Go Fly a KITE

JIM CONKLIN*

Kite flying may be old stuff to most of us, but it's no longer kid stuff when you get up to designs like this big triangular box. Here's one way to divert the family while you operate portable this summer.

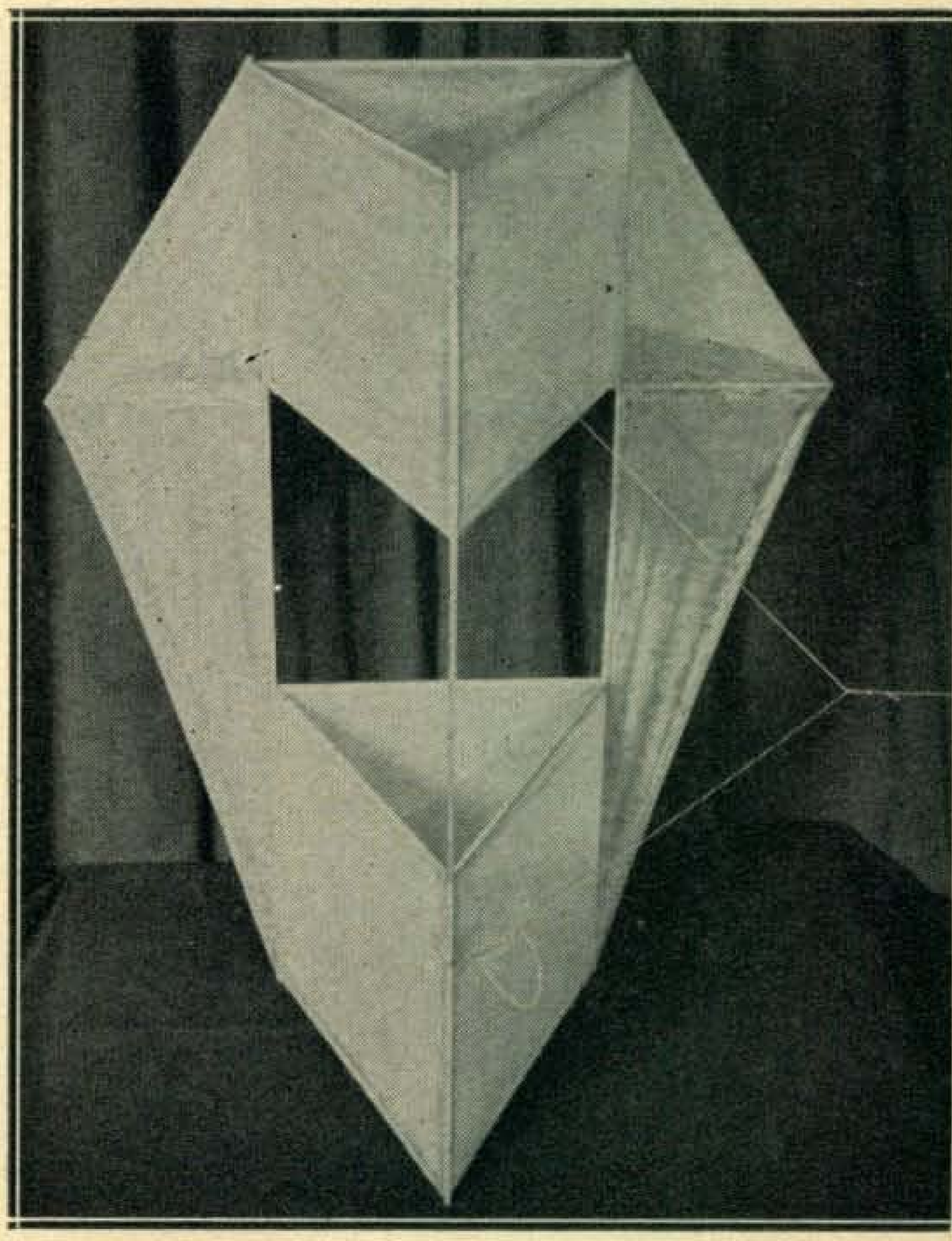
FOR YEARS, amateurs have been talking about "sky hooks." Most have been built from the ground up, although a few articles have appeared about using a meterological balloon or the kytoon (kite balloon). Even old Ben Franklin conducted some field-day work with a kite. Kite-flying is a facinating subject, and very helpful on field days when working on 80 or 160 meters, but most hams have done little about it.

A few months ago, Commander E. M. Little, USN, brought his ship to the Mare Island Naval Shipyard for overhaul, and immediately began to show us all up on kite flying. When ours were bobbing all over the sky, he would send two or three up on a mile or two of string, and they would stay in the sky for days. Some of our kites were the common Dutch or tailless kind, others were boxes made of aluminum rods and cloth, or the ones packed with Mae West radio sets in aircraft life-rafts. But after considerable experience towing them across the Pacific ocean, Commander Little has settled on a triangular box with side wings, similar to the one pictured.

A box kite requires matching the members in strength, size and weight; careful assembly; and proper adjustment of the string. The triangular box with its wings, however, is more easily adjusted and flown, and is satisfactory in a wide range of air speeds. It readily allows enough lift for its weight plus a half-mile or more of heavy string, with three or four pounds of lift remaining at the bottom of the string. This is much less than one kite used for military purposes (before the airplane was invented), which was 36 feet long and lifted a man 100 feet into the air, but the little triangular box will fit into the back seat of a car, and is about all that can be handled conveniently when there are strong surface winds.

Construction

To construct the kite, obtain some ¼-inch square, or slightly larger, sticks made of white pine or spruce. Cut three of them 49″, one 36″ and twelve 15″ long. In order to arrive at the framework shown in the second photograph first construct the rectangular back. Lay out two of the 49″ sticks marked *a* and *b* in Fig 1. Starting ¼″ down from the ends of *a* and *b*, secure a fifteen-inch stick, *e*, between them. Drill a small hole to take a stick-pin or small brad with a tight fit but without splitting the wood, and glue the joint with Testor's *formula A* cement or DuPont's household cement. Fifteen inches down from *e*, insert the second cross stick, *f*. One-quarter inch up from the bottom end of the long sticks *a* and *b*, put in stick *h*. Stick *g* goes in 18″ above *h*.



Using 60 and 30 degree miters, prepare the remaining eight fifteen-inch sticks for mounting, to complete the four triangles *ejk*, *flm*, *gno*, and *hpq*. One end of each of the eight sticks should have one miter to fit against the long sticks *a* and *b*. The other end of each of these eight sticks should have two miters, one so that *j* and *k* will fit together, and the same with the other three pair; the other miter is to form a flat surface at the ends of *j* and *k* and other pairs, on which the keel strip *c* can later be laid and secured to all four triangles.

Pins should be used to hold in place all these

**Jr. op. at W3VQ-W3MVV/KH6, Pearl Harbor, T.H.*

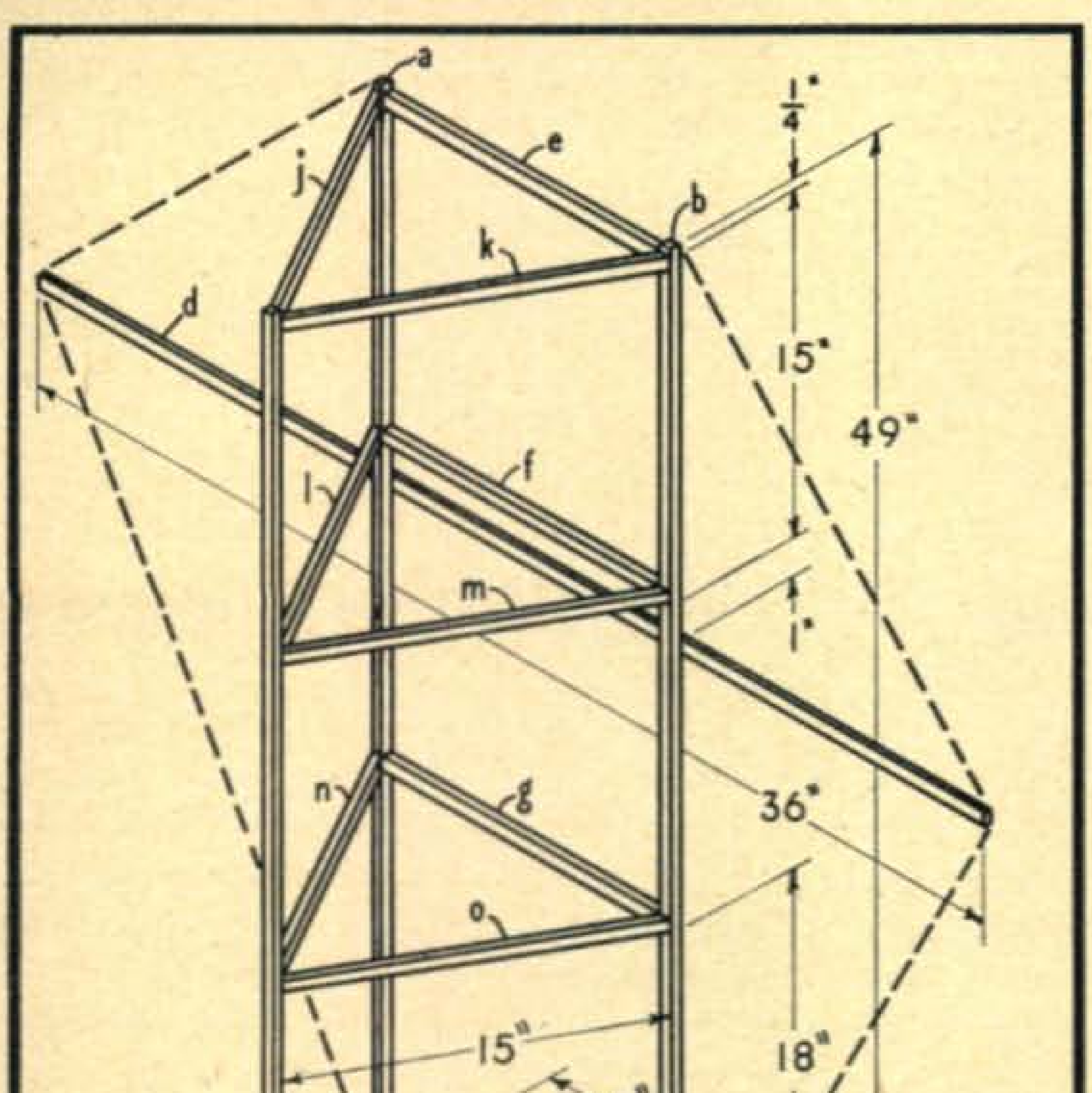
eight sticks, and the keel piece *c*, which should also be cemented when attached. At this time, a few turns of thread can be wound around the joints to strengthen them and to hold some cement on the surface of the joints.

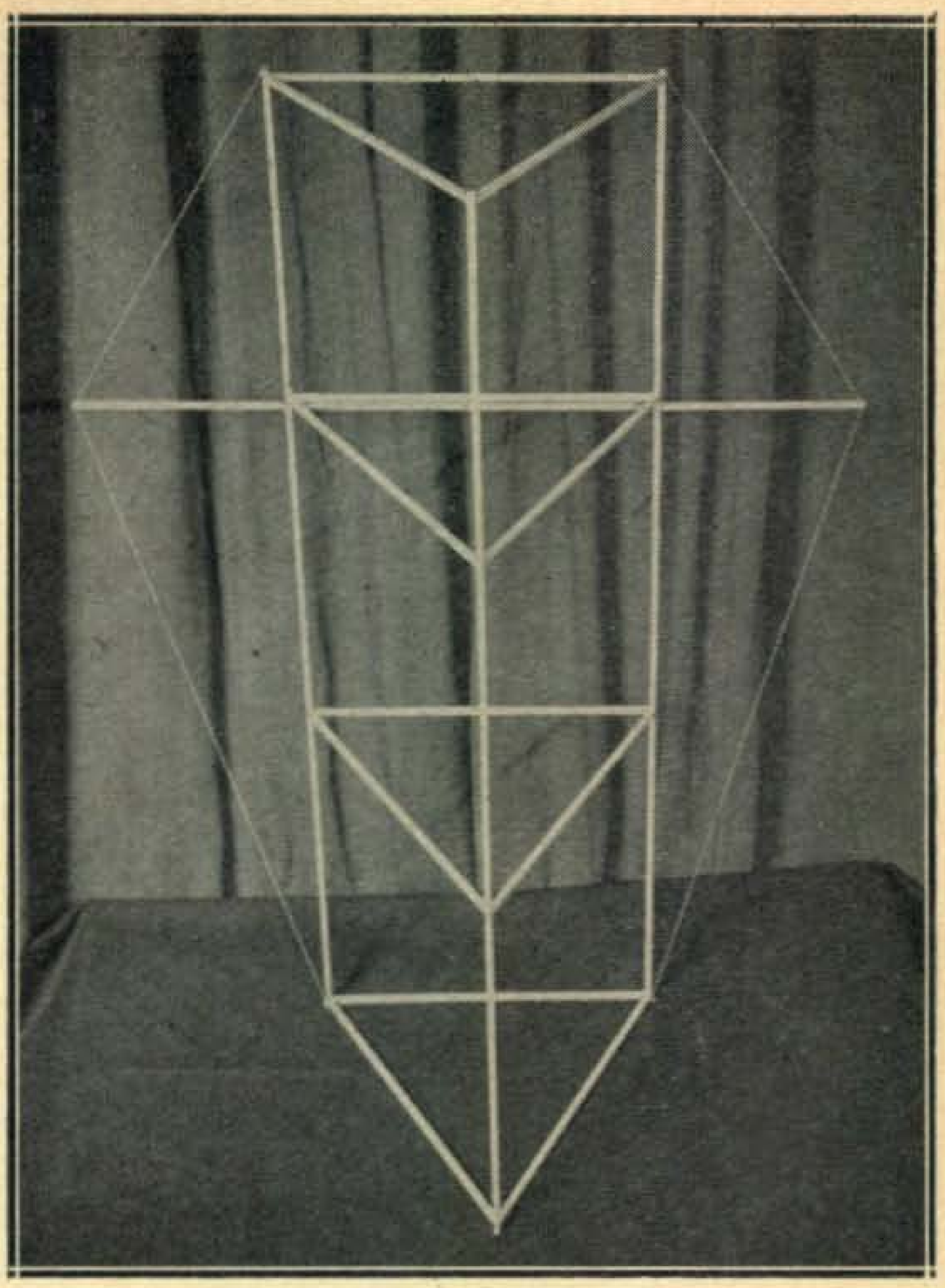
The 36" wing stick *d* can now be fastened to *a* and *b*, beneath them and about one inch below *f*. Thread and cement are sufficient to hold this piece without a pin. It is a little easier to let this stick go until after the two ends of the triangular box are covered, if care is taken to mark which stick is *c*, to avoid the unbalance which will result if it is later confused with *a* or *b*.

A very light kite can be constructed by covering it with model airplane paper, but this covering may blow out in very strong winds or in a rain unless it is sprayed with airplane dope. Kitchen waxed paper is satisfactory. Cellophane, such as is obtained in rolls from the frozen-food sections of the mail-order houses, is strong unless the edge rips. This trouble can be prevented by using scotch tape to secure it to sticks and around strings so all edges are protected. Tracing paper (apparently an oiled parchment) has stood up in a light rain. Light, strong cloth may also be used. Scotch tape should always be on hand to repair rips.

The cellophane or cloth may be stretched around the upper and lower parts of the triangle sections, and fastened. With paper, it is probably as easy to cement in place three separate rectangular panels at each end of the frame. The frame will be wabbly until the covering is put on; the covering is a very important strength member and, therefore, should be stretched tight. After the covering is in place, the kite becomes rigid.

Fig. 1. Details of the frame, which is made of 1/4" square stock.





The completed framework before the covering is applied. It is just over four feet high, and three feet wide at the wing stick.

Next, slot the ends of the wing stick *c* with a coping saw or other tool. Tie a string to the upper 1/4" extension of *a*, run it through the slotted end of the wing-stick *c*, and secure it to the lower 1/4" extension of *a*. Run a similar string between the ends of *b* via a slit in the other end of *d*. Now cover the triangle formed by the string and *a*, and cover the similar triangle formed by the string and *b*.

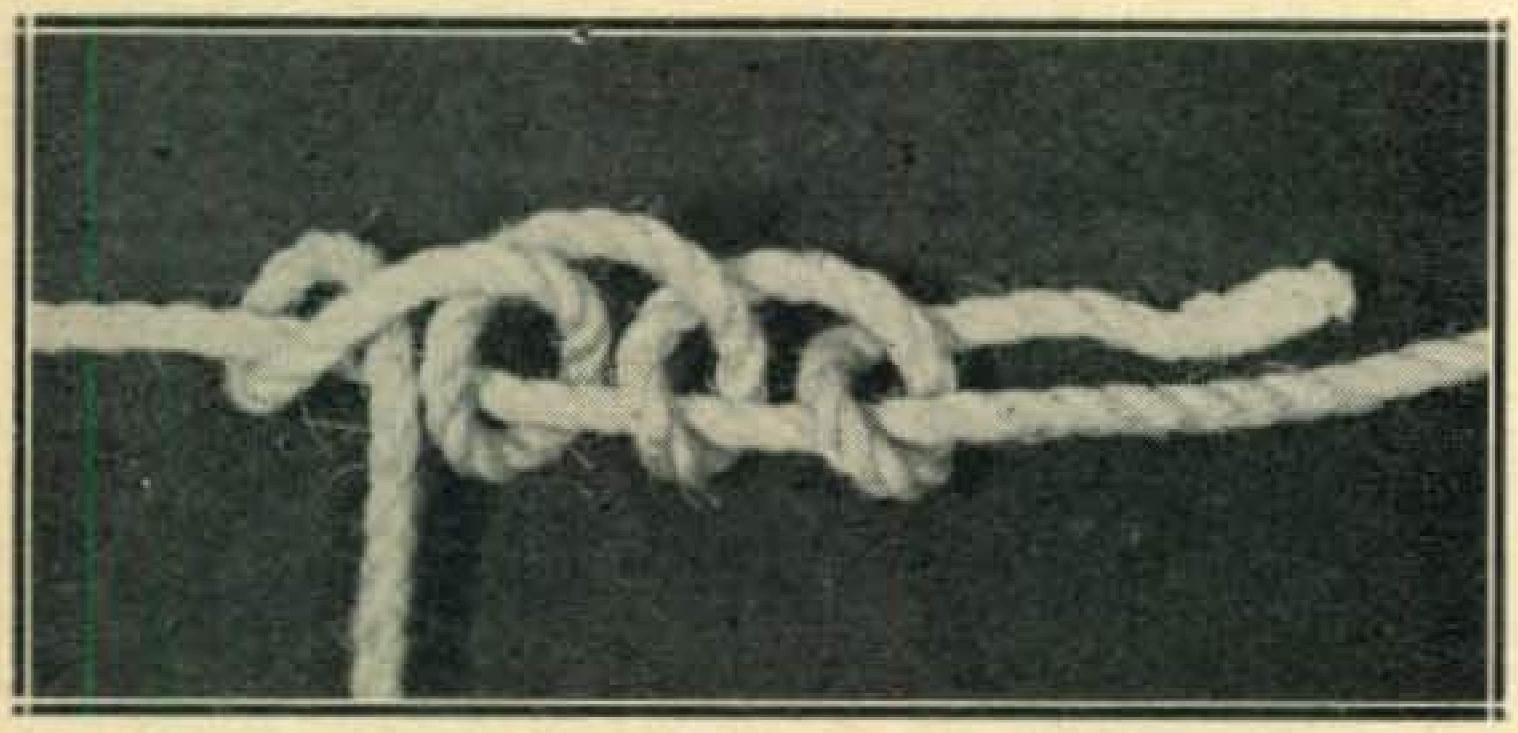
It is necessary to keep both halves of the kite physically equal so that they will have the same lift; if this is not done, the kite may tend to circle in one direction. Similarly, the weight of the materials and their distance from the center should be the same on both sides to keep the kite balanced. A little extra scotch tape or unnecessary material is enough to unbalance it. Check the balance of the kite by hanging it by the keel stick *c*, after the bridle has been attached. The balance may then be corrected by pasting paper or scotch tape to a wing.

The bridle should be attached to points along the keel strip *c* that will minimize the strain; the best places, therefore, are along the central part of the two covered triangular boxes. Place a piece of scotch tape over the stick and the covering about five inches down from the junction of *j* and *k*, and also the same distance down from the junction of *n* and *o*. Punch small holes through the scotch tape and covering so that the bridle string can be tied several times around the keel stick *c*. Use a bridle about 38" long. The kite string will be attached to a point on the bridle opposite *l* and *m* in a light breeze, and a little higher up in stronger wind. An automatic adjustment can be installed by making the bridle string a little long, and tying near its bottom a series of rubber bands that will stretch about six inches on a 3-pound pull. These rubber bands should short-circuit a loop of the bridle string so that if they should break, the bridle string is still intact.

The Kite String

We have been using a sail twine made up of six threads, obtained from American Thread Company in large spools. Beeswax was rubbed on it as it was reeled. Tests in the shipyard industrial laboratory show that it breaks between 18 and 19 pounds if it has no knots. With the best knot we have devised, it breaks at a little over 12 pounds at the knot, although it should be possible to splice the twine like rope without loss of strength. Another type of cord is serving twine, used to form cables of numerous wires in telephone central offices and radio stations. This is heavily impregnated with beeswax, and can be obtained in larger sizes that cannot be broken by hand. The twine should not weigh over two pounds per mile, for a kite of the size described here.

The string can be attached to the bridle with a clove hitch and two half hitches, as shown in the third picture. This can be slid along the bridle for adjustment. The knot is a weak point in the system but the lift is seldom up to the breaking point of the twine. We hope to run tests shortly on the breaking point of knots using a simple



The recommended manner of knotting the kite string to the bridle.

form of wire-rope thimble, such as by slipping a piece of electrical spaghetti over the twine before tying it. This would be something like the parlor trick of rolling a cigarette in cellophane so that it may be tied in a knot without breaking the paper.

One must be careful of wear on the kite string at or near where it is tied at the ground. One answer to this, which permits letting the kite out fast to get it out of a dive or reeling it in fast, is to fly the kite from a crank-driven string reel set in a frame. Wood and steel reels are obtainable from anyone who uses quantities of hook-up wire. The core should be four to eight inches in diameter (by building it up if necessary) to facilitate taking in a lot of string per turn. The diameter of the reel should be about four inches or more larger than the core, to hold enough string. It is usually desirable to have two to four miles of string on the reel if much kite flying is to be done, and a few kites lost now and then. The handle fastened to the reel can be stopped from turning due to the kite pull by putting a bracket of some kind on the frame. A peg driven in the ground is needed to keep the frame and reel from being dragged along the ground by the kite unless the assembly weighs over ten pounds.

Up She Goes!

If a kite is stable on the ground, and the wind is not gusty or irregular around buildings and trees, the kite can be flown right out of the hand. A better way usually is to have someone hold it about fifty yards downwind and let it go when the wind is strong. In this way, the kite is likely to take right off and climb quickly for the first 100 feet or more, to a point directly overhead, where it will take out more string rapidly without much likelihood of going into a dive. If it should dive, let out string rapidly until the kite starts to right itself, even if it closely approaches the ground. With the string let out fast, it may land gracefully, whereas with a tight string it may crash in a dive at about thirty miles an hour and be useful only to provide a few sticks with which to make the next kite.

After the kite gets up to about 400 feet it will usually show much greater signs of stability than when it is in the variable surface winds. When it is up a half mile to a mile, it may fly for days when there is little evidence of any wind at all on the surface. For that reason, it is best to let a kite well out though its main purpose may be to hold up only a few hundred feet of antenna wire.

It should not be necessary to make special adjustments on this type of kite if it is physically balanced when tested on the ground. However, the kite can be made more stable if necessary, and able to take stronger winds, by placing a backward bow in the wing-stick *c*. This can be done by tying a string between the ends of this stick, and tightening it carefully while bending the short wings backward. A tail may also be added at the bottom of the kite. However, instability of this nature, requiring such drastic measures, may mean that the kite will get into trouble when it is hauled down.

Like aircraft, kites are in the greatest danger while landing. They are most inclined to circle and dive when the string is hauled in, especially as they get within a few hundred feet of the ground. It is frequently necessary here at Mare Island to let the kite stay up until late at night or early the next morning when the wind velocity will be lower. Kites may be put up in a large field and moved to more congested locations. Where telephone wires interfere, the kite string can be let out to a knot and cut at that point; then a string and stick can be tossed over the wires so that the end of the kite string can be moved over such obstructions.

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W1LDD, Net Control station of the Boston Area "Sunday Evening Two-Meter Round Robin" tells us that the name has been changed to "The KB Net" in tribute to their old friend, W1KB. Charlie also passes along the sad news that W1AXW, George Bent, was accidentally electrocuted while working on his rig April 7, 1951.

W2QED of Seabrook, N. J. is ready for anything the 420 mc band has to offer. Ken now has a crystal-controlled transmitter, which uses an Amperex 9903 as a tripler to drive another 9903 as a straight amplifier. At 100 watts input, sufficient output is obtained to light a 40-watt lamp to almost full brilliance. Ken found it necessary to shield the final amplifier completely to reduce radiation losses. The ASB4 receiver has been modified by changing the 955 converter over to a u.h.f. crystal mixer circuit, and numerous other minor modifications have been made which provided added gain and narrower band width. Although relatively high power is available, it is not usually necessary for local QSOs. Solid contact with W3NAG, located near Philadelphia, approximately 35 miles away, can be maintained when the input to the final is reduced to about one-tenth watt! W2QED is another 420 mc experimenter who insists that, watt for watt, *better* signals can be obtained over a given path on the 420 mc band than on two meters!

That's it for this month. Keep us posted! 73

Brownie, W2PAU

GO FLY A KITE

(from page 28)

Some thoughts on Antennas

So much for the kite. The antenna may be secured to the kite string after the kite is well up in the air. A string can be fastened to the kite string with a clove hitch and two half hitches around the kite string to hold the antenna with weakening the string. This take-off string may lead to a light insulator made of a bead or small piece of plastic, and then to a light antenna wire. A stranded aluminum wire would make a good antenna, but steel or copper also will work. A size as small as #22 is ample for handling high power.

By maneuvering the kite reel so that the transmitter is downwind from the reel, the light antenna may be dropped directly down to the transmitter, and little strain may be placed on the antenna. The high-level winds remain fairly stable, so that it will not often be necessary to move the reel.

A vertical antenna a quarter wavelength long is a good antenna, but requires a good ground which is not generally available at a field-day location. The ground problem can be dodged by using a half-wave antenna, feeding it at the voltage loop. Longer antennas, higher multiples of a quarter wave, may be satisfactory at some distances depending on conditions, but in general, vertical antennas much over a half-wavelength long will be inferior, especially on the higher frequency bands.

If the antenna is permitted to slant, a "long wire" antenna, directive along the wire and in the direction of tilt obtained, although limited as to direction and distance that it is effective, because of the lobe angles and the normal high-angle radiation that is necessary to work stations a few hundred miles away.

In closing, here are a few words of caution. (1) Do *not* lift a wire with a kite within a half-mile or so of overhead power wires! (2) Use a static drain, such as a resistor of 100,000 ohms or so, from antenna to ground. With these precautions, the use of kites, which in themselves are interesting, will add many enjoyable hours to a field-day excursion.

220 MC TRANSMITTER

(from page 18)

Turn the meter switch in the second position, placing the meter across R7 to read the grid drive to the second tripler. Reconnect the "B" supply to R6. Starting with condenser C6 about half capacity, tune for maximum grid drive, which should be about 3 milliamperes. Make certain that this stage is now tuned to 73.8 mc, either by means of a grid dip meter or an absorption wavemeter such as a Millen #90608.

The next step is to put the meter in the third position, placing it across R13 to measure the final grid drive on the 832. Reconnect the "B" supply to R11 and tune the butterfly condenser C10 for maximum grid current, which should be about 1 milliampere. Make certain that this stage is tripling to 221.4 mc and not doubling to 147.6 mc. This may be proven by using a grid dip meter or by means of Lecher Wires.

You are now ready to tune the final. Connect a 115 volt 10 watt lamp across L7 with the wiring to L8 temporarily disconnected. The coupling between L6 and L7 should be loose, at least one half inch separation. Condenser C11 should be about one third capacity. Now reconnect the "B" supply to R16 and tune C11 for maximum brilliancy of the 10 watt lamp. Turn the meter switch to Position 6 and with a maximum voltage of 300, the final plate and screen currents should read about 80 milliamperes. With the switch in Position 5, the total "B" drain for the three 6J6 tubes is 70 milliamperes.

The antenna coupler should now be connected. Connect the 10 watt lamp through the antenna relay to L10. Reconnect L7 to L8. Reapply the "B" voltage to the entire transmitter and slowly tune C12 so that the lamp burns brightly. The tuning of this condenser is very sharp. L8 should be tightly coupled to L9. L10 should be coupled as loosely as possible and still transfer maximum power to the lamp load. Make certain these three coils are all wound in the same direction.

You will note some interaction between C2 and C4 so therefore a slight retuning of all stages might result in still greater carrier output. The builder should not run into any great difficulty if he follows closely the layout, uses the components specified and winds the coils to the right sizes.