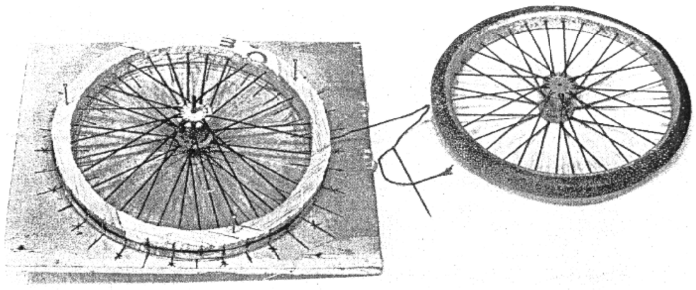
SPOKE-IT YOURSELF

DENNIS BINNIE provides the answer to those tricky scale wheels

PFFT Ed note: This is not for the beginner, but if you study his article carefully, it certainly can be done.



WHEN VISITING various scale meetings with my free-flight *Bleriot,* I have often been met with questions such as *"where did you get those pram wheels from* ?", or more simply *"what sort of machinery did you need to make the wheels* ?". Actually they are much easier to make than one would imagine - and only very basic hand-tools are required for their assembly. Before looking too horrified at the size of the model (it is powered by a Rivers 3.5*cc* diesel, and weighs 3~lbs) combined with the fact that the wheels consist merely of balsa and thread, I should perhaps point out that they have withstood a great deal of abuse in the form of 'heavy landings' - not to mention crashes! On every occasion the wheels have survived. with only minor scuffing of the 'tyres', whereas most other parts of the venerable machine have been extensively repaired. Different forms of construction are used for the main wheels and the tailwheel - and naturally the former are designed for greater strength.

Using the following methods, you will find it quite easy to make spoked wheels to suit your own model - and remember that the finished product is very light indeed.

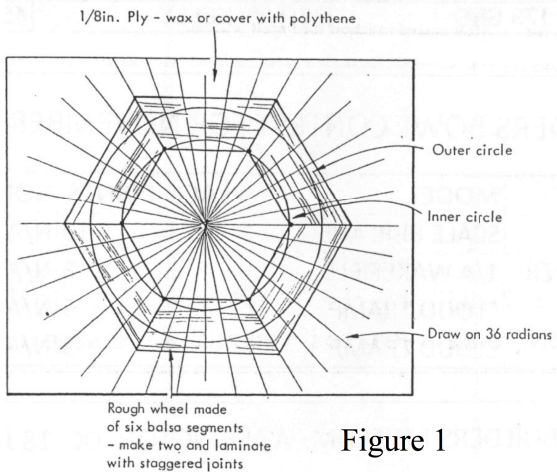


Figure 1

Main Wheels

First, draw onto a piece of 1/8in plywood the inner and outer circles of the wheel *(Figure* 1), then mark off six equally spaced points around the inner circle. Use these marks as the joint lines for strips of balsa used to form the wheel itself - the width of the strips will depend on the width required for the finished wheel, while the thickness should be half that of the total thickness of the finished wheel.

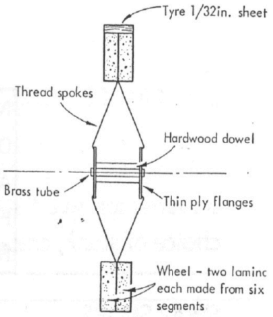


Figure 2

Place grease proof paper or polythene over the jig (or wax with a candle) to prevent parts from adhering to it, then take six of these balsa strips and glue together - also as shown in *Figure* 1. When set, repeat with a further six segments, then glue these two laminations together, with the joints staggered. This form of construction minimizes the effect of end grain and adds to the strength considerably.

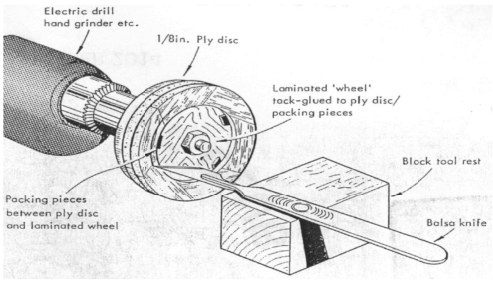
When all is set, mark out circles the correct size with a compass - you will find it easier to hold the compass centre point on a piece of scrap wood the same thickness as the tyre. Using a fretsaw, the surplus material can now be removed leaving a ring ready for the next stage, which is the sanding plus drilling of the spoke holes.

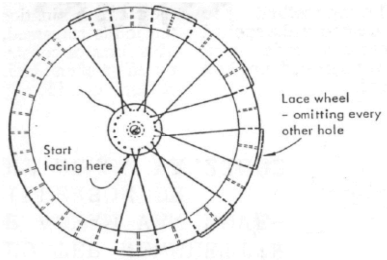
With a protractor, mark the plywood with 36 points outside the outer circle as shown in *Figure* 1, then carefully pin the balsa ring in position, (ensuring that it is exactly central. Using a rule, mark the lines on each side of the ring and continue over onto the unfinished tread by joining the center and outer points. The next stage really needs some form of turning device i.e. a lathe. I realize that not everyone possesses one, but a small hand grinder or hand drill suitably mounted, or electric drill, will do. Cut out a separate 1/8in ply diameter slightly larger than the inside circle and drill centrally to take a bolt which will be gripped in the chuck. Mount the ring on the disc with packing pieces between them - spot glue or pin together so as to run as true as possible when being 'turned'. See *Figure* 3. With the wheel now being revolved, sand the inside of the rim until smooth, using the glass paper wrapped around, or glued to a piece of hardwood. Next with a balsa knife mounted on a block set nearly to center height, lightly score the rim line and finish it with a piece of folded glass paper. Remove ring, reverse and carefully true up again (and glue it) on the disc/packing pieces and score the other side as before. Apply sanding sealer to the rim only when dry, and then paint the rim colour (usually silver). With a small drill or thin wire made to a spear point, carefully drill spoke holes in the centre of the tyre (tread). The hub is a piece of hard dowel drilled centrally (Ed Note: chuck the piece of dowel into the drill, turn in on and hold the drill against the end while it turns) to take a brass tube bearing, while the flanges are pieces of thin ply each drilled with 18 holes equi-spaced. The jig is now fitted with a pin in its centre, the same size as the wheel axe. This must fit tightly, so drill a little undersize and press the pin firmly in place.

All is now ready for assembly. For the *Bleriot* front wheels I threaded a needle with heavy shoe thread, knotted at one end. Referring to *Figure 4,* start lacing with the knot inside the hub

flange, then through the rim missing every other hole. When you have 18 spokes threaded (leave plenty of surplus thread on the needle) place brass tube bearing over the jig pin, followed by rim with spokes and flange. Glue the latter to the hub dowel. Depending on whether the tyre is central to the hub or offset coned (as some 1914-18 aircraft were) pack up the rim to suit - the shortest spokes are on this side. Secure the rim to the jig centrally and pull each 'spoke' taut - then glue the ends to the outside of the rim. Repeat the threading for the other flange whilst holding in your hand - it is easier to manoeuvre the needle this way. Once again, pull the spokes taut and apply glue to the outside rim.

Figure 3





Now take some 1/32in balsa strip, the width of tyre, well soaked in water. Glue around the rim and feather the edges where they overlap. About two layers will do. When dry, place the wheel back on the 'lathe' and sand tyre to shape. The complete wheel can now be dipped in a shallow tin filled with thinned dope, removed and the surplus spun off. When dry repeat again if required - this process helps to stiffen and tauten the spokes. The last stage is painting the tyre. If the wheel is running true it can be mounted on a spindle and slowly rotated with the tyre dipping into a shallow trough of thin grey-black paint up to the edge of the rim; adjust the trough with packing. Alternatively, mask the rim and spokes with a paper disc and either brush or spray paint.

Tail Wheel

This method for much smaller wheels is similar, but because of the small size of flanges the drilling of these is dispensed with - the spokes being wound round the jig pin and glued to the ends of the wooden hub centre. The other half of the spokes are then added, and once again glued to the hub. Finally, the blank flanges are added - these can be dimpled with a needle to give a spoke head effect. See *Figure* 5. Building is a little tricky but the result is a very light and really tough wheel

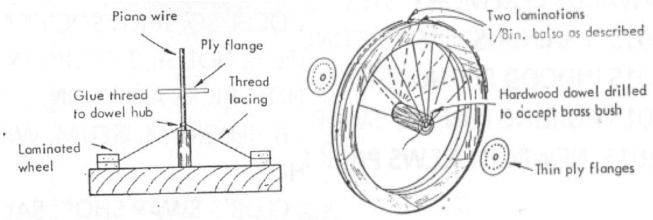


Figure 5
Alternative method for small wheels.