

Candle powered plastic bag sealer – Plans and instructions

Materials

Wood, plywood or MDF board (12mm x 800mm x 700mm)
Square doweling (10mm X 10mm x 2000mm)
Nails (20mm)
Wood Glue
Baking foil
2 X 440ml Drinks cans
Small candles

Tools required

Wood Saw
Drill and Bit (5mm)
Tape Measure
Pencil
Hammer
Fret saw
Emery paper
Scissors
Felt-tipped pen
Ruler
Bucket of water

Construction

Ideally a wooden box that has already been used for packaging should be used for the frame of the sealer. If this is not possible then a box must be constructed; a suggested method can be seen below:

It is important for the box to be stable and level.

The body of the box will have four sides and a bottom.

A good size for box is 40 cm long, 30 cm wide and 8 cm deep. This should accommodate most plastic bags, but it may be varied as required.

Wood, plywood or MDF are ideal for the base and sides of the box; some wooden doweling with a square cross-section will also be needed for batons (explained later).

A wooden board should be marked up with the pencil and tape measure so it can be sawn into appropriate rectangles (see fig 1). 2 x (40cm x 30cm), 2 x (8cm x 42cm), 2 x (8cm x 30cm).

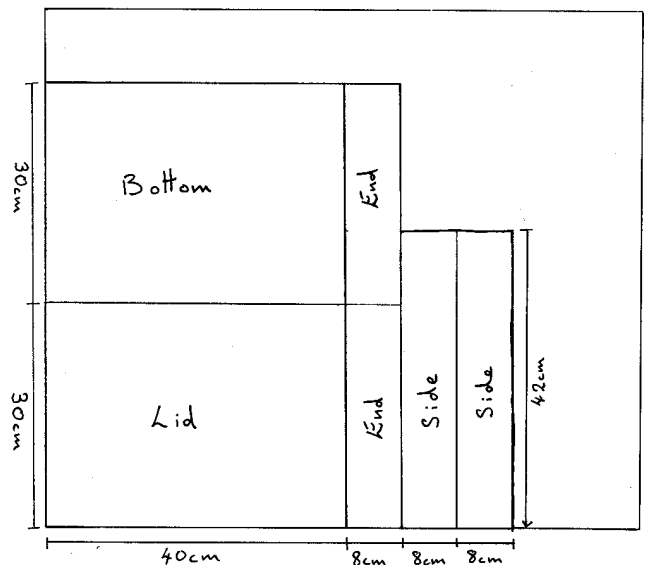


Figure 1

The 2m dowel should be sawn into lengths of 2 x 37 cm, 2 x 27 cm and 4 x 5 cm.

Once this has been done, the box excluding the lid, can be glued together.

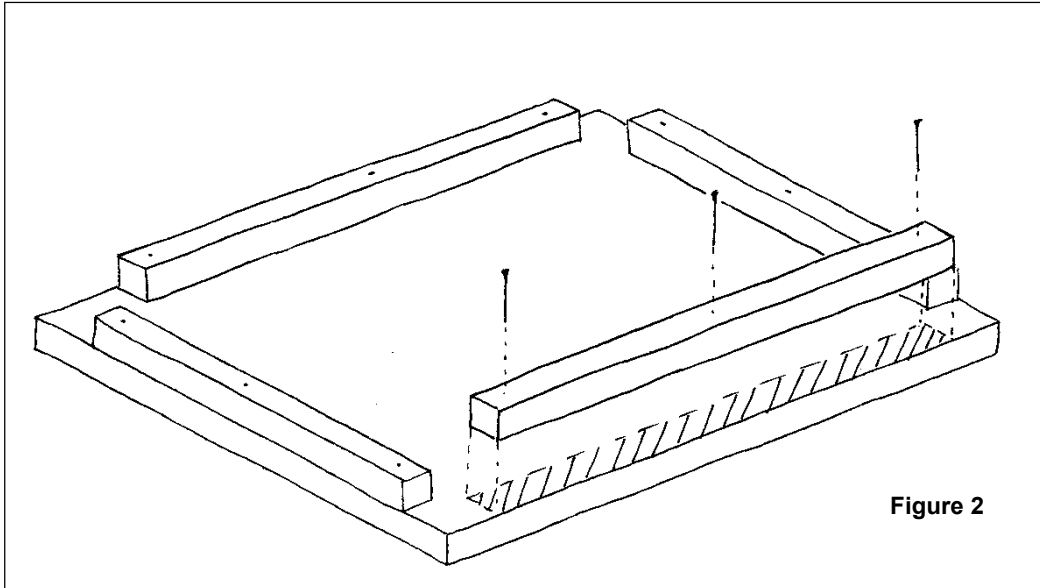


Figure 2

The lengths of dowel mention above are to be used as batons. Initially the four longest sections of the dowel should be glued (hatched area) and nailed to the base (see fig 2).

The four remaining smaller batons are to be attached in a similar way to the ends of the box (see fig 3). Note that dowel should be attached to leave a 1cm gap between the end of the dowel and the top of the box, eventually the lid of the box will rest on here.

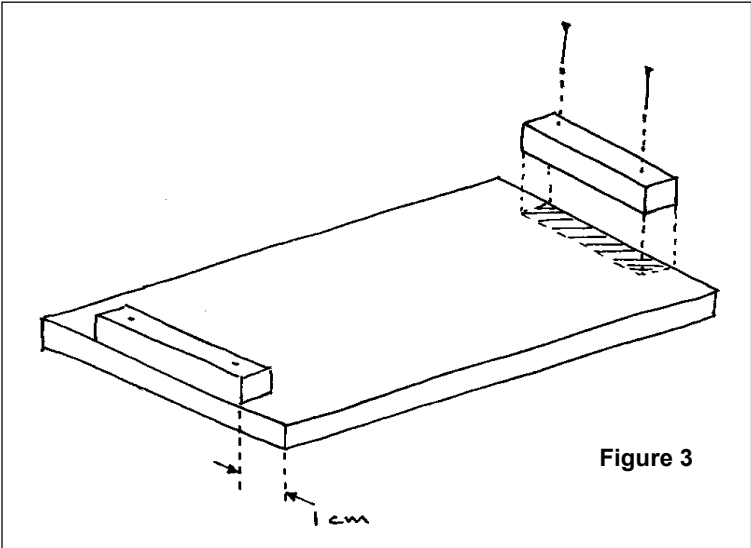


Figure 3

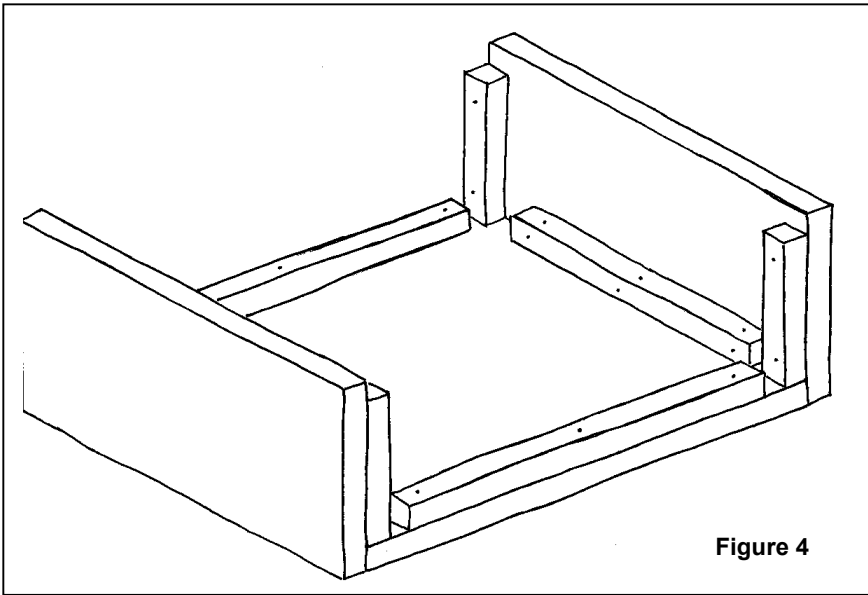


Figure 4

Once this has been done the ends should then be attached to the base (see fig 4). Remember that glue should be used wherever a baton touches the side of the box.

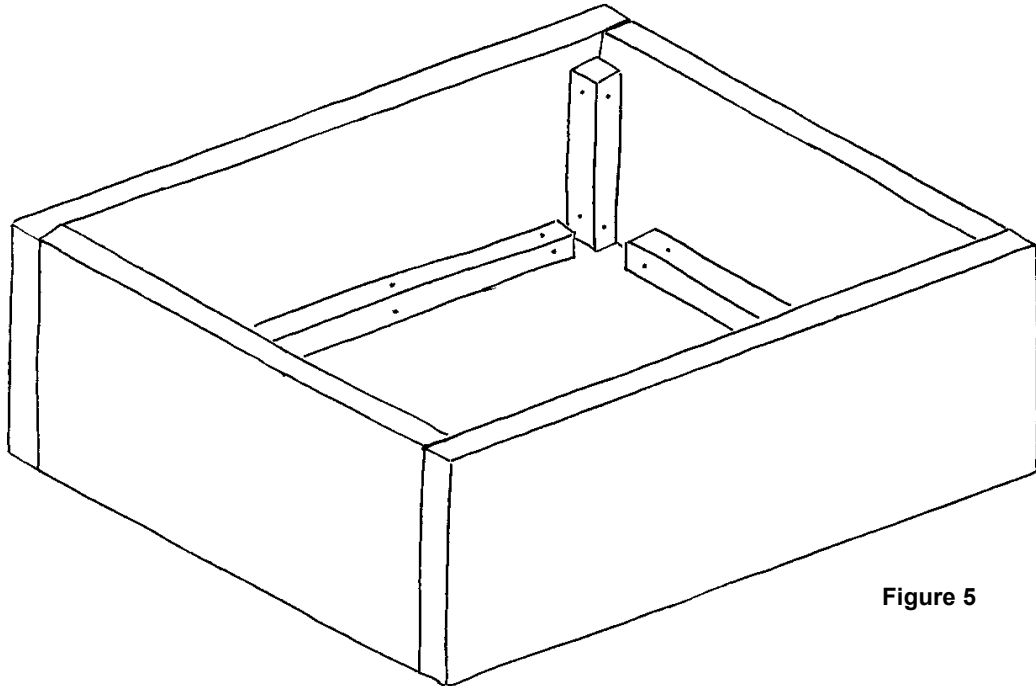


Figure 5

The two remaining sides can then be glued and nailed into place to complete the body of the box (see fig 5).

Once the frame of the box has been completed, thought must be given to the lid. The lid should be the same size as the base (approximately 40cm by 30 cm). The lid will be supported by the existing batons in the box (see fig 13, later).

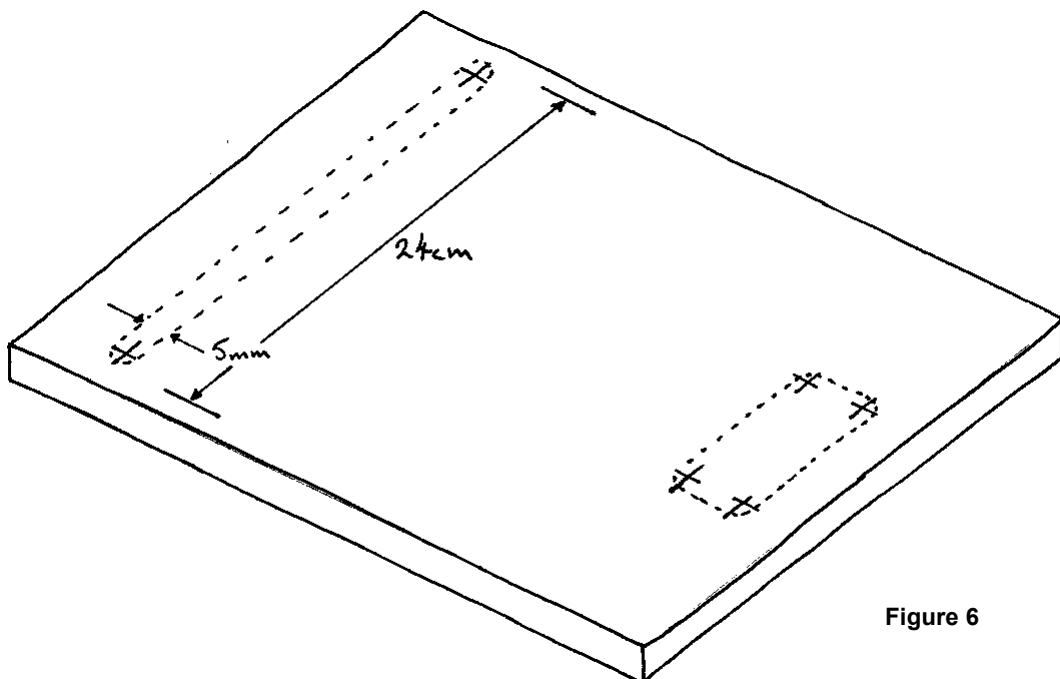


Figure 6

So that the lid can be removed, a large finger hole should be drilled at the bottom of the lid (see fig 6). At the opposite end of the lid a slit should be cut out of the lid approximately 24 cm long, 0.5 cm wide and 4cm from the edge of the lid (see fig 6). First drill holes in the wood where the crosses are marked. Then use a fret saw to cut along the dotted lines.

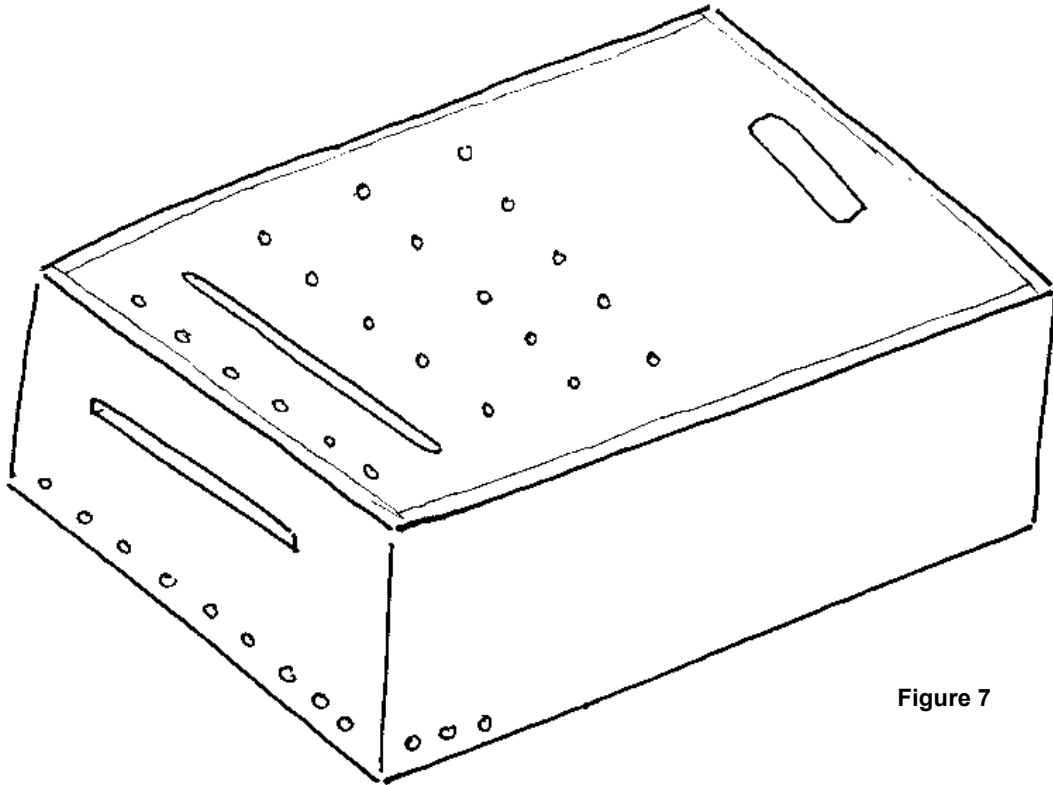


Figure 7

A second similar slot should be saw half way up the front of the box, this will be used to view the candles. Air holes must be drilled into the box as shown (fig 7); this will allow air to get to the candles.

The inside of the box should be lined with baking foil, which can be stuck on using wood glue. Make sure that the baking foil does not restrict airflow. You will need to pierce the foil where it covers the air holes and slots.

The 'hot strip' will be made from a 440ml drinks can. **BE CAREFUL WHEN USING SHARP SCISSORS.** Use scissors to cut off both ends of the can (see fig 8), this should leave a cylinder. At an angle of about 30° , cut the cylinder in a spiral fashion (see fig 9). This should leave you with a diamond shape of flat metal.

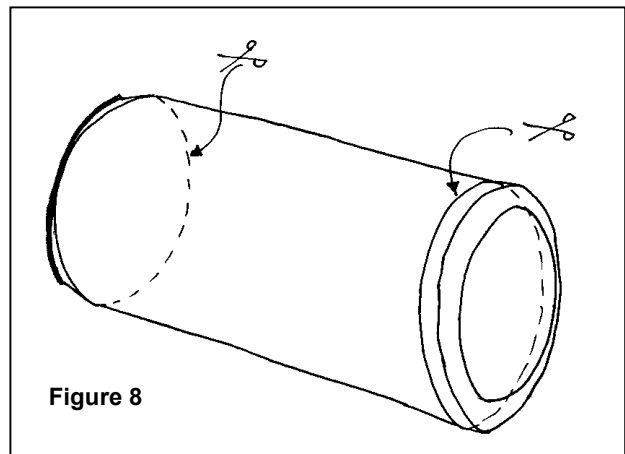


Figure 8

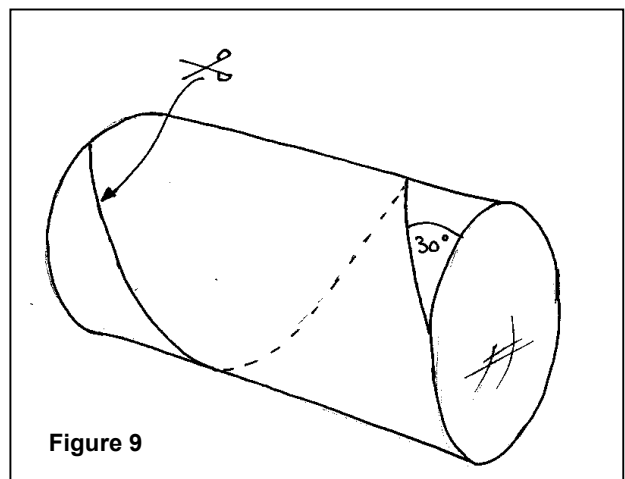


Figure 9

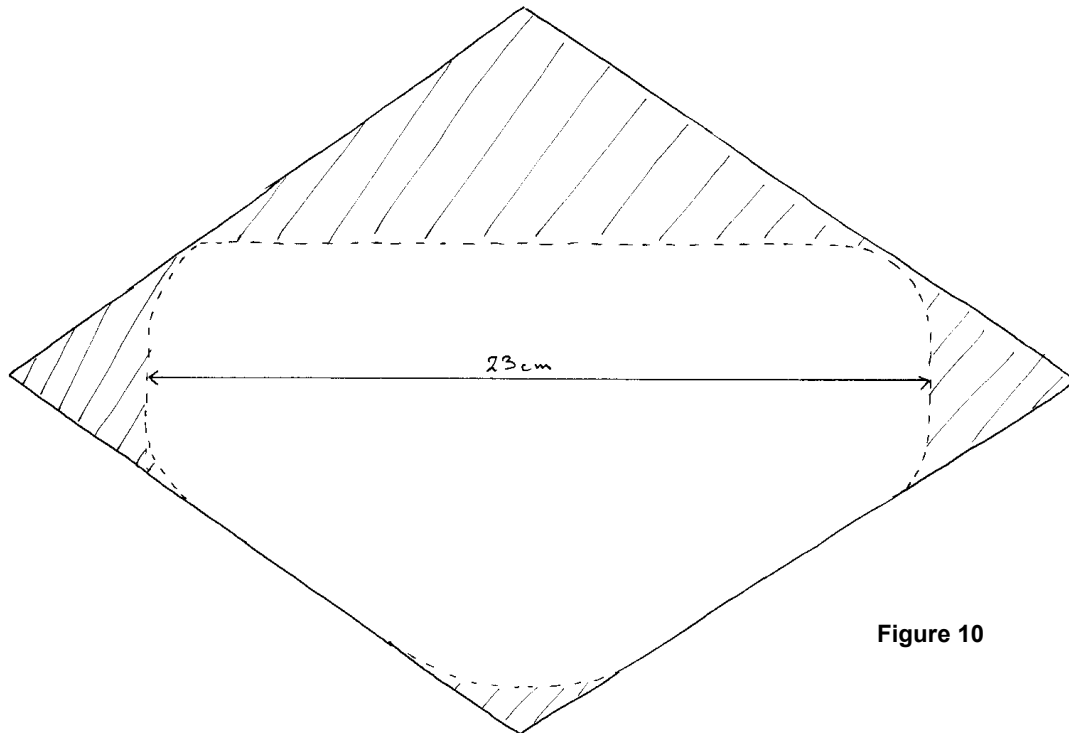


Figure 10

Using the scissors and tape measure cut off the two sharpest points of the diamond to leave an overall length of 23cm (see fig 10).

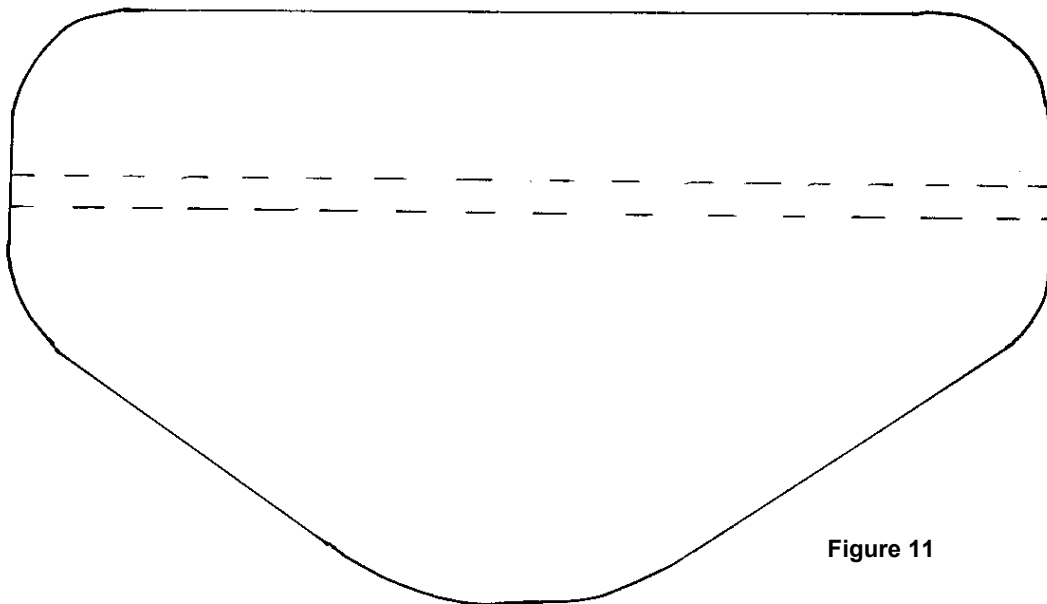


Figure 11

The other two corners must also be rounded off so as not to be of any danger. One of the sides should be cut back some way as to allow the strip to fit in the box. Eventually the diamond should look like that see in fig 11. Make sure that there are no sharp corners of splinters left on the sheet of metal.

Place the sheet in a shallow tray filled with water. Use the emery paper to scrub off the paint on the sheet, it is important that this is done as the paint may pose a fire risk.

Dry the sheet. Using a ruler and felt-tipped pen, mark a 1cm band down the centre of the sheet (see fig 11).

Bend the metal along these line so that a raised 1cm wide strip is left. The two sides can be bent in towards each other to form a 'T' shaped cross section (see fig 12).

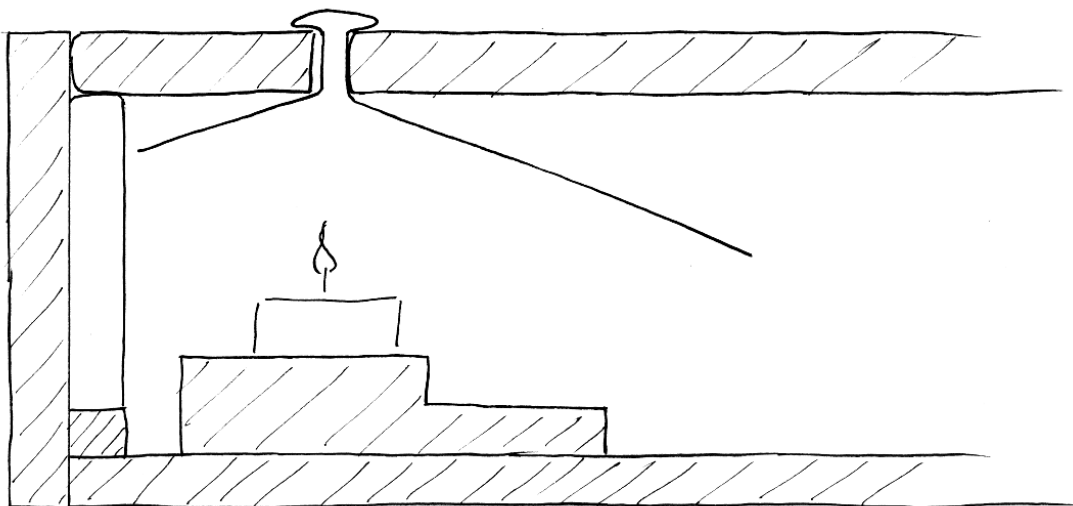
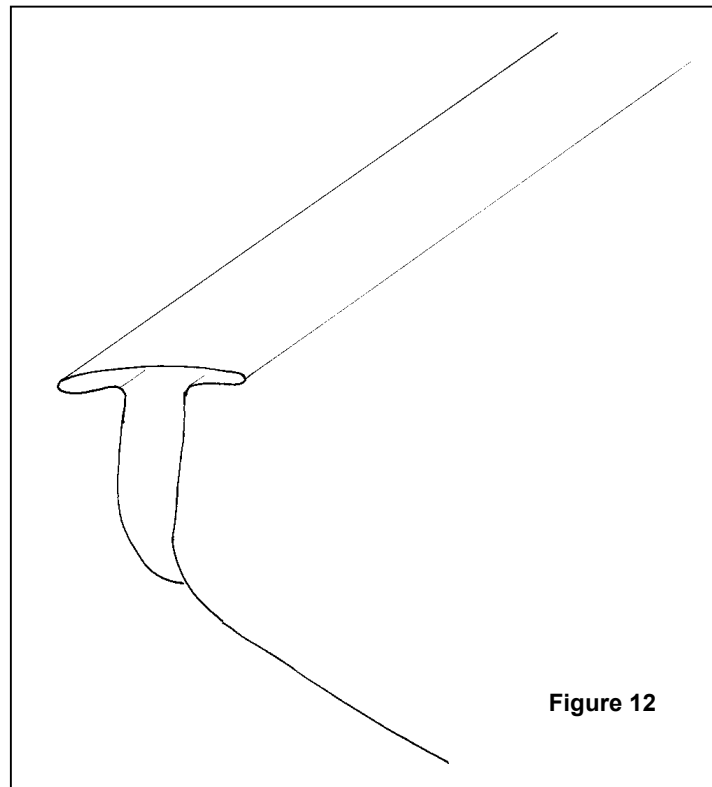


Figure 13

The strip can then be placed into the slot in the lid of the box, and the two flaps protruding into the box folded back to hold the strip in place and protect the lid (see fig 13).

Clamping system:

Using what is left of the wooden board; a section 3cm wide by 35cm long should be marked out and sawn to length. This will be used to clamp the bag against the hot strip. The wooden board can be seen in figures 18 and 19.

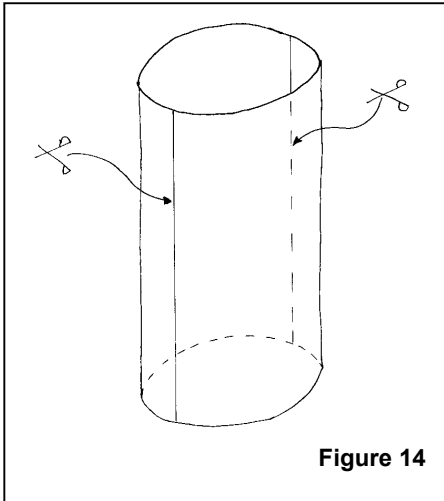


Figure 14

Take the second drinks can and once again remove the ends with care (see fig 8). Cut the remaining cylinder twice down its length to produce two equal rectangles (see fig 14 and 15). As before the paint should be removed from these rectangles. The two rectangles should be placed next to each other on the 3cm x 35cm wooden board cut earlier, in such a way as the inside of the cans faces up wards, and sheet edges are flush with the edge of the wood. The join between the two rectangles should be as small as possible and as close to the centre of the board as possible (see fig 15). Once in place they should be nailed to the board.

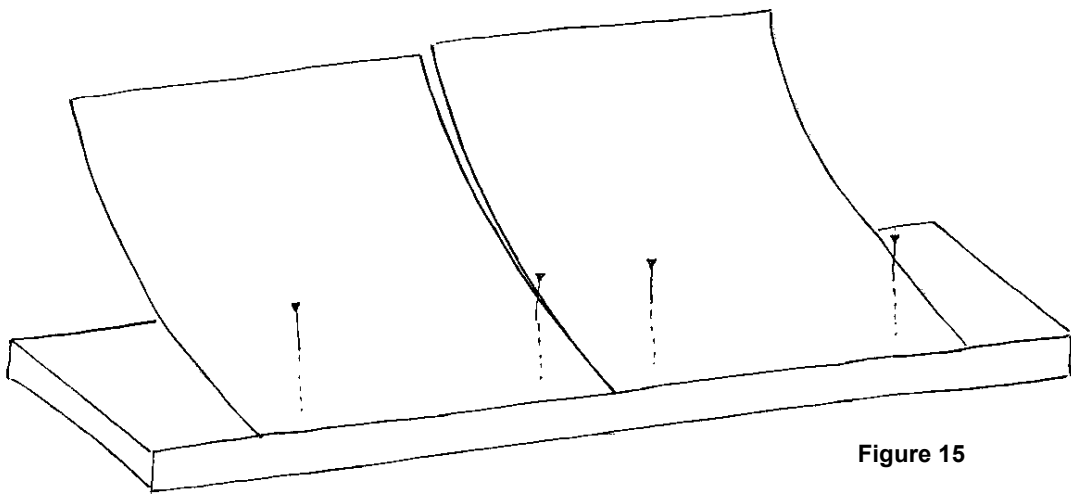


Figure 15

Turn the board over and place it directly over the strip in the lid of the box so that the rectangles point away from the centre of the box.

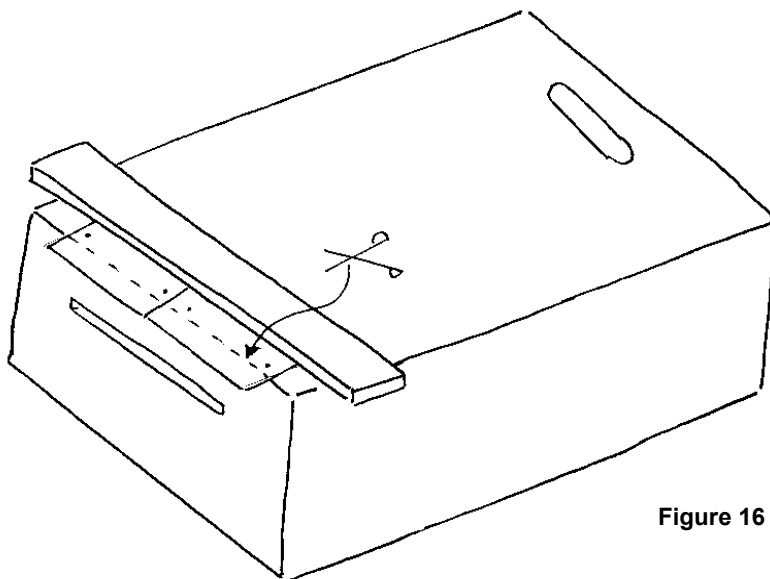


Figure 16

The rectangles can then be nailed to the lid of the box close to the edge (see fig 16). Any part of the rectangles, which stick out past the lid of the box, should be trimmed off carefully (see fig 16). Make sure that no nails protrude out of the wood, as this could be dangerous. The two metal rectangles attached to the lid and the clamping board will act as a hinge, they will also protect the wooden board from the heat of the strip. If the clamping board is hinged correctly then it will always be in line with the hot strip.

If there is any of the wood left it is recommended that a plinth is made so that the height of the candles can be varied easily. Two pieces should be cut approximately 25cm X 3cm and 25cm x 6cm. The two pieces should be glued together so that they are flush on one of the long edges. The cross section can be seen in figure 13.

Finally 5 small 'tea-light' candles should be placed in the box, on top of the plinth, so that they are directly under the strip in the lid of the box and evenly spaced. The bag sealer is now ready for use.

Use

Before any action is taken, a bucket of water should be within reach of the operator at all times to be used if anything should catch light, if the operator should be burnt.

Ensure that there are five candles placed equally directly under the strip in the lid of the box. The candles should be approximately 4cm from the lid of the box; the plinth mentioned above can be used to achieve this.

Once the candles are in place they can be lit and the lid of the box closed. The box should then be left for 10 minutes to allow the strip to reach operating temperature. Periodically check that the candles are still lit using the viewing slot.

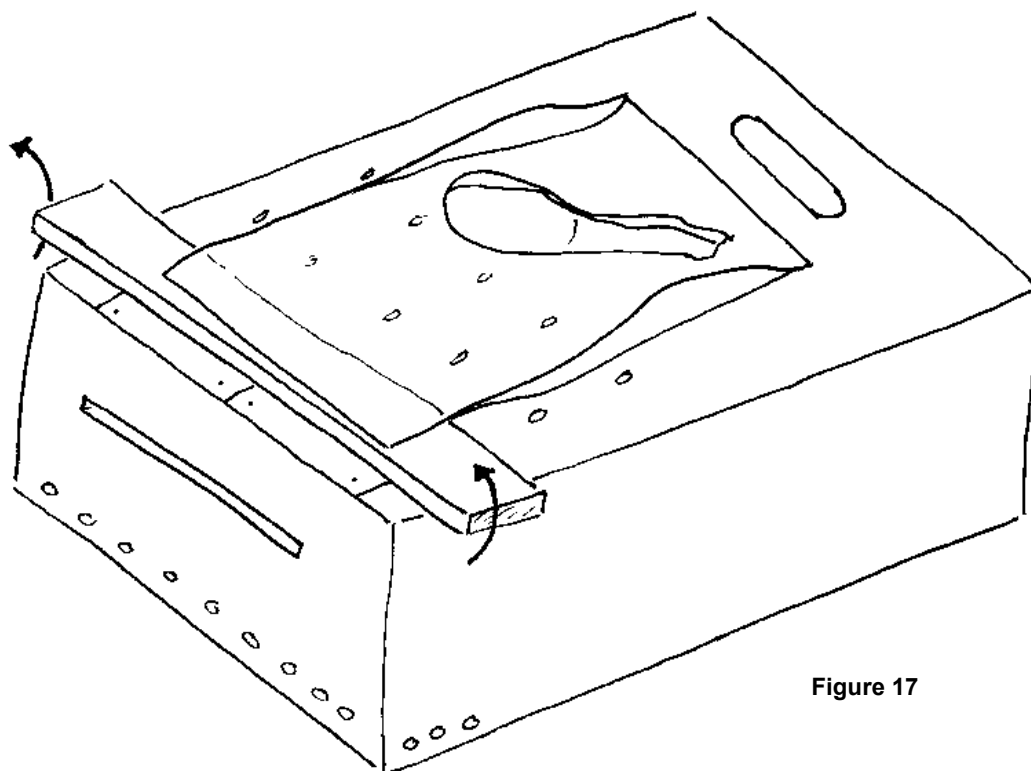


Figure 17

After 10 minutes, the box should be ready to seal. Place the plastic bag on the box in such a way that the centre and contents of the bag is resting on the centre of the box, and the open end of the bag is resting **on top** of the clamp (see fig 17).

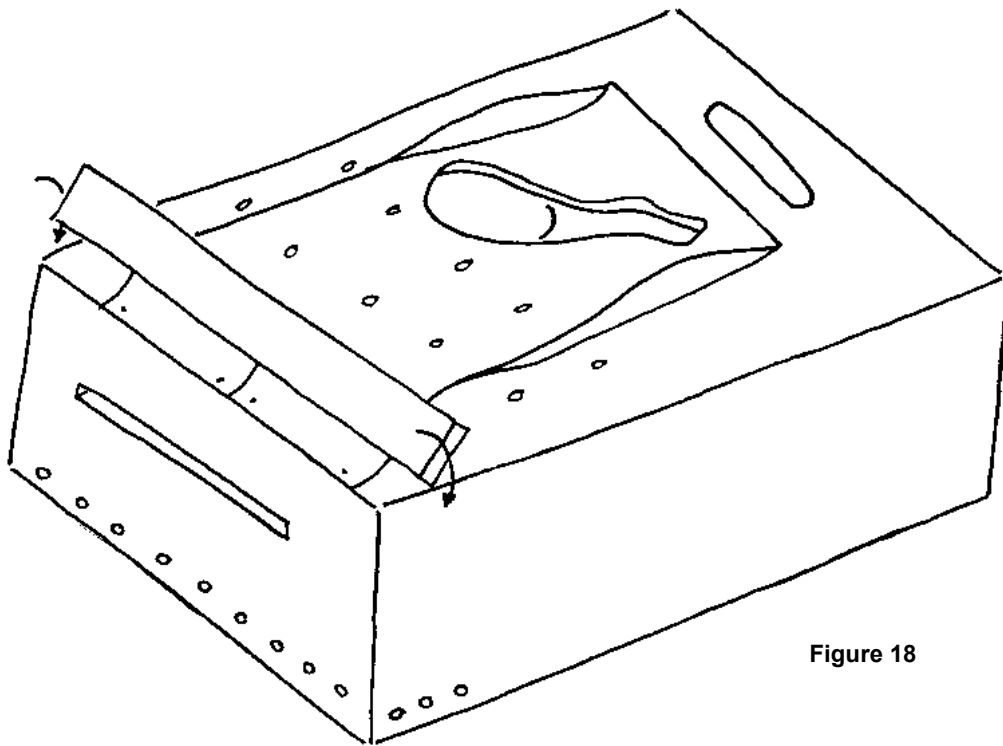


Figure 18

Lift the clamp with both hands so that the open end of the bag falls onto the hot strip (see fig 18).

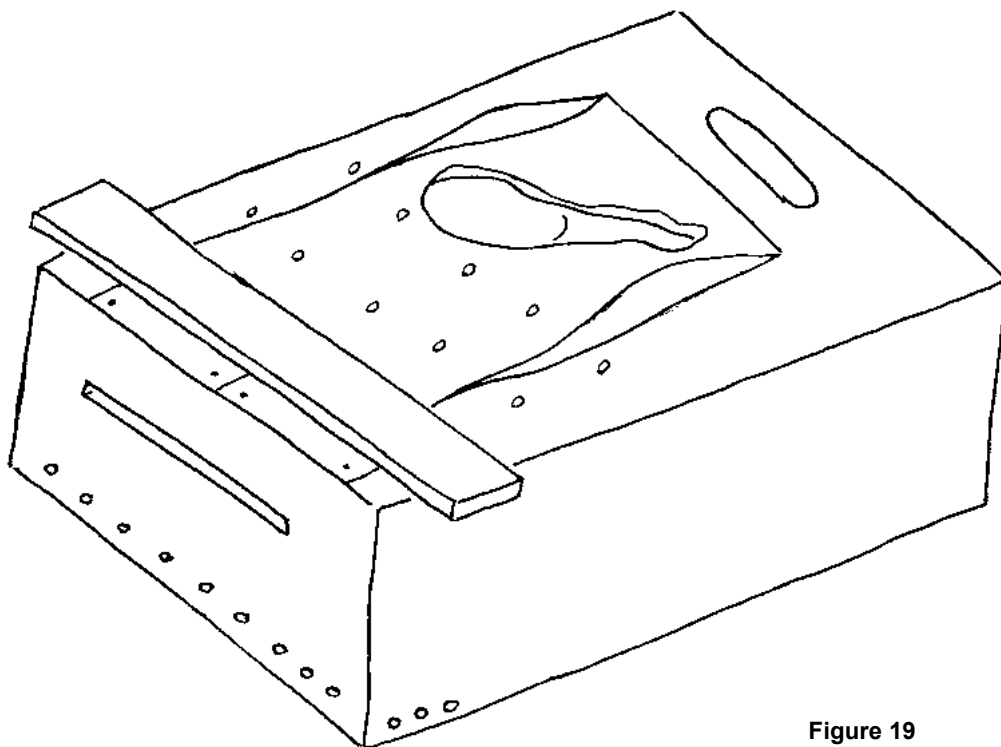


Figure 19

Lower the clamp so that it presses the bag against the strip (see fig 19). After 1 or 2 seconds raise the clamp again and remove the bag, which is now sealed. Be careful when removing the bag, as the hot strip will be hot enough to burn the operator.

Note: Initially, when the sealer has just heated up, the bag may need longer to seal. Also thicker bags will need longer to seal. If the sealer is to be used for long periods (over 2 hours) the candles may need to be lowered if the temperature of the strip becomes too hot.

Once the operator has finished using the sealer, the candles should be blown out carefully. The wax in the candles is likely to be liquid so it is recommended that the candle be left in the box to allow them to cool.

Safety

Throughout the instructions points referring to safety have been underlined and should receive special attention when these instructions are being followed.

The sealer should only be constructed by a responsible adult(s). It is not recommended that children should use the sealer, but if it is necessary, it should be under adult supervision.

Points of particular interest are listed below:

Construction:

Scissors: When cutting a metal can it is important to be aware that small splinters of metal will be produced. The scissors themselves will be sharp, and should be used with care.

Saws: Both the wood saw and fret saw are very sharp and should be handled with care.

Nails: Care should be taken when using a hammer to hammer in the nails. Also any nails that protrude from wood should be bent over to reduce the risk of injury.

Baking foil lining: This is an important part of the design and should not be overlooked. The baking foil (tin foil) will fire proof the wood and insulate the box to maintain a high temperature.

Use:

The sealer should not be left unattended.

Very hot strip – burns: The strip will become very hot (up to 150°), this is easily enough to burn the operator. Also the candles themselves will pose a fire risk and should be handled with caution. If the operator receives minor burns, they should run the affected area under a cold tap. If serious burns are received, or it is not clear how serious the burns are, ask the local doctor for assistance.

Bucket of water: A bucket of water should be within reach of the operator at all times when the candles are lit. If anything other than the candles is seen to be alight, then the sealer should be soaked thoroughly with the water from the bucket.