

SECTION 1: HEAD

SECTION 2: NECK

SECTION 3: SHOULDERS

SECTION 4: BODY

SECTION 5: BASE

We have designed this Dalek as an exercise for a well-equipped school, using the resources and facilities of several departments—woodwork, metalwork, art and so on. It could also be built at home—but only by someone with considerable ‘do-it-yourself’ experience.

You do not need to be a professional to build a Dalek, but you will need some basic skills, precision, common sense and, above all, enthusiasm! You will need the use of some machinery, such as a woodworking lathe and a band or jig-saw. Don’t follow our instructions too slavishly; do not be afraid to improvise.

For clarity, we have divided the Dalek into five sections: 1 is the head – and this needs a full week to complete; 2 is the neck; 3 is the shoulders; 4 the body; 5 the base.

The head could adequately be made from reinforced papier mâché instead of the more complex fibreglass. If you do decide to use fibreglass, exercise extreme care in the process: barrier cream should always be used to protect your hands and the fibreglass should only be handled in a well-ventilated area. Fumes can be unpleasant and dangerous in a confined space. Note well, too, that the accelerator and catalyst used must not be mixed together. That could be dangerous.

To make sure that this Dalek design works, we asked the Technical Sixth Formers of Highbury Grove School, London N5, to produce a Dalek as a feasibility study. With help from their staff, they produced the magnificent black-and-orange specimen (*below*) in two weeks, at a cost of £12.



‘We based our Dalek on these plans for size and shape, but substituted materials that were to hand or more easily obtainable,’ says the school’s Head of Technical Studies, Don Jackson. ‘And with careful marking out, pieces like the neck disc can come from the unwanted centre of the top of the body, and the top of the body can in turn come from the unwanted centre of the baseboard.’

Highbury Grove also cut costs by scrounging aluminium from a scrapyard for £1, instead of paying

more than double from a stockholder. Don Jackson’s verdict: ‘A very worthwhile, enjoyable project. There is no process in construction that 12 and 13-year-olds could not do, with supervision.’

Finally, we wish you good luck!

**These are the basic materials required to build a Dalek:**

- 1 28 lb bag modelling clay
- paper/polystyrene
- 1 roll 500 mm bandage
- 28 lbs fast-setting potter’s plaster
- 4 sq yds hessian scrim
- ½ pint shellac
- 1 tin car wax polish
- ½ pint PVA release agent
- 2 oz accelerator
- 2 oz catalyst
- strips of glass matt
- 2 lbs gelcoat resin
- 6 lbs layup resin
- acetone
- soap and water
- 1 tub barrier cream
- sink plunger
- 2 car parking lights (for flashing lights on head)
- 2 6V 0.3 amp bulbs and holders
- 6 volt battery

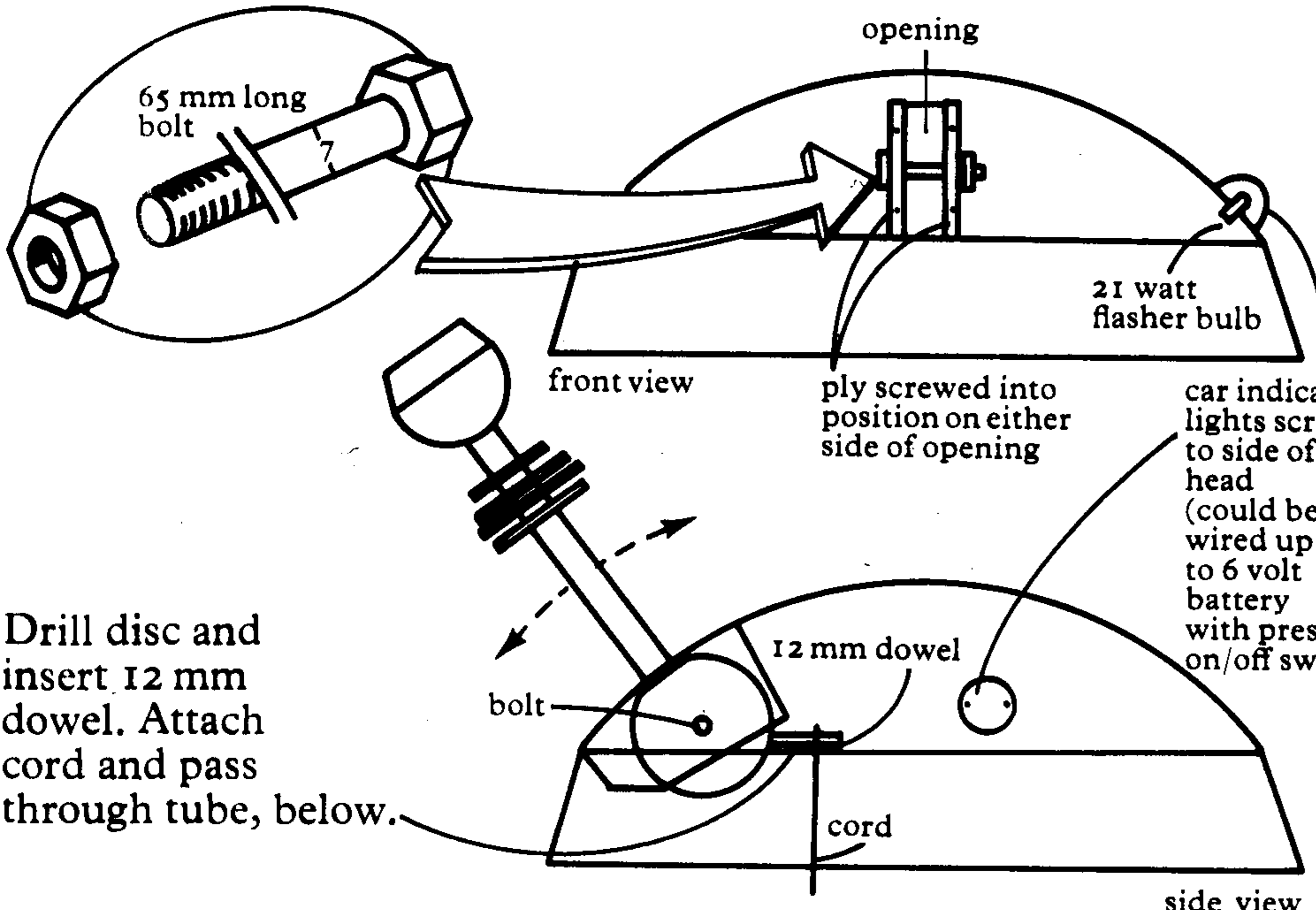
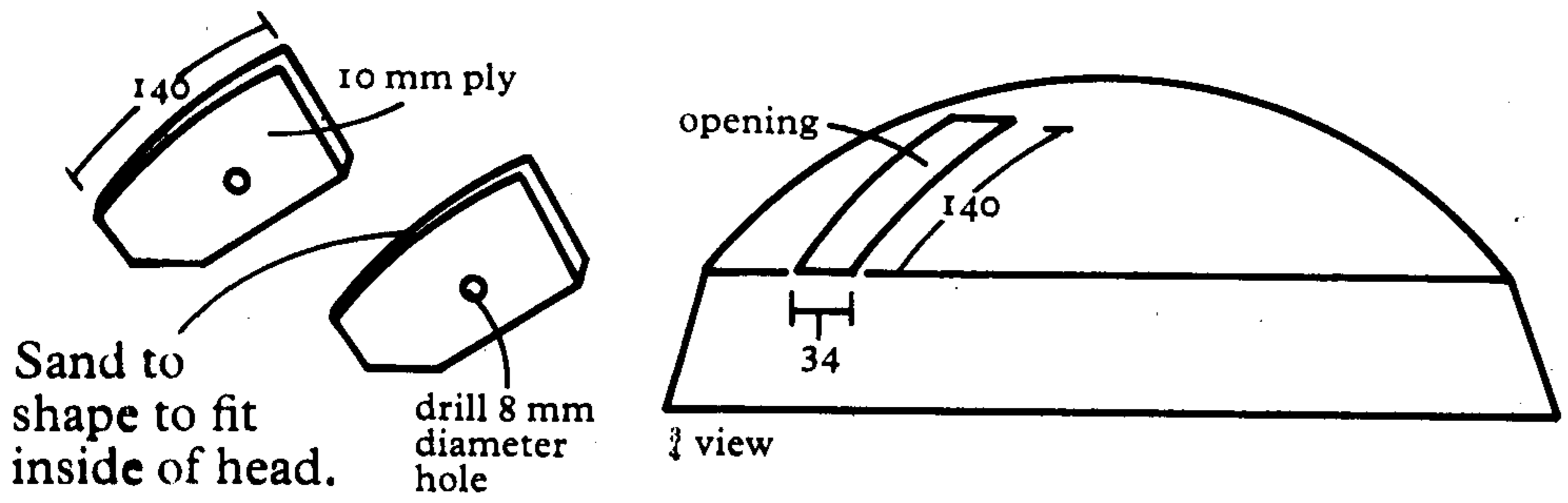
- 1.5 mm ply 1 sheet 5 ft × 5 ft
- 6 mm ply 4 sheets 5 ft × 5 ft
- 9 mm ply 1 sheet 8 ft × 4 ft
- 15 mm ply 1 sheet 10 ft × 4 ft
- 12 mm wooden dowel
- 27 mm wooden dowel
- 2 wooden balls 95 mm diameter

- 24 polystyrene balls 100 mm diameter
- 6 ball bearings 6 mm
- 30 gauge fine aluminium mesh 275 mm × 1470 mm
- 24 gauge large aluminium mesh (2 strips) 655 mm × 180 mm
- aluminium 1425 mm × 150 mm and two strips 651 mm × 10 mm
- soft aluminium 40 mm × 170 mm
- 36 mm aluminium or plastic tube 455 mm
- 40 mm aluminium or plastic tube 615 mm
- 3 mm steel rod 315 mm
- 15 mm rod 270 mm
- brass shim strip
- aluminium angle
- ribbed rubber flooring foam strip
- 3 plastic rotating castors 1½ in to 2 in diameter
- perspex 2mm 80 mm × 80 mm
- 2 brass rings (internal diameter 28 mm, cut to 10 mm long)
- screws, nuts, bolts, snap rivets, fast-drying enamel paint
- Approximate total cost: £15**



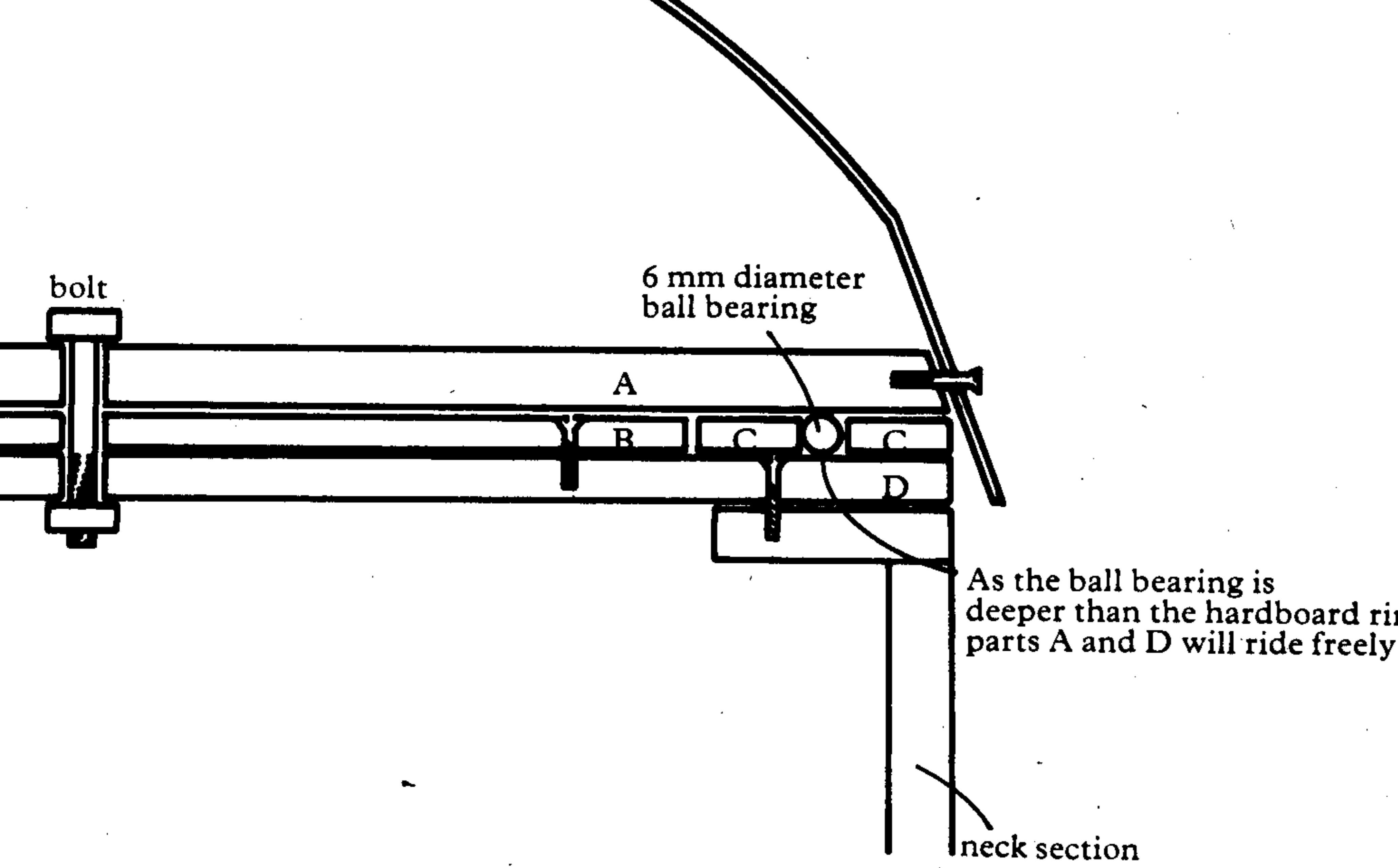
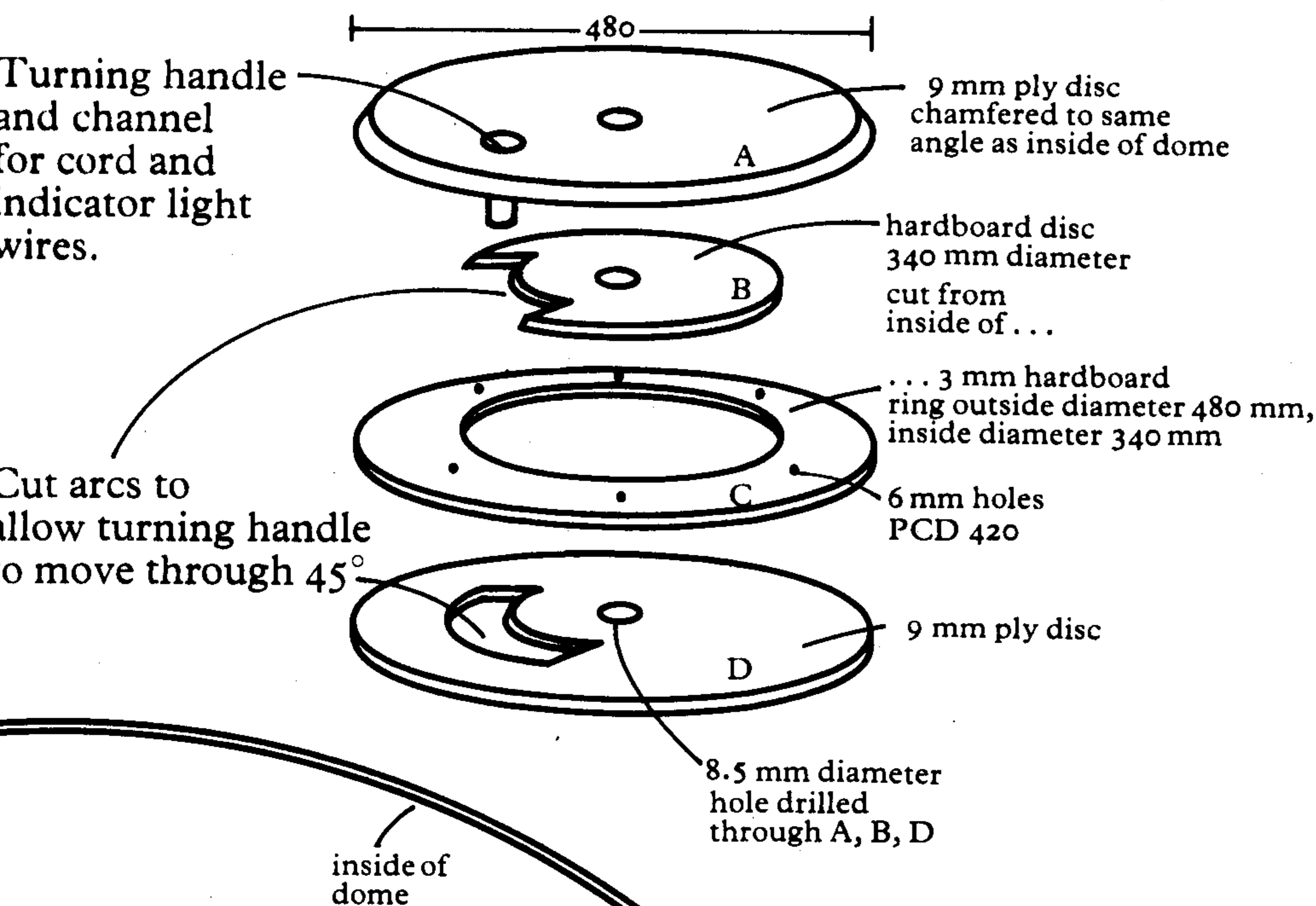
### 8 FIXING THE ANTENNA

Cut an opening 140 mm long, 34 mm wide, in the head. Take two pieces of 9 mm ply and cut to shapes shown below. Fix into inside of head with screws. Fix antenna into position with 65 mm nut and bolt.



### 9 MAKING THE HEAD TURN

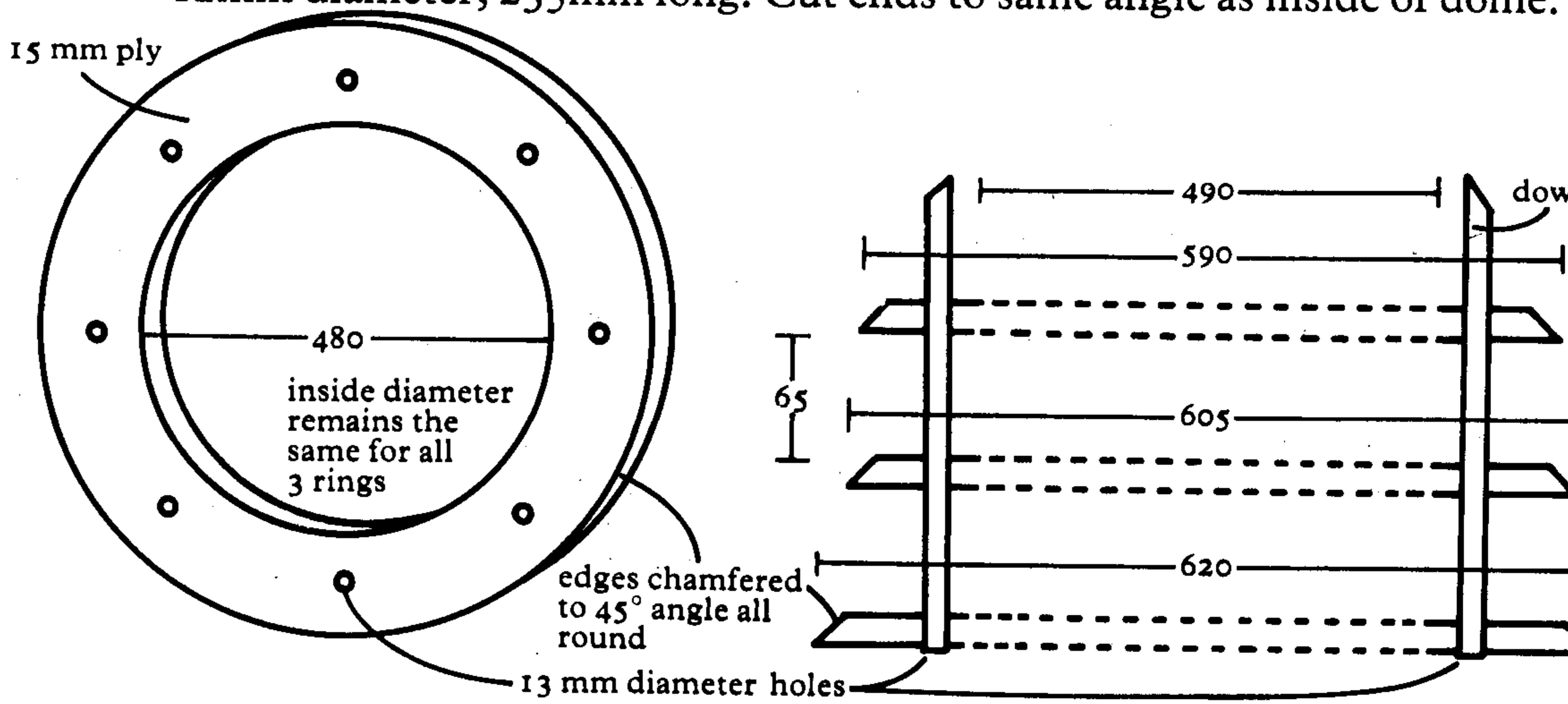
From a sheet of 9 mm ply cut a disc 480 mm diameter (A) and another disc 480 mm diameter (D). From a sheet of 3 mm hardboard cut a disc 480 mm (C). From that disc, cut an inner disc 340 mm diameter, (B). Drill 6 evenly spaced 6 mm holes right through ring (to hold 6 mm diameter ball bearings). Assemble as below and screw dome to (A).



## SECTION 2: NECK

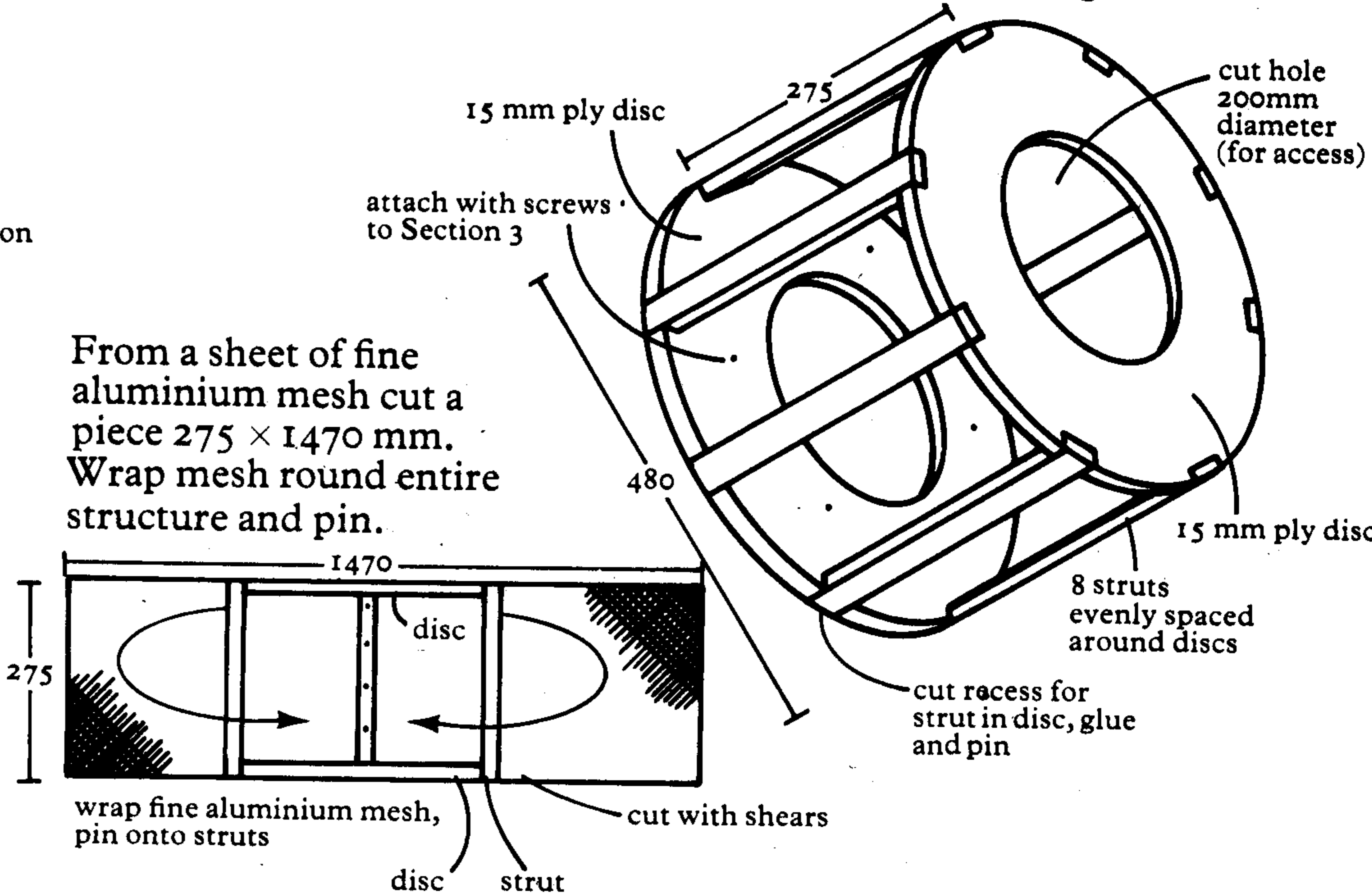
### 10 MAKING THE RINGS

From a sheet of 15 mm ply, cut 3 rings as shown below. Drill 8 evenly spaced 13 mm diameter holes PCD 530 mm. Insert 8 wooden dowels, 12 mm diameter, 235 mm long. Cut ends to same angle as inside of dome.



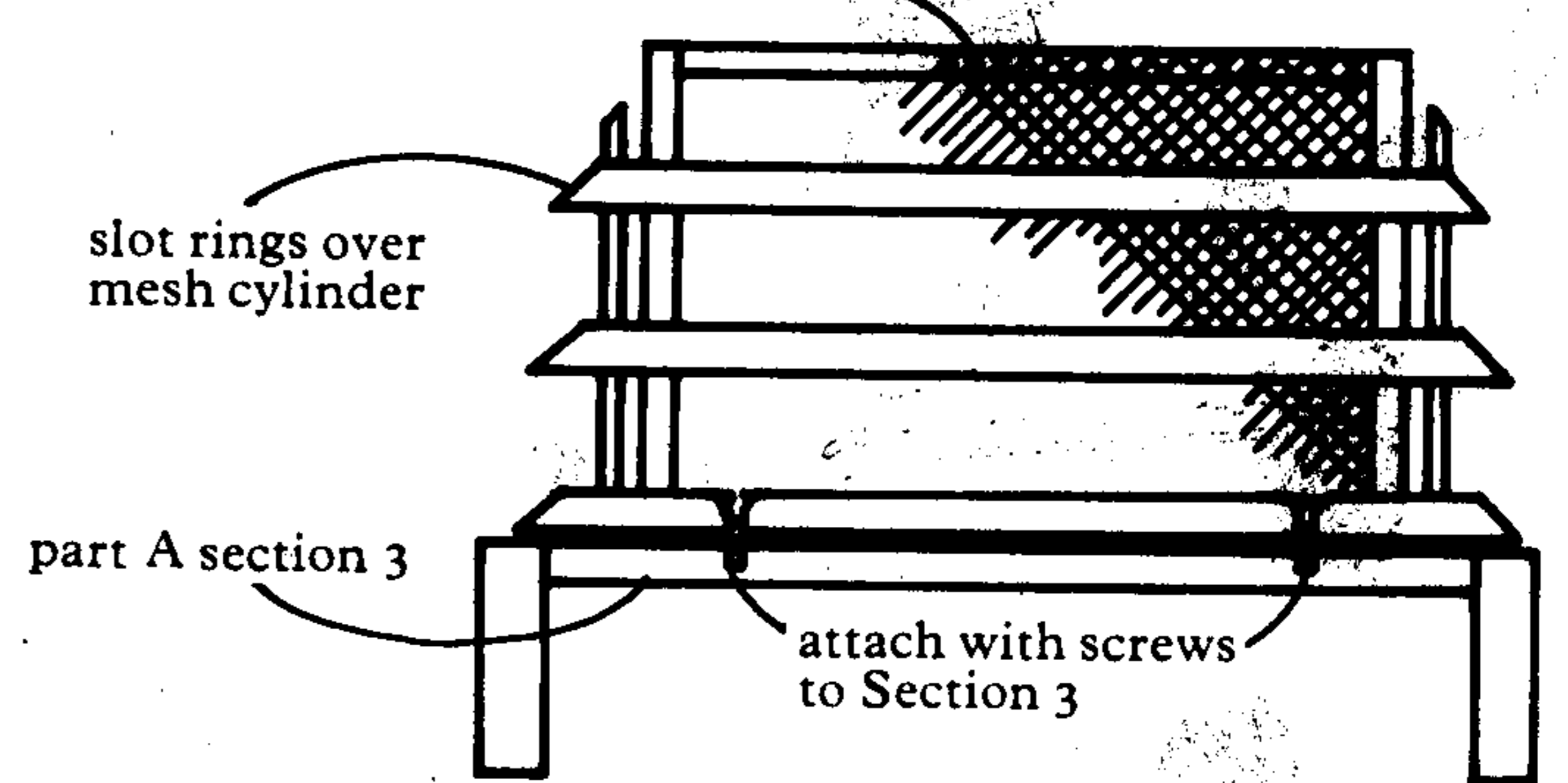
### 11 MAKING THE MESH CYLINDER

From a sheet of 15 mm ply, cut 2 discs 480 mm diameter. Cut 8 softwood struts 10 x 25 x 275 mm and assemble with discs as in diagram.



Fit the rings over the mesh cylinder.

Screw part D of Section 1 onto this surface.

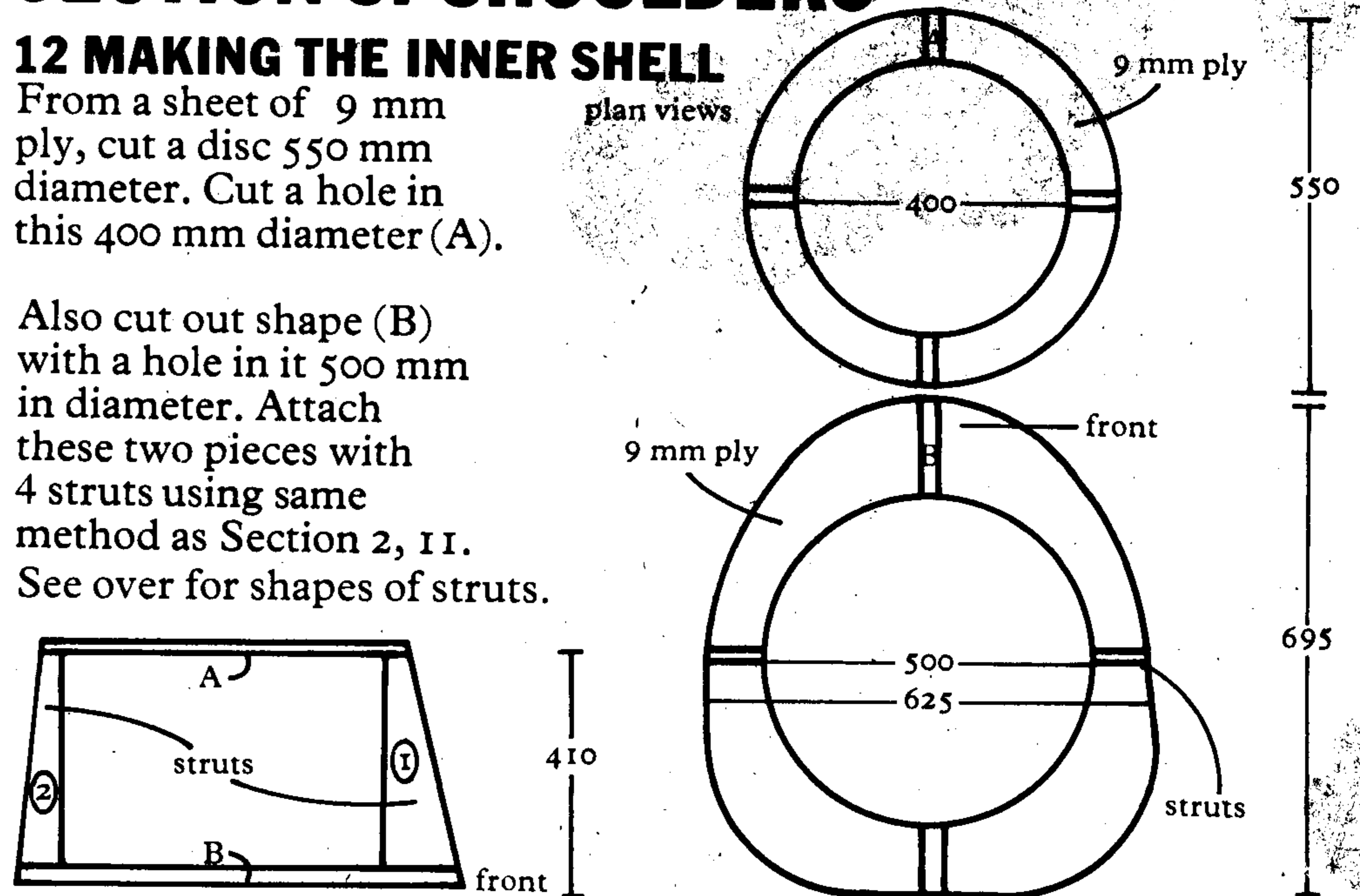


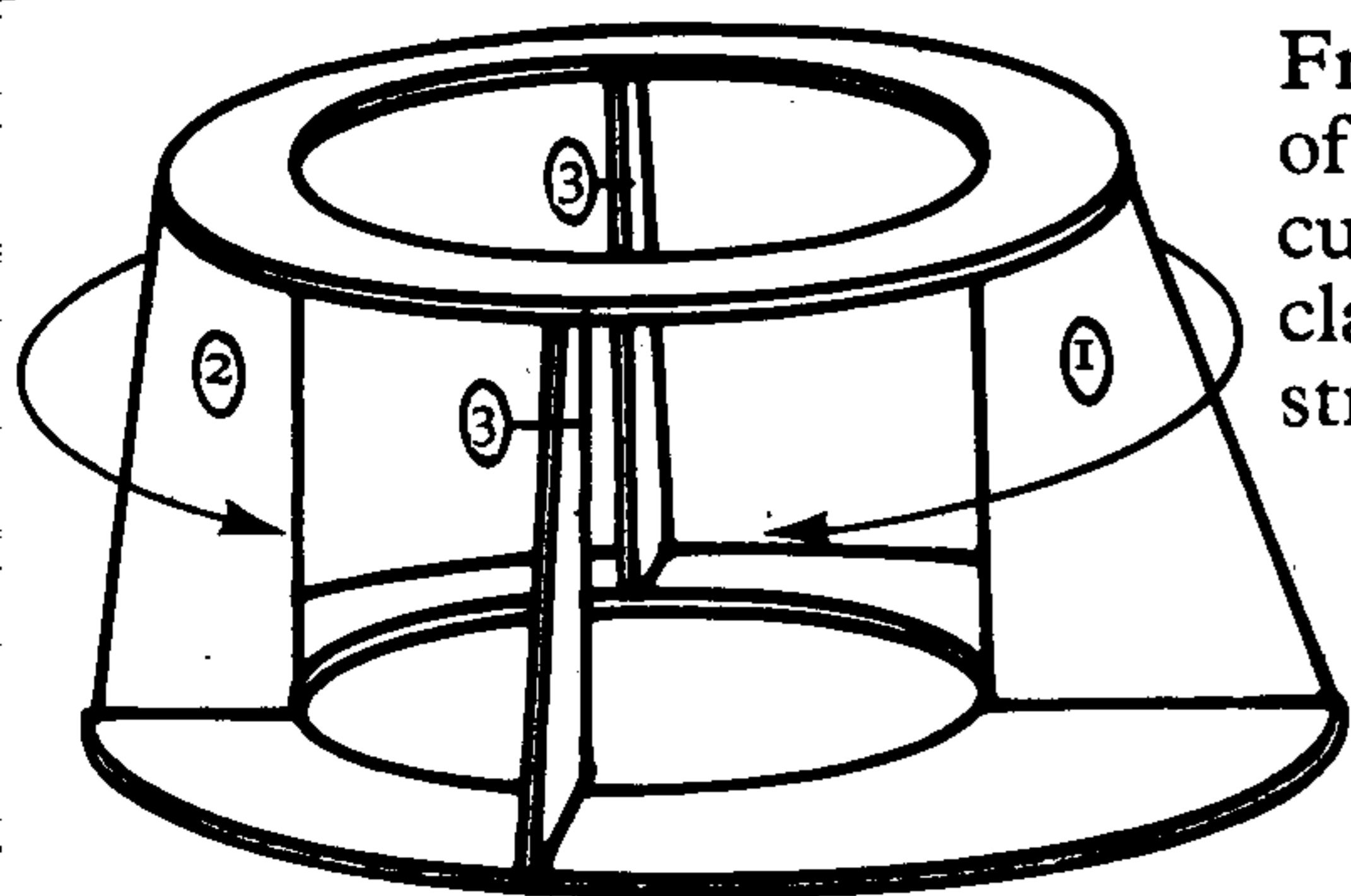
## SECTION 3: SHOULDERS

### 12 MAKING THE INNER SHELL

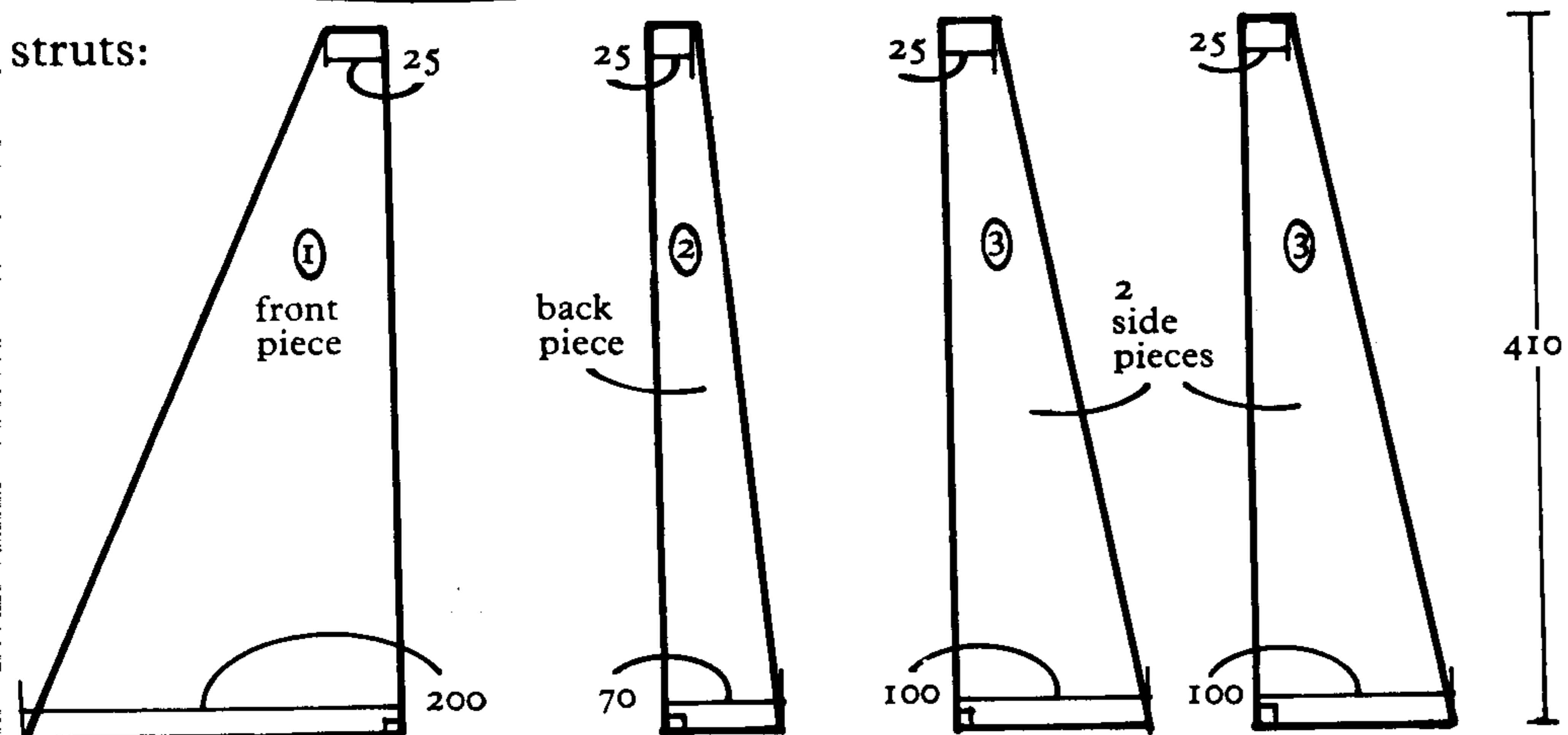
From a sheet of 9 mm ply, cut a disc 550 mm diameter. Cut a hole in this 400 mm diameter (A).

Also cut out shape (B) with a hole in it 500 mm in diameter. Attach these two pieces with 4 struts using same method as Section 2, 11. See over for shapes of struts.



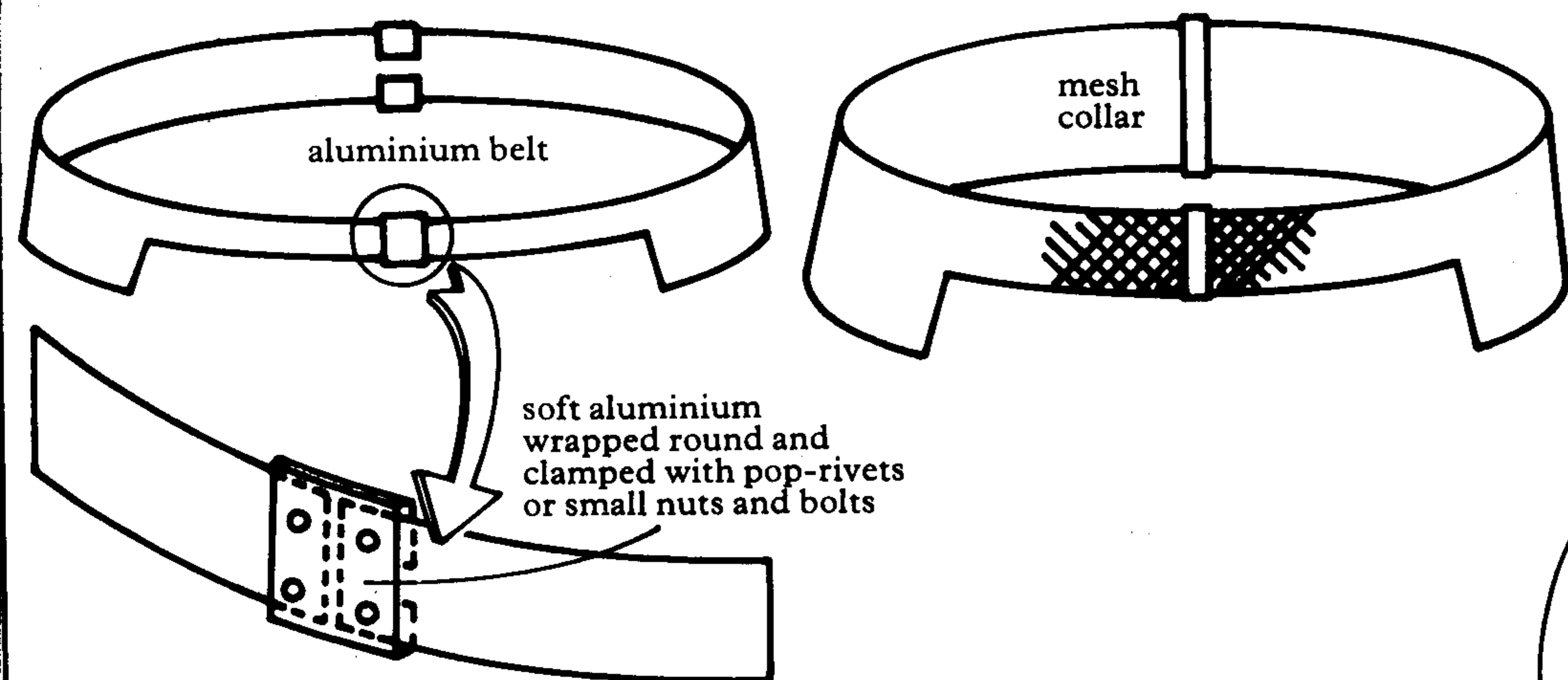


From a sheet of 1.5 mm ply, cut 2 strips to clad assembled structure.



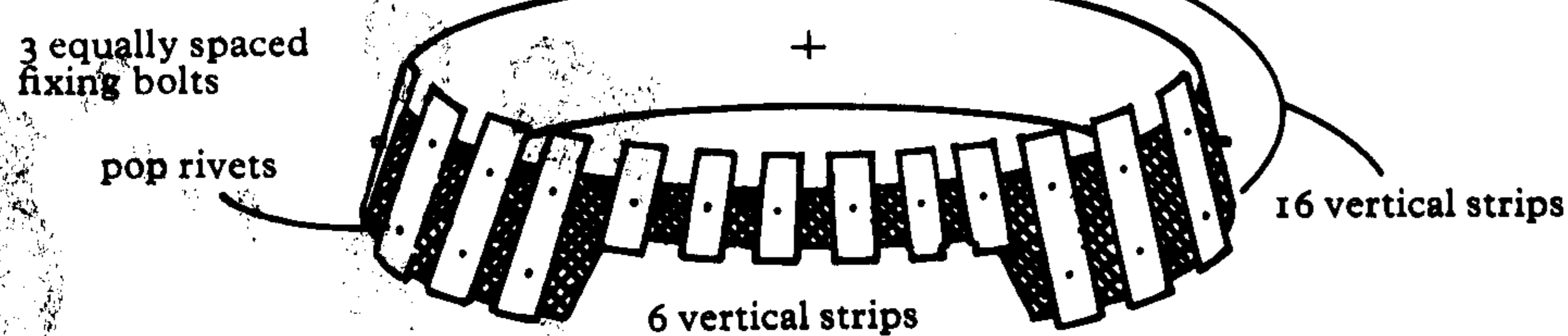
### 13 MAKING THE MESH COLLAR

From a sheet of aluminium, cut 2 strips 651 x 10 mm. Join at front and back with a piece of soft aluminium 40 x 170 mm and clamp. From a sheet of large aluminium mesh, cut 2 strips 655 x 180 mm. This fits over aluminium belt...

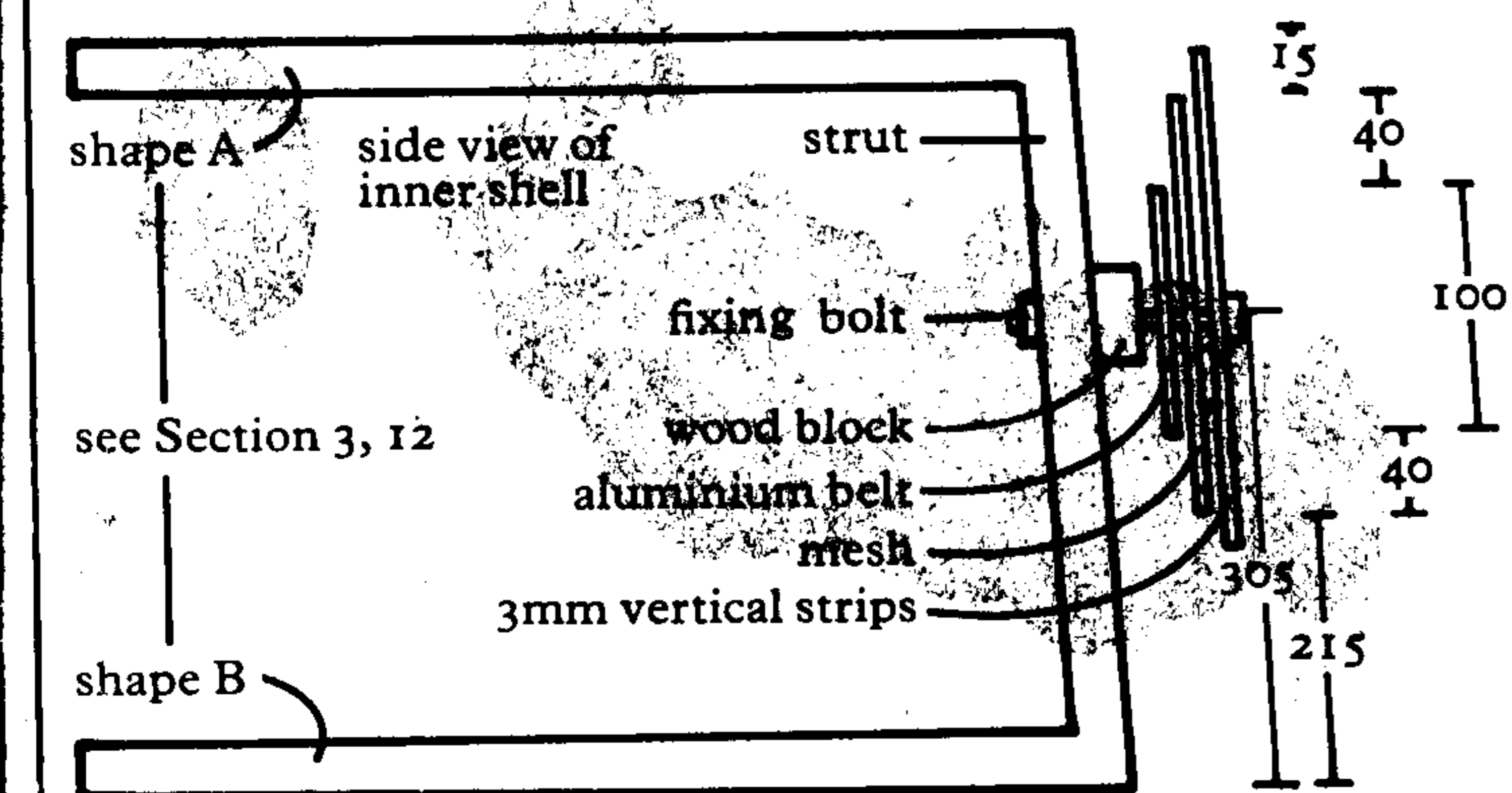


soft aluminium wrapped round and clamped with pop-rivets or small nuts and bolts

and is held in position with 16 vertical strips of 3mm ply 50mm x 215mm and 6 vertical strips of 3mm ply 50mm x 125mm, all anchored with pop rivets.



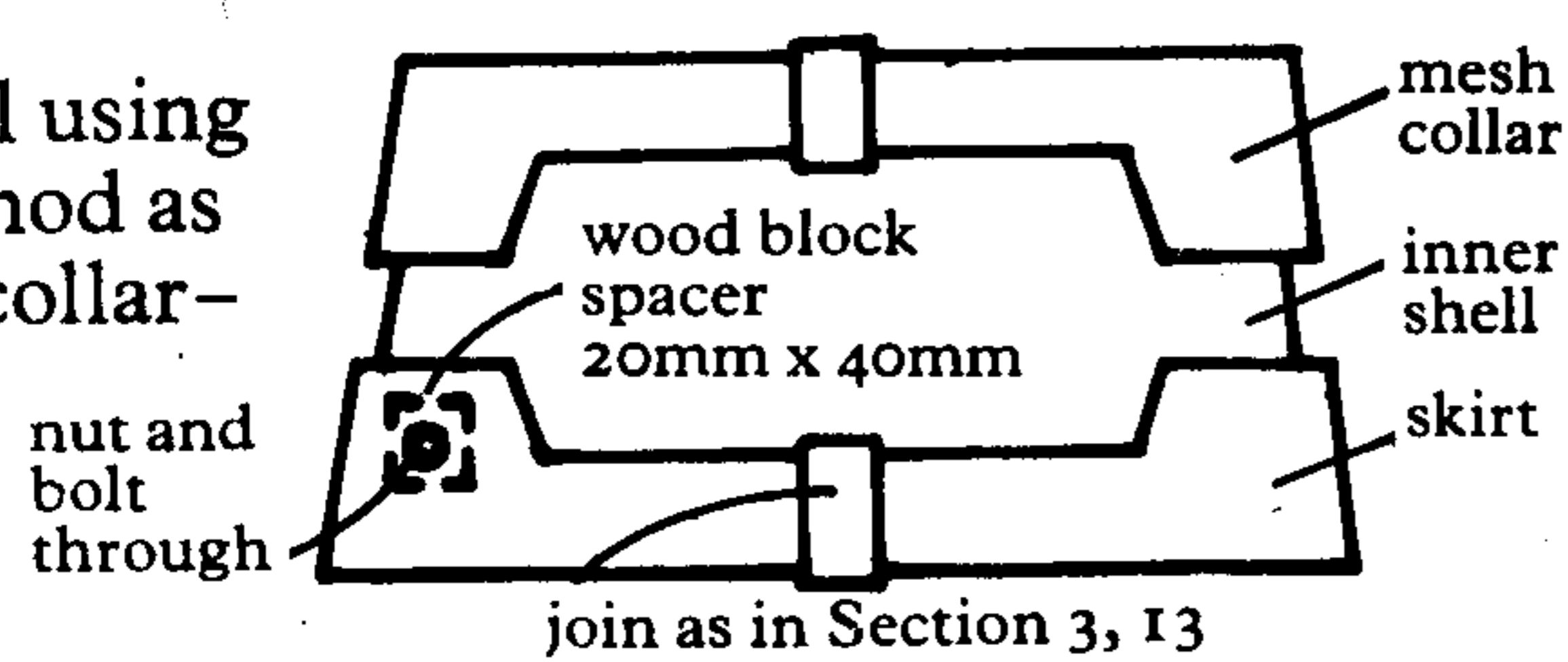
The aluminium belt and the aluminium mesh are separated from the inner shell by a block of wood 20mm thick, 40mm x 40mm, and fixed through to the shell with nuts and bolts.



### 14 MAKING THE ALUMINIUM SKIRT

From a sheet of aluminium, cut 2 shapes shown opposite. Fix to inner shell using same method as for mesh collar -

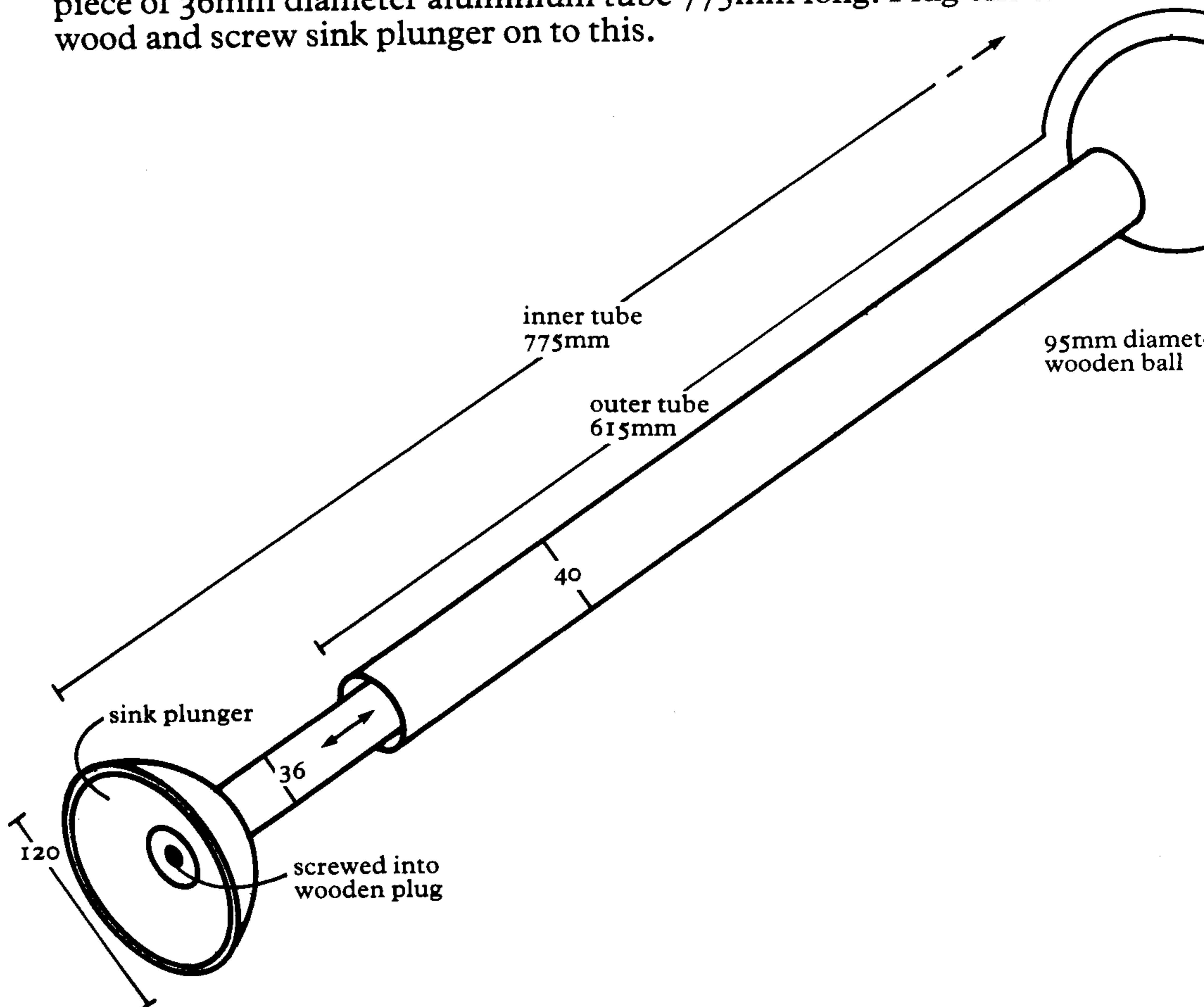
Section 3, 13.



join as in Section 3, 13

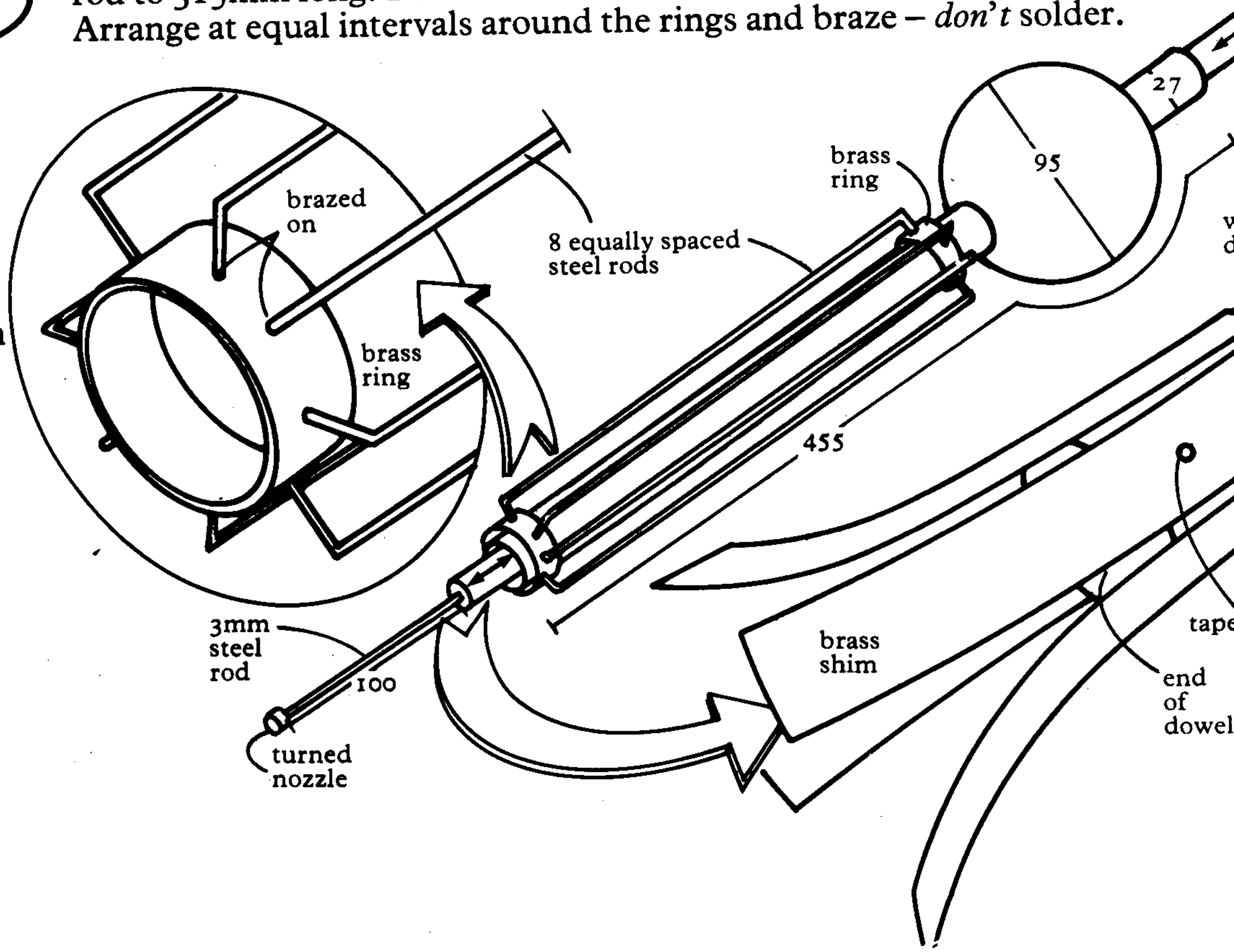
### 15 MAKING THE ARM

Cut a piece of 40mm diameter aluminium tube to 615mm long. Drill hole through 95mm diameter solid wooden ball and insert tube securely. Cut a piece of 36mm diameter aluminium tube 775mm long. Plug one end with wood and screw sink plunger on to this.

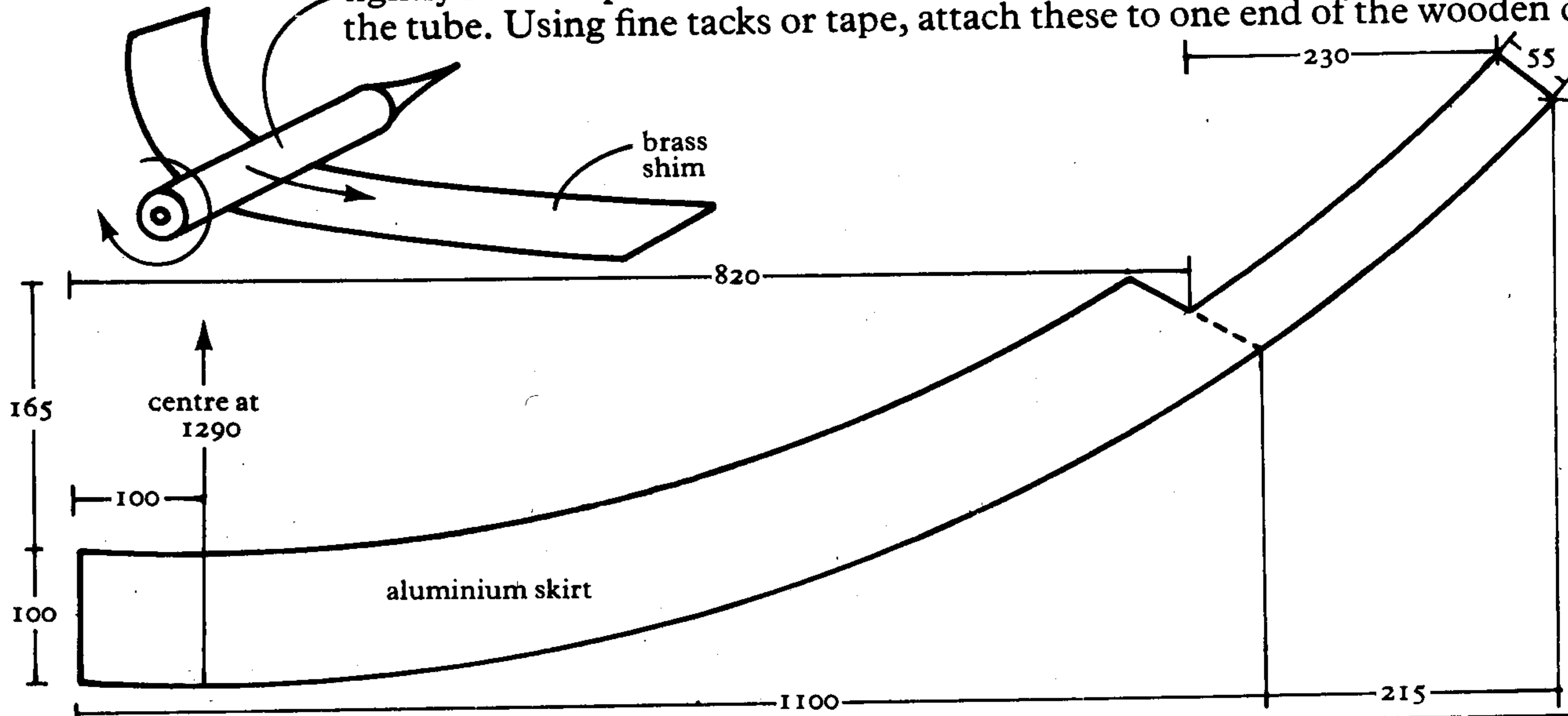


### 16 MAKING THE EXTERMINATOR

Cut a piece of 26mm diameter aluminium tube to 455mm long. Drill a hole in identical wooden ball and insert tube as shown in Section 3, 15. Fix 2 brass rings in position as shown. Cut 8 equal lengths of 3mm steel rod to 315mm long. Bend 10mm at either end of each to a right angle. Arrange at equal intervals around the rings and braze - don't solder.

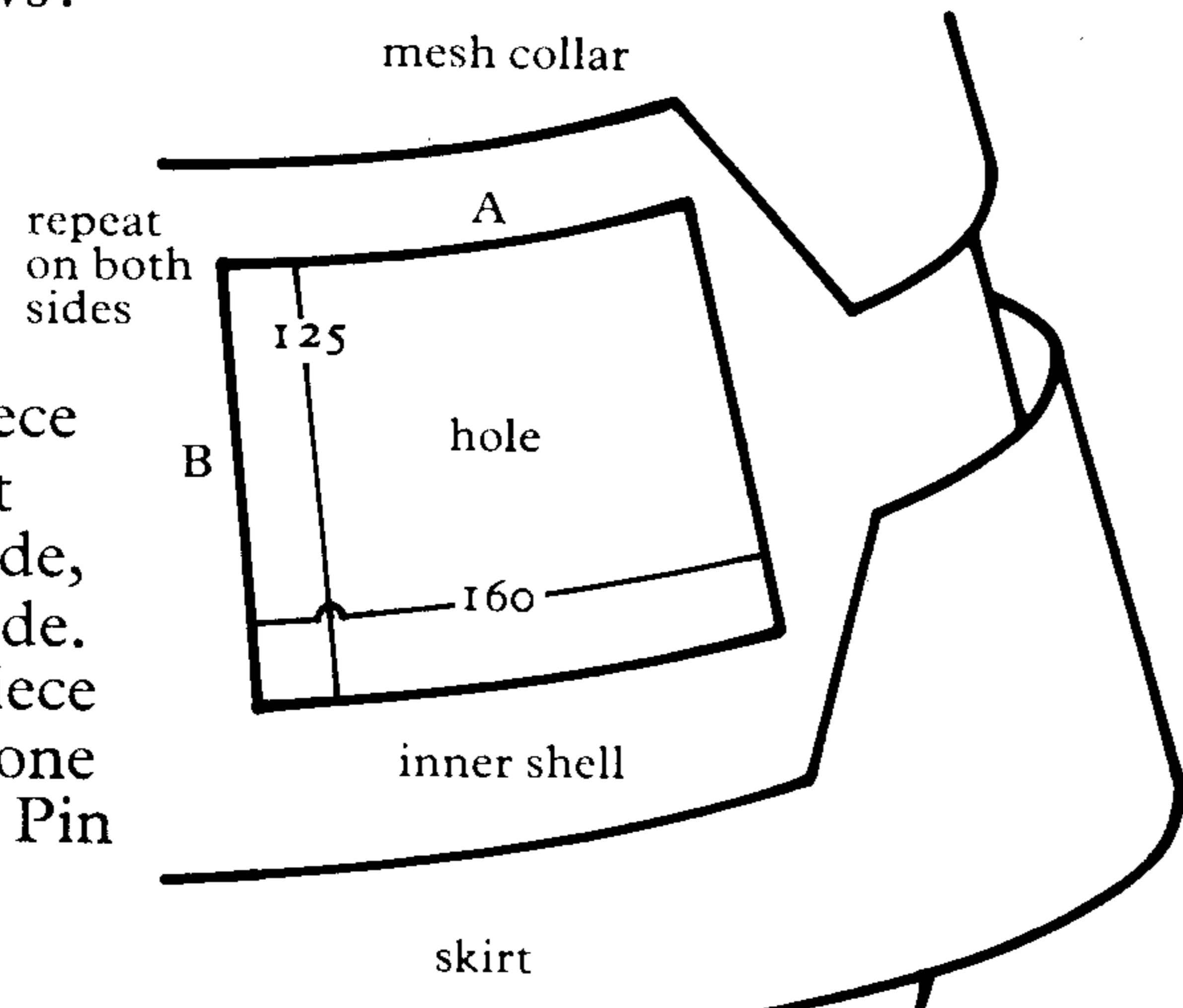


Take 4 identical pieces of brass shim 100mm long, 10mm wide. Roll them tightly round a pencil so that they will spring open when pushed out of the tube. Using fine tacks or tape, attach these to one end of the wooden d

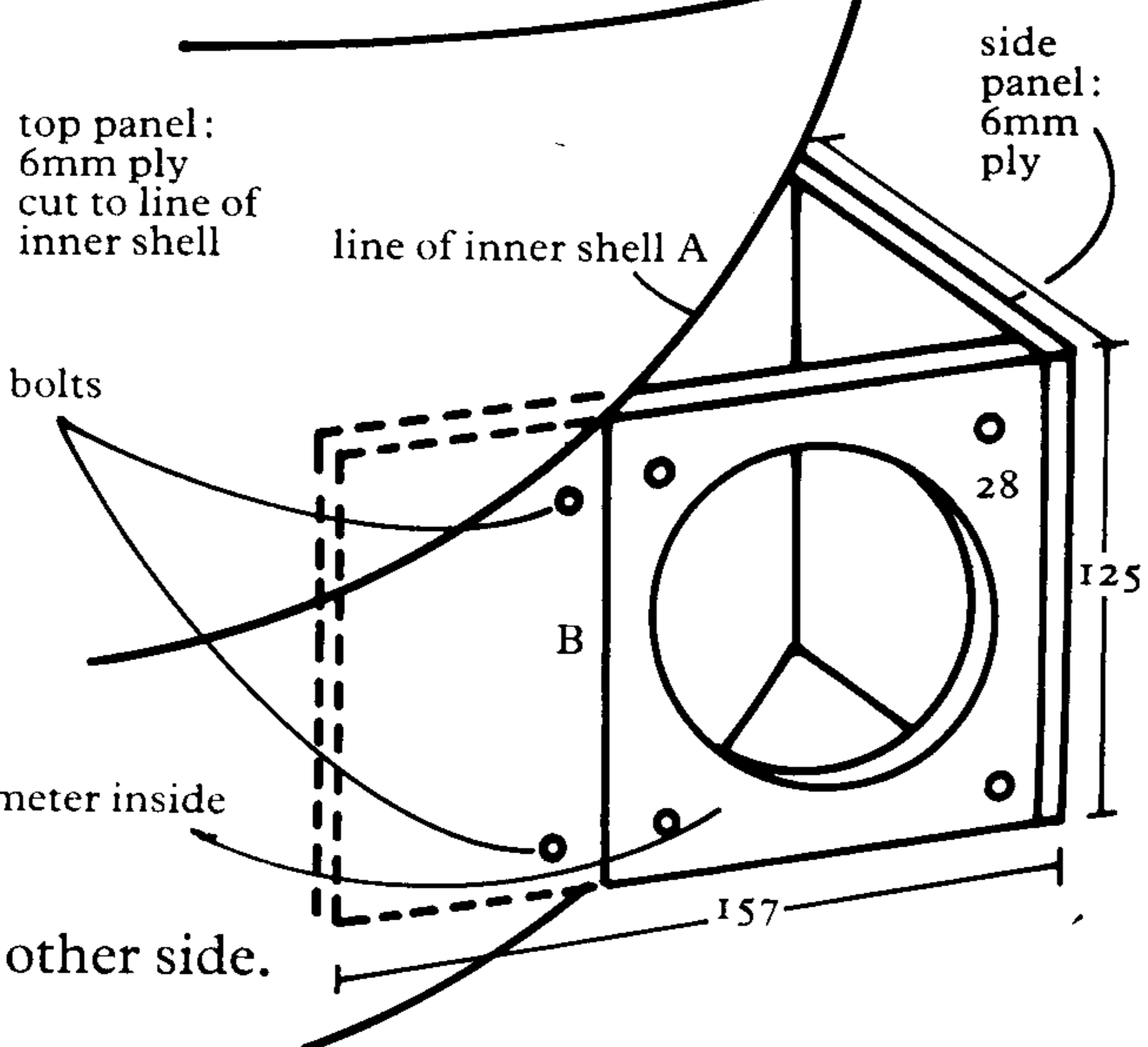


## MAKING THE ARM AND THE EXTERMINATOR MOVE

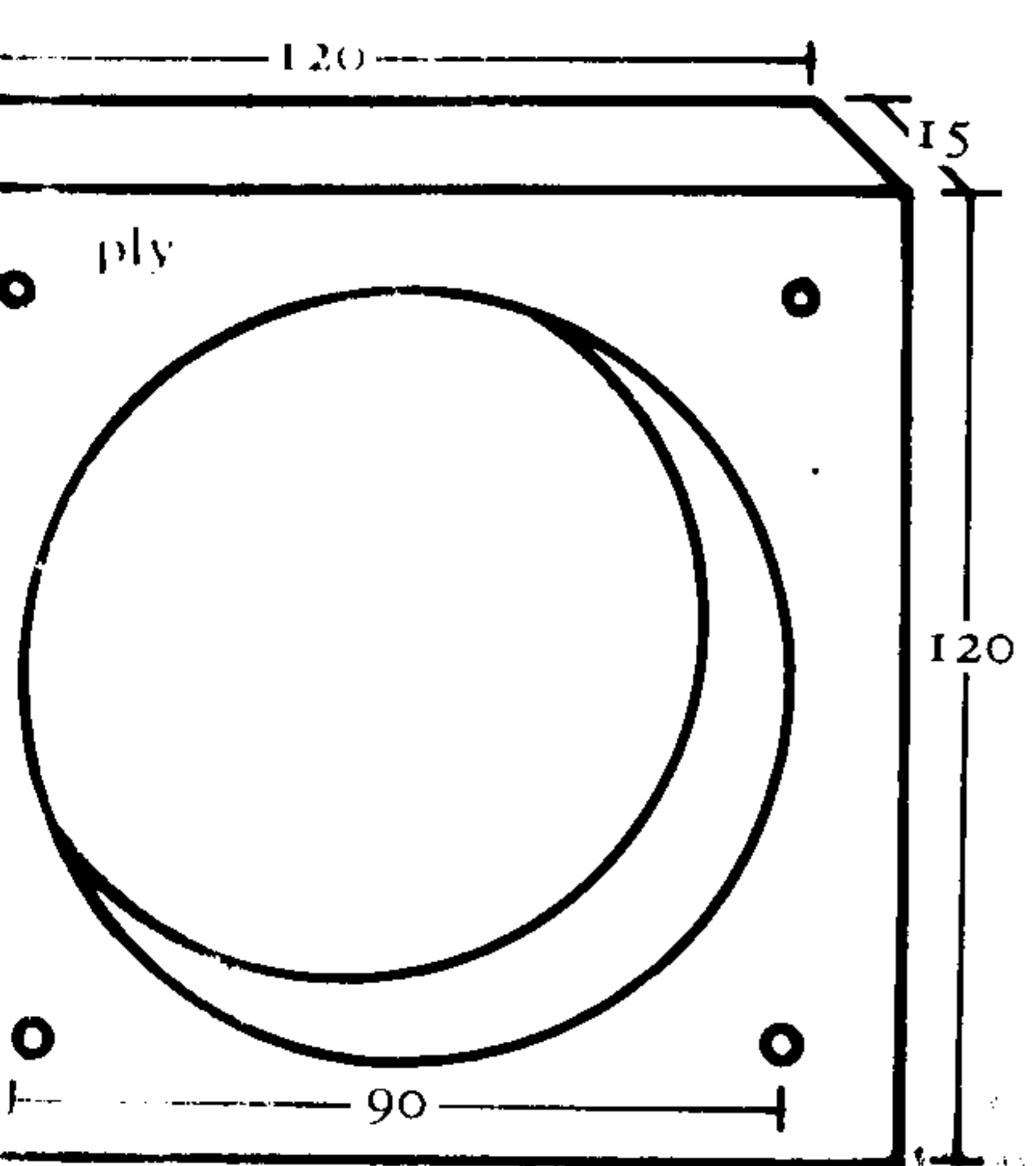
holes in the inner shell as follows:



From a sheet of 15mm ply, cut a piece 157mm x 157mm (front panel). Cut a hole in this 90mm diameter one side, chamfered to 97mm on the other side. From a sheet of 6mm ply, cut one piece 157mm x 112mm (side panel), and one piece 112mm x 135mm (top panel). Pin and glue these together to form a tapered box as shown below.



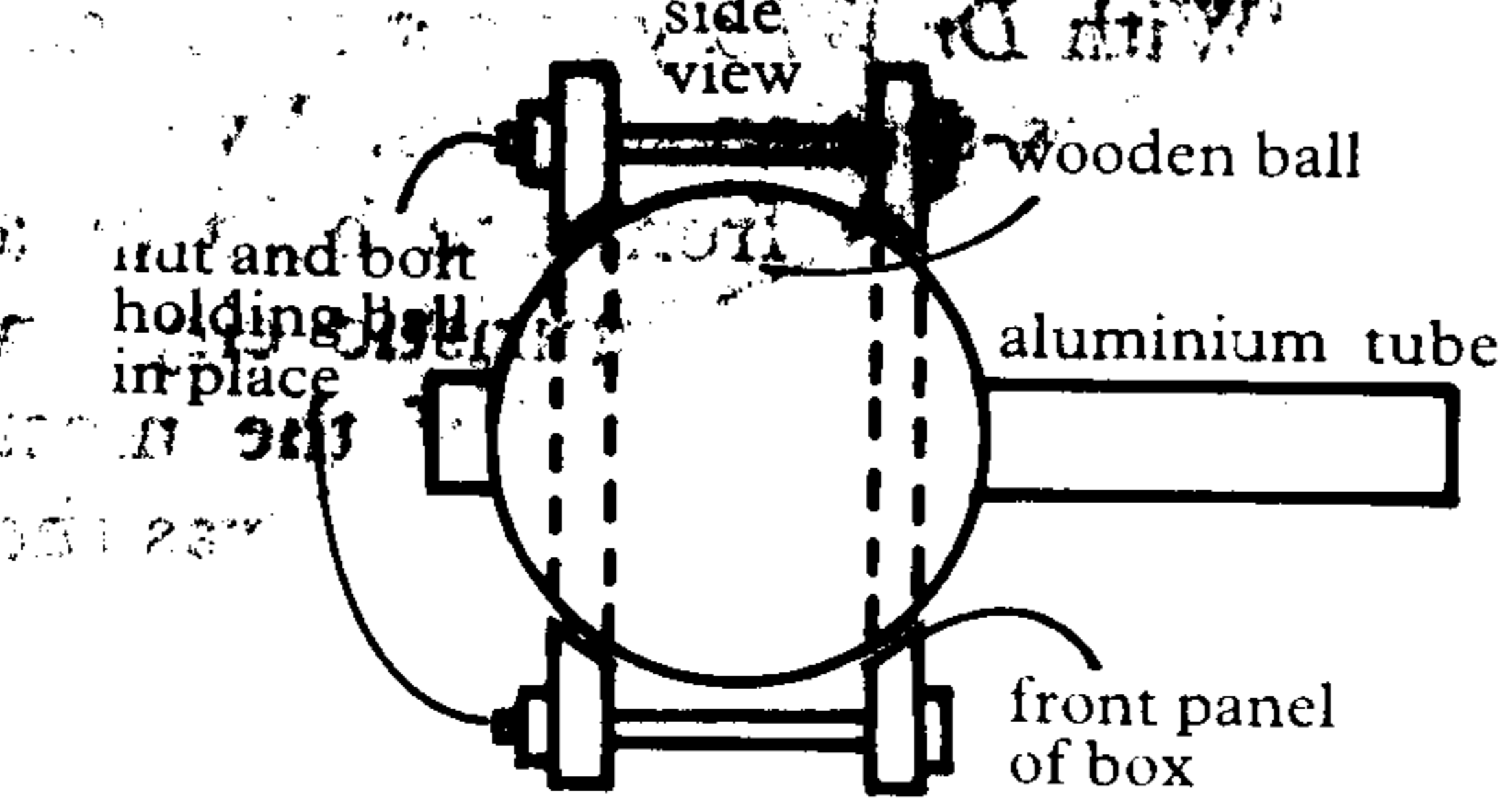
Repeat same process in reverse for the other side.



From a sheet of 15mm ply, cut 2 pieces 120mm square, each with a hole in the centre 90mm diameter on one side, chamfered to 97mm diameter on the other.

Next, drill 4 holes 4mm diameter in the front panel of the box at the corners and 4 identical holes in same positions through separate ply shape shown opposite.

Assemble arm and exterminator as shown below.

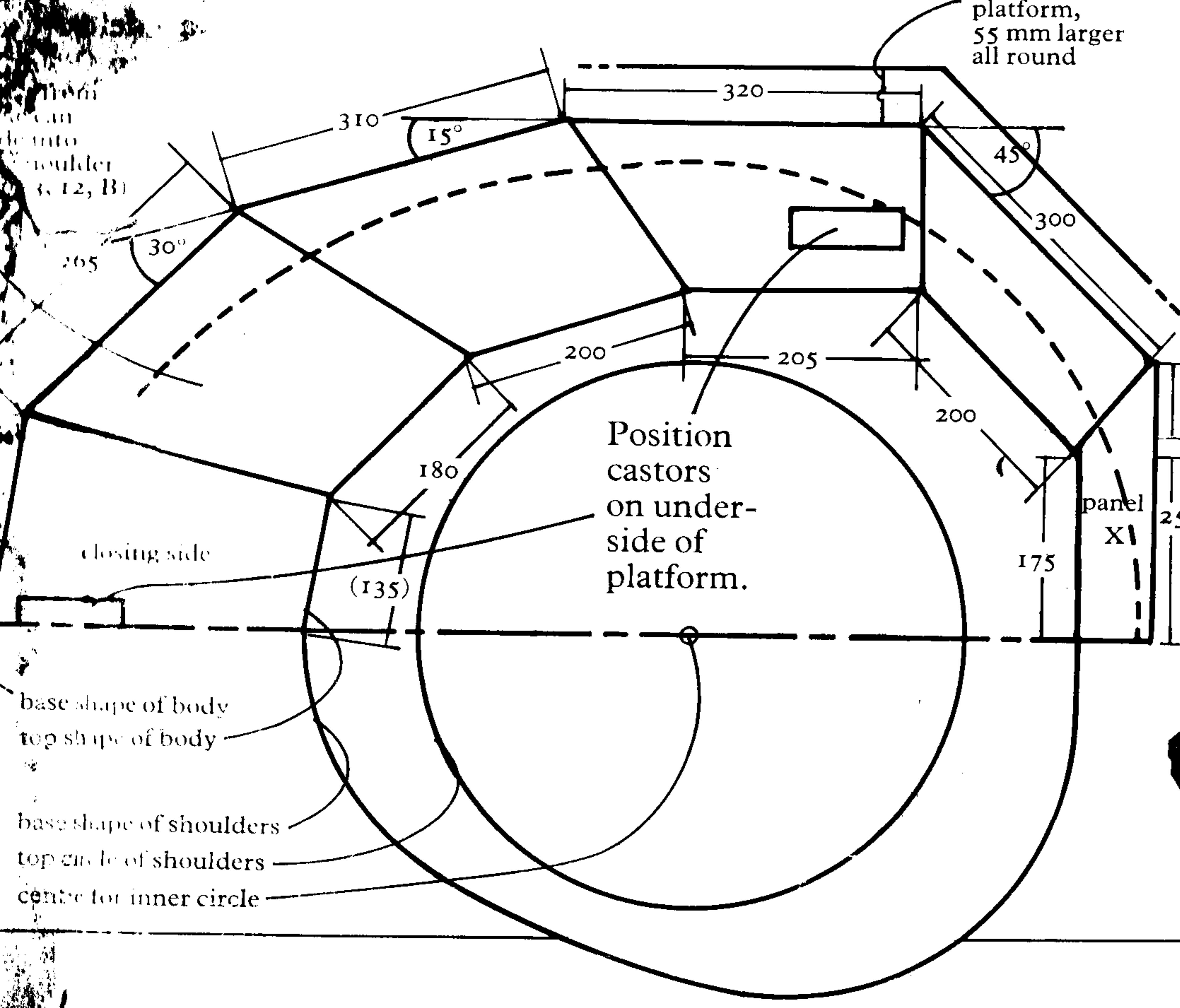


Adjust the tension of the nuts and bolts until the arm and the exterminator can be moved freely but are held in place.

## SECTION 4: BODY

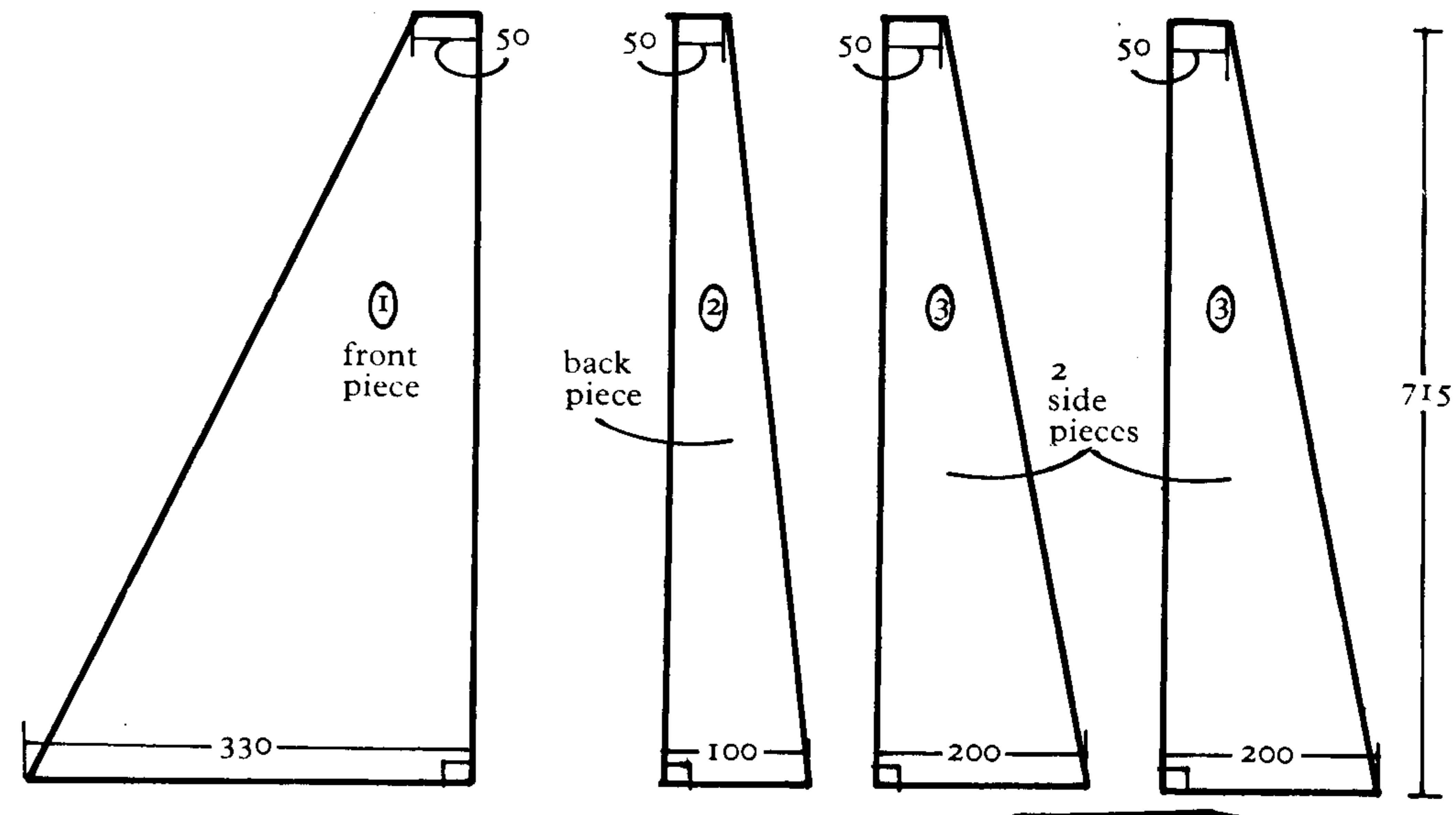
### MAKING THE FRAME

From 15 mm ply, cut base and top shapes.



## 19 ASSEMBLY

From a sheet of 15 mm ply, cut these shapes and assemble as in 3, 12.

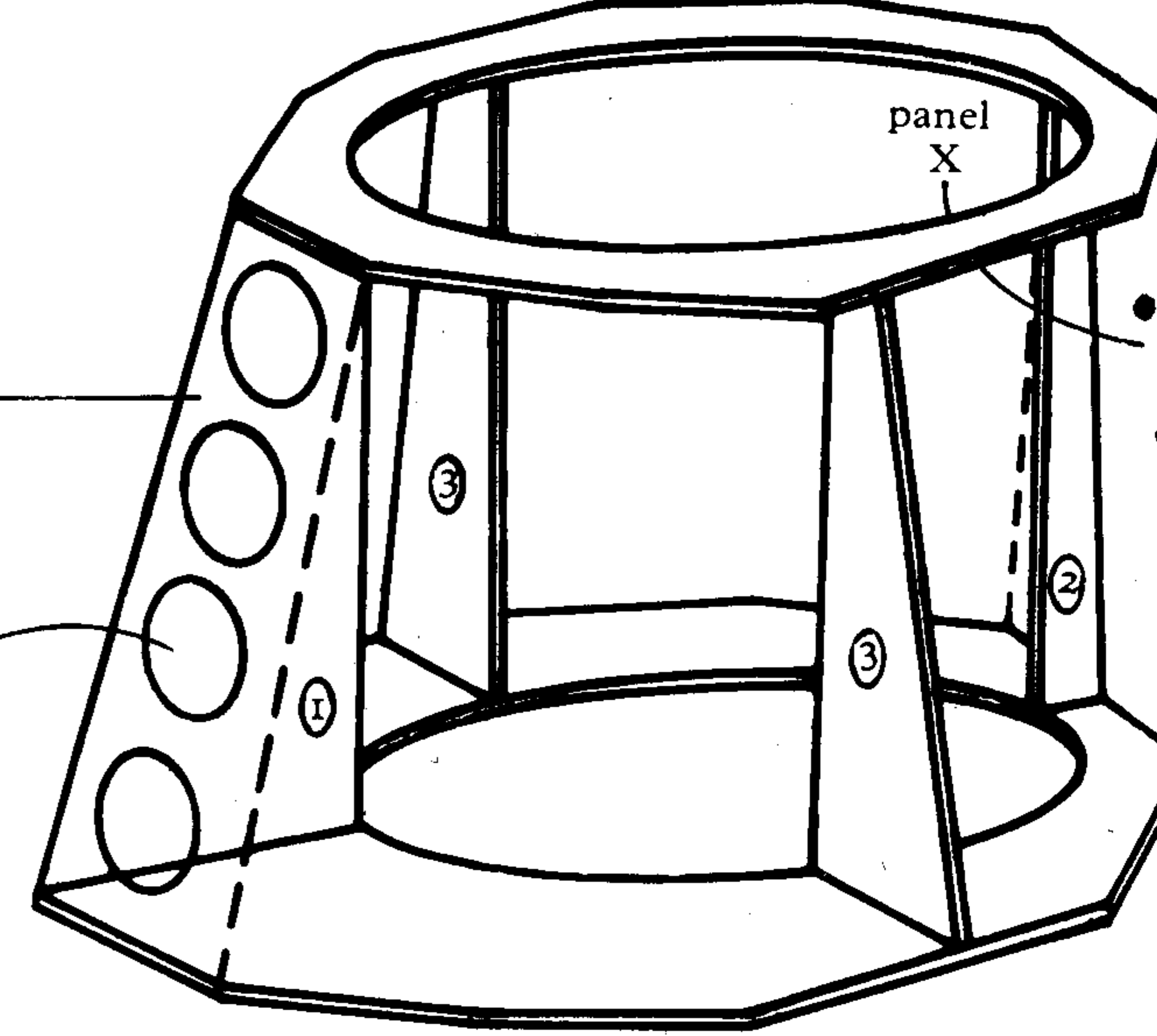


## 20 CLADDING

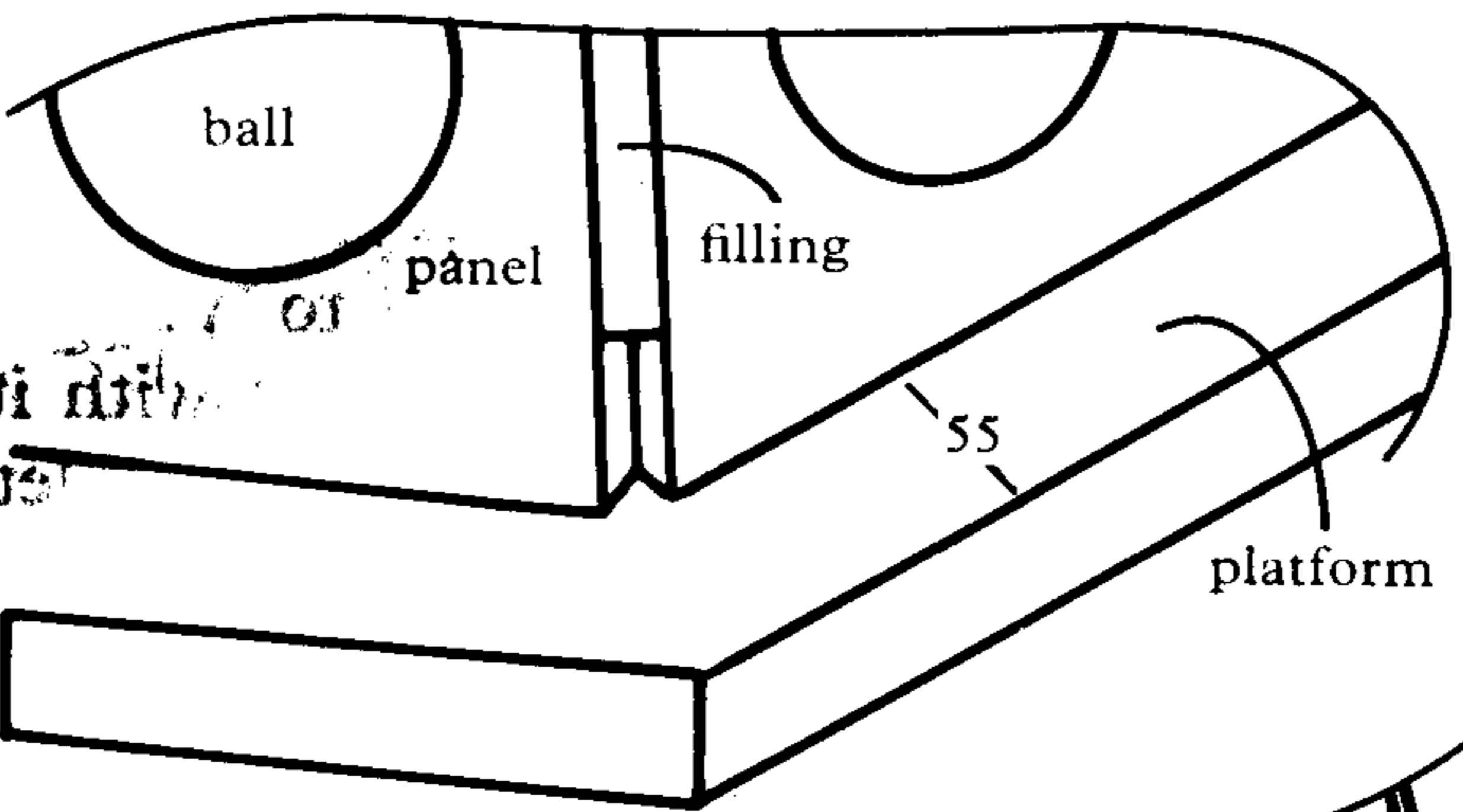
Clad frame with 11 panels of 6 mm ply.

## 21 DECORATING THE PANELS

Cut in half 24 polystyrene (or similar) balls of 100 mm diameter, and glue to panels - 4 to each, except for panel X, which has 8.



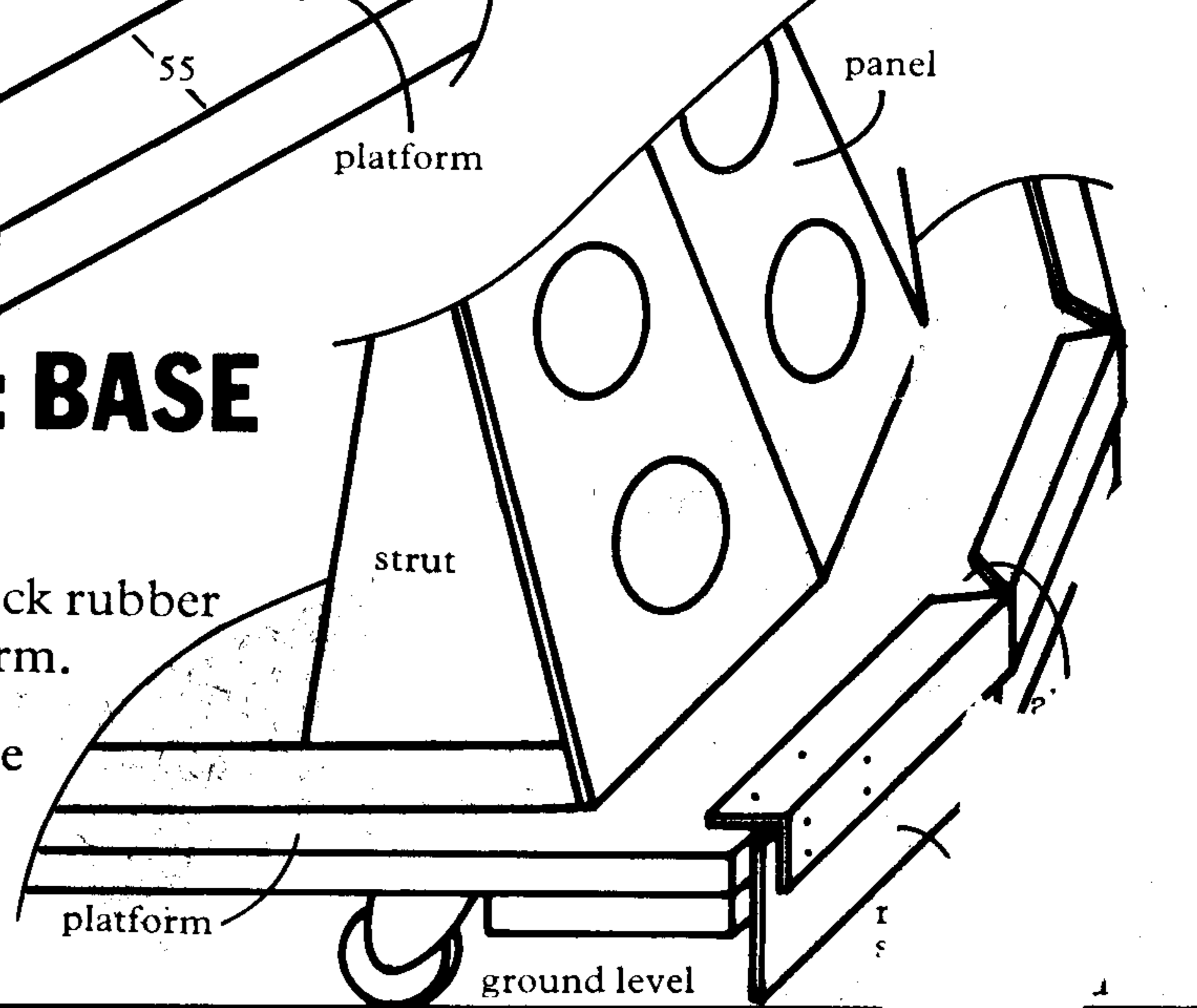
Fill up gaps left between the panels with Polyfilla or plastic wood. Sand to a smooth finish.



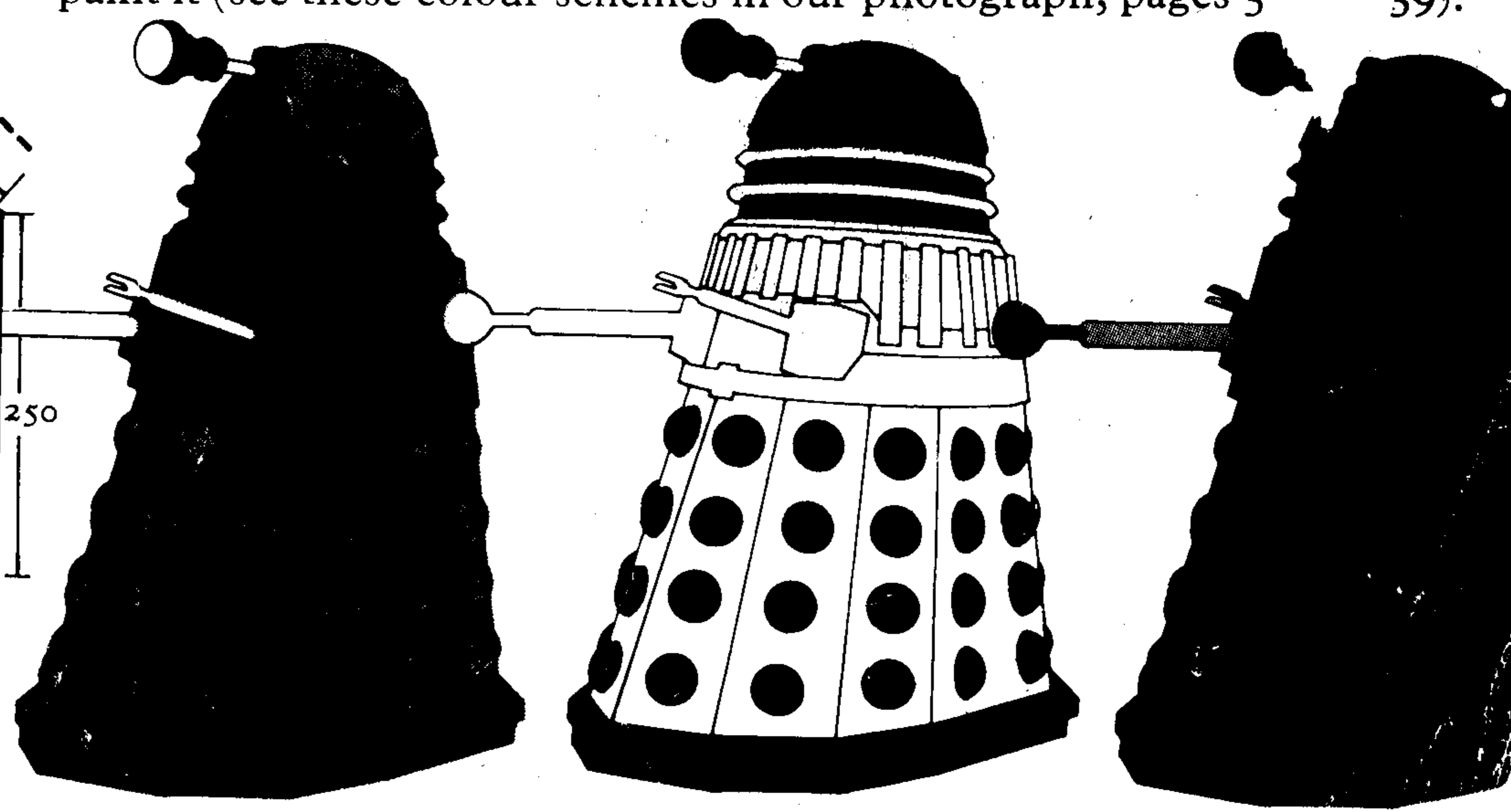
## SECTION 5: BASE

### 22 MAKING THE RUBBER SKIRT

Cut a strip of thin black rubber to encircle the platform. Screw into position with aluminium angle.



Assemble the Dalek, screwing the sections together. All that paint it (see these colour schemes in our photograph, pages 3 to 39).



Now you've seen how to make a Dalek yourself, turn overleaf and read how the behind-the-scenes professionals bring *Dr Who* to screen.