



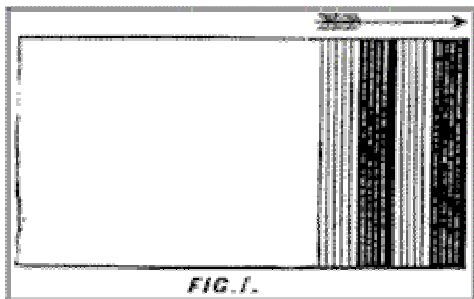
Balloon Explorium

How to make a fire balloon.

by C.E. Johnstone, BA

*This first appeared in the December 1891 edition of "The Boys Own Paper". London, England. Remembering that in 1891 they didn't have some of the ability to generate heat as we do today, this balloon carries its flame aloft. **We do not NOT recommend sending any flame aloft in a tissue paper balloon.***

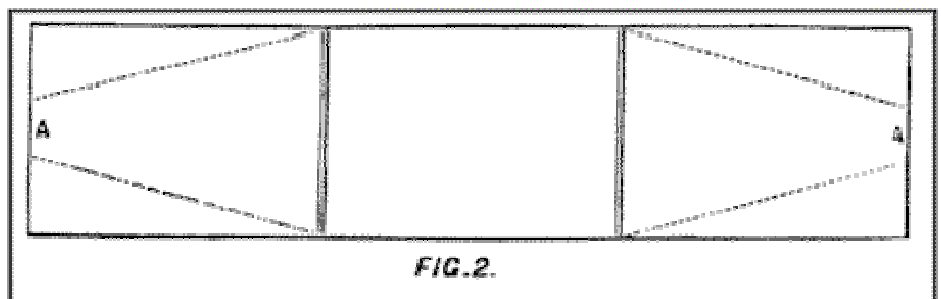
The first thing to be done is to procure the tissue paper, which can be bought from any cheap stationer at the rate of eightpence aquire (84 sheets) for the dark shades and half that price for the lighter colours. It is a good plan to get one quire of each, as for instance, black and pink, or dark and light blue. This gives an effective contrast of colour, and at the same time there is an advantage in the slight extra substance and strength of the darker papers. Next, ask the cook to make some smooth, thin paste, and while it is being made, set to work and clear the largest table that is available, and cover it with newspapers.



In deciding on the shape and size of the balloon there is plenty of scope for everyone to exercise his own taste and judgement, but the beginner is recommended to try the following pattern, as being not merely easy to construct, but also easy to set up. It is made of ten panels, each consisting of three sheets of tissue paper fastened together end to end. I will suppose that the balloon is to be of two colours, namely black and pink; there will be five panels of each colour, and they will be arranged so that the colours come alternately.

In order to make the panels, the sheets have to be pasted together end to end in threes, and it will be found that much time will be saved and the joins most neatly made if all the sheets are pasted at once. The best way to do this is to take a sheet of black paper, and place it with the edge of one end corresponding with the end of the table. On top of this lay another black sheet, allowing the underneath sheet to project about half an inch beyond the upper one. Then place the next sheet in the same way, and go on until you have twenty of your sheets arranged as in fig 1, with five sheets of black at the bottom, and then five sheets of pink; then five more of the black; and five more of the pink.

Put a book or some light weight upon the top sheet, and, with a good broad brush, proceed to paste all the twenty edges, working all the time in the direction indicated by the arrow. When all the edges are pasted, including the top one, which is the only one that needs much care, pick off each sheet in turn, and fasten it to one of the dry sheets of the same colour. When there are ten pairs thus joined end to end, take them in the order in which they were done, so as to get the driest first, and fasten to each pair a third from the ten pasted sheets which are left. You will then have ten pieces of three sheets each, five pink, and five black, and you will also have discovered why the sheets in fig 1 are arranged in fives of alternate colours, which was not perhaps apparent at first sight.



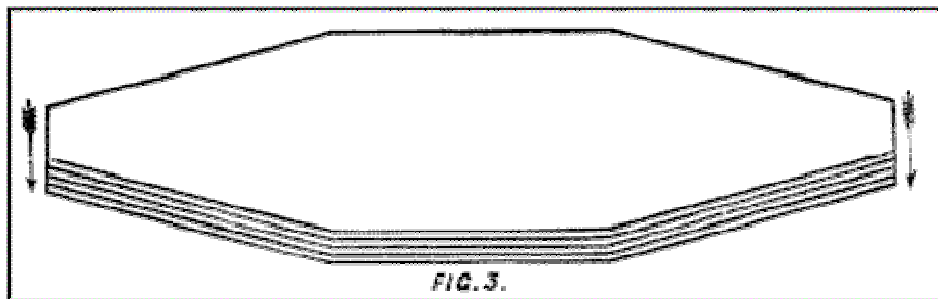
Now comes the cutting out of the panels, which should be done carefully or the side joins will not fit properly. Lay all the ten pieces one on



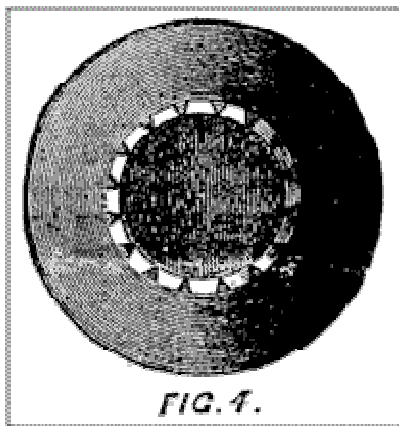
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top of the other, taking care that they lie as evenly as possible together and, with a large pair of scissors, cut through all the thicknesses at once along the dotted lines in fig 2, making the part at each end, marked A, about five inches wide.

Arrange the five black panels with the edges overlapping half an inch as in fig. 3, so that they can all be pasted at once. Take the five pink panels and turn down half an inch of the edge, and, after smoothing the crease well down, turn it half back again, so that it stands straight up from the table. Then lay each black panel upon each pink one in such a way that the turned up edge of the latter will, when flattened down, fall upon the pasted edge of the former. In this way, the first five out of the ten side joins may be made very quickly and neatly.



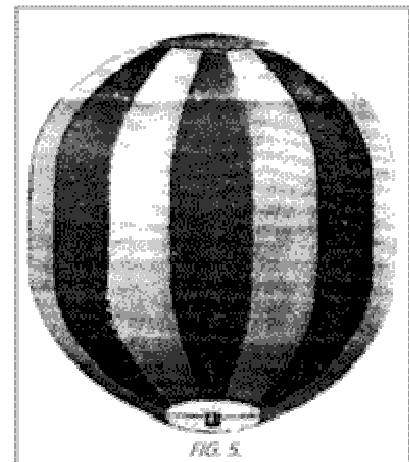
To make the joins neat, it will be a good plan to double back each of the pink panels. The edge can then be turned up and the pasted edge of the black slipped under it, just as before, and in this way all the joins, even including the last, can be made without difficulty.



There will still remain the holes at the top and bottom, which, if the directions have been carefully followed, will be about thirteen or fourteen inches in diameter. Cut out two circular pieces of tissue paper each about twenty inches across and paste on of these over the top like the 'cap' of a football. For the bottom take a piece of fairly stout wire and bend it round into a circle a foot in diameter. Cut out the centre of the circle of tissue paper and paste the wire ring into it as in fig. 4. This should be pasted on the bottom of the balloon, which will be found an easier matter than pasting the top, because the hand can be put inside through the hole to smooth down the join. At this stage it is a good plan to get a spirit-lamp and fill out the balloon in a room in order to find out any holes or places where the joins have come unstuck, which can be patched with small pieces of tissue paper and a little paste.

The only thing that still remains to be done is to fasten a piece of wire across the middle of the opening at the bottom to hold the wadding for the methylated spirit. If you get the lid of a high, round, chocolate box, it makes a very convenient and light receptacle for the wadding, holding it nicely together and keeping in the spirit. It is easy to pass the wire through two holes in it, and if plenty of spirit is put in, the cardboard itself will not burn for a long time, fig. 5.

For sending up the balloon, choose a still day, and, if possible, a sheltered spot. Make a torch by binding some wadding with wire round the end of a stick. Soak this in methylated spirit, and then bind round it some stiff cardboard. Get some people to help you hold out the sides of the balloon, and light the torch inside the balloon. It will burn with a small flame at first,





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but, as the balloon begins to fill, the cardboard will begin to burn, so that the flame will get larger when the danger of its catching the sides if the balloon has diminished.

When it has filled well out, and is beginning to pull upwards, pour the spirit over the wadding on the wire, draw the torch out and light it. The balloon should then rise steadily into the air, and, if there is a light wind, it will probably drift gradually out of sight. It adds somewhat to the excitement to fasten to it a post-card directed to yourself, with a request on the back that the finder will say where it was picked up, and then post it; but, of course the chances of its returning to you are not really great.

If the balloon is sent up at night, it should be made to carry a Bengal lightⁱ, otherwise it passes very quickly out of sight.

If, however, you decide to send it up by daylight, which is, on the whole, the best plan, it may be made to take up a small parachute, so arranged as to become detached when the balloon has reached some desirable height. To make the parachute, cut out of a sheet of tissue paper the largest possible circle, and fasten to it, about two inches from the edge and at regular intervals, sixteen pieces of stout cotton eighteen inches long. The best way to fasten them is to cut eight pieces of cotton, each a little more than a yard long. Lay each of them in such a way that the middle comes over the spot from which you wish the threads to hang down, and then paste over that middle a stripⁱⁱ of tissue paper, so that the two ends will hang from each side of it. When all sixteen have been arranged, gather all the ends together and fasten them to a piece of wood about the size of a bottle cork, which ought to be heavy enough to hold it steady. Fasten to the top of the parachute a thread by which to hang it to the wire at the bottom of the balloon; and in the middle of this thread tie a small piece of slow match, which should be lighted just before the balloon goes up.

If you have not got any slow matchⁱⁱⁱ, an excellent substitute may be made by soaking some blotting paper in a very strong solution of ordinary salt. Dry this in the sun, and roll up a small piece of it, about two inches long. If this is tied into the thread and lighted at one end, it will burn slowly as the balloon goes through the air till it causes the parachute to drop off. Great care, however, should be taken in lighting this, as it sometimes happens that when the balloon has been quite successfully inflated and is all ready to go up, the efforts to light the slow match for the parachute in too great a hurry set the whole thing on fire, and all your time and trouble is thrown away. I sincerely hope that such a fate will not overtake any balloon constructed and sent up in accordance with these directions; but if such a thing should happen, I give you a piece of advice, which I am sure you will find good: go straight off and make another.

ⁱ Known today as a flare, it is a combustible device used to emit a dazzlingly bright light for signaling or illumination on railroads and highways and in military operations. The flare in its present form dates from the early part of the 19th century, when the introduction of potassium chlorate permitted the development of chemical mixtures to produce coloured light. Previous to this the only colour had been the bluish white light produced by a mixture of sulfur, saltpetre, and orpiment. These blue lights, as they were called, were and still are often used at sea for signaling and illumination. They were also known as Bengal lights, probably because Bengal was the chief source of saltpetre.

ⁱⁱ A scrap of tissue paper.

ⁱⁱⁱ This was cord or twine soaked in a solution of potassium nitrate and dried. When lit, a slow match smoldered at the end in a slow, controlled manner.