dieppe.
The Monday… it is as it was… I found a corner in the Kite Village restaurant and sat down and got the sparring cut to size.
The Tuesday… got the spars fitted…

… and on the Wednesday…….time to get the bridle sorted, many thanks to those who put up with my presence in this tent, robbing them of their exhibition area, for me, a perfect area in which to work.

This is all that was left of 100 Meters of bridle line…

...and then, all of a sudden, it was Thursday.

All hands on deck…….Flip-Flops a running….camera on the go…

An incredible experience, the years of accumulated knowledge of kite building, the perseverance to get a job done well, the love of the sport that we share, a kite builders dream was fulfilled to the utmost on this morning of the 11.September.2014…

but the story does not end here…
After a successful maiden flight, admittedly with almost zero wind, the bridle had to be tweaked to gain more stability in the higher wind speeds forecasted for the rest of the day in Dieppe…

… and for the forthcoming competition “la luminescence".

Due to the strong gusts, which had already caused a few minor damages to Taranis, it was decided not to fulfil the criteria for said competition.

That did not hinder François from Cerf-Volant Club de France from presenting Taranis with the title:

"Coup de coeur".

Well, Taranis does pack up into a neat package to travel with.

Did I mention travel? Three and a half hour drive, nine hour flight and another six hour drive and we are in Nag's Head, Outer Banks, North Carolina...Yeah!! Hosting this year's American Kitefliers Association Grand Nationals.

Taranis is to be a part of a kite exhibition held in the ballroom of the Comfort Inn...

... also participating in the competition for "Bowed Kites" and has to undergo the scrutiny of the judges...

... which also includes a flight demonstration at a height of 100'.

A perfect Ground Crew: Gayle, Steve and Cass helped with the launch, dodgy at best, because the wind speeds had caught up...

... and it was either fly or fold!
The 8mm horizontal spars had been replaced with 10mm and extra tails were added to compensate for the higher wind speeds...

Perfectly commented by Kevin:
"The kite was anchored for the full height and then staked again at the bridles. The ground crew held it steady for initial launch. Then when Christian was ready he unhooked the bridles and allowed it to climb. It was a good plan for limiting damage should the wind prove to be uncooperative".
Taranis rose to the occasion and also raised the bar of my achievements.

AKA Kite Making Special Awards:
2014 Craftsmanship – Christian Baden Powell – Taranis
2014 AKA Grand Champion: Christian Baden Powell – Taranis

Many thanks to Christian Baden Powell for allowing me to reproduce this article.

Leba Kite Festival

See the map at the end of the article

28 to 30 August 2015

Jacqui, Peter and Flat Stanley* were invited to fly at the Leba Kite Festival and set off on Thursday 27th.
Flat Stanley was invited to assist in the cockpit!

We were met at Gdansk Airport and driven to Leba where we were put up in a superb room in the Lantarnik Hotel which, as indicated by the name, has a large lighthouse built on the top.

In spite of this landmark we managed to get lost on the first night and were found wandering the streets by another friendly Kite flyer from Germany who guided us home!

Friday morning arrived and we were whisked off on a land train through the streets of Leba to the first of the host Hotels who were providing breakfast for everyone.
Fed and watered we walked to the beach where our kites had already arrived.
The site was perfect with fine soft sand, warm sun and a steady wind of about 20 mph blowing straight along the beach.
We quickly set up a rubble bag with about a ton of sand as a ground anchor and launched out South African/Union Jack Sled Delta that Paul Morgan had finished just in time.
Next the blue and red Fauchi dragons were put up closely followed by the purple one that was completed by Meik Schlenger (the designer) only two days before the festival.

They flew like a dream and were so impressive that Meik offered his green one to be added to the set.

Liberal amounts of beer were provided by the sponsors and cheese or ham rolls for lunch.
At 3 pm we started to put everything away only to find that the pull on the sled/delta and the Fauchis was too much to wind them in! Even the ground anchor had moved about a foot up the beach.
It took Meik and I nearly ¾ hour to get them out of the sky!

All packed away and it was time to catch the land train back to the Hotel to freshen up and have another beer and a chat with other flyers before setting off for the evening meal provided by another local hotel in Leba.

Saturday was very much a repeat of Friday except that Jacqui and I decided that it was Dolphin day so managed to loft 8 dolphins, 2 Clown Fish and an Angel Fish.
They sat in the sky all day entertaining the public whilst Meik had his giant inflatable lighthouse at the other end of the arena with Bernard Dingworth flying his Maple Leaf parafoils somewhere in the middle.

In the evening we all joined in with the locals for a parade through the streets which ended at a park where a craft fare, food stalls and an entertainment stage were there to welcome us all.
Speeches were made, bread was handed over and the party began – it was wonderful to see how the whole town joined in!

Sunday was a quieter day for wind so Jacqui and I decided to concentrate on single line kites starting off with our two Genkis which ended up staying in the sky all day. At one stage we also had a Nick James Angel, a Ken McNeill Ichiban, a high aspect flowtail delta, three falcons and a little devil - the last two also made by Nick James – in the sky all at the same time!
All too soon it was 1 pm and time for a group photo before packing all our kites away.

At 3 pm most of us assembled at the harbour for a boat ride provided by the organisers as a reward for all our efforts.......they never said it was the Tsunami Boat ride travelling at over 120kph across the bay for nearly half an hour.

Leba Kite Festival was one of the most 'fun' festivals I have ever attended and it seems odd to me that people were happy to feed us, put us up and entertain us for doing what we most enjoy, flying kites!
I cant wait for next year!

*Flat Stanley is a sled that started life in Texas and has visited many kite festivals across America before coming over to Europe where he has been photographed making friends in France, Germany and Denmark. This is his Polish adventure before going to South Africa. After that he has a few Git inspired events to manage before moving on to a new companion next year.
The hope is that he will travel all around the world on his journey back to Texas.
His progress is posted on his own Facebook page 'Flat Stanley Kite Project'.

VEHICLE PASS 2016

MIDLANDS KITE FLIERS OF GREAT BRITAIN

c/o 52 Shepherds Court, Drotwich Spa, Worcestershire, WR9 9DF

mkf.org.uk

MIDLANDS KITE FLIERS VEHICLE PASS 2016

Members are advised to display this vehicle pass, by hanging it from their rear view mirror, whenever they are attending any club meeting, fly-in or Festival.

This will ensure that you will not be charged admission to that event. It also lets the site managers know that you are bona fide members of the club.

Your cooperation is greatly appreciated.