

A CONVEX WATER LENS (i).

1- ITEM			
A CONVEX WATER LENS (i).			
2.-PURPOSE			
To construct a convex water lens for simple optical experiments.			
3- INFORMATION SUBMITTED BY			
Beijing Teaching Aids Centre, Hengshui Prefecture, Hebei Province, China.			
4- LINE DRAWING OF PROTOTYPE			
5- MATERIALS FOR CONSTRUCTION			
Components	Qty	Materials Required	Dimensions
1 Aperture Cylinder.	1	Cardboard.	approx. 25cm x 15 cm.
2. Water Container	1	Electrical light bulb.	As available
3. Centralising Ring.	1	Cardboard.	To suit dia. of bulb.
	1	Cardboard	approx. 20cm x 20cm
		Adhesive	
Tools: Scissors, long-nosed pliers, spirit burner.			

6- CONSTRUCTION DETAILS

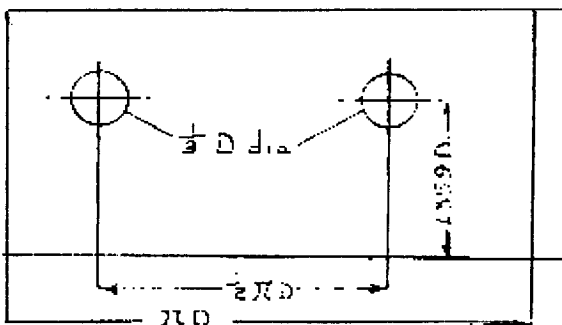
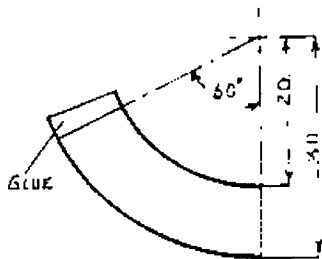
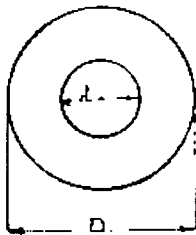
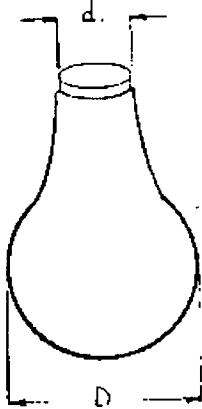


Fig 1.

Gently heat the base of an old bulb over a spirit lamp. Gently twist the bulb whilst heating and gradually pull the base off from the bulb. With a pair of long nose pliers break off the air exhaust tube. Using the fine flame of a blow torch heat the end of the bulb and remove the filament unit. At the same time the entry hole can be widened using a pair of large tweezers.

Let D diameter of bulb.

d diameter of bulb neck.

See Fig. 1

Fig 2.

From a piece of cardboard cut out a centralising ring of outer diameter D. and inner diameter d. as in Fig. 2.

Fig. 3.

On a piece of cardboard mark out the shape shown in Fig. 3. Allow a little over 60°, for gluing purposes. Cut out and glue the shape to form a truncated cone stand for the bulb.

Fig. 4.

On a piece of cardboard mark out a rectangle D long and 2.5D wide. (Allow a little extra on the length for gluing purposes). Mark out two holes each of 1/3D in diameter, according to the dimensions given in Fig. 4. Cut out the holes and the rectangle. Bend and glue the rectangle to form the aperture cylinder.

Assemble the apparatus by placing the stand on the desk and the bulb on the stand. Then place the aperture cylinder over the bulb with one hole facing an object (e.g. the window). Place the centralising ring over the neck of the bulb to hold it steady. Finally fill the bulb with water.

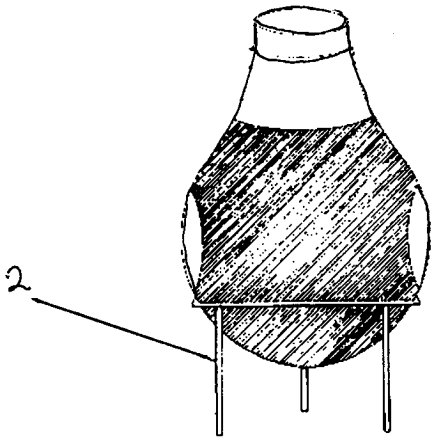
7- METHOD OF USE

Set the apparatus on the desk with an unpainted face towards the window. Fill the bulb with water. Using a notebook as a screen adjust the distance of the notebook from the lens until a clear upside down image of the window can be seen (objects outside the window may also be able to be focussed onto the screen).

8- COMMENTS

Wear eye protectors when working with glass. If a blow torch is not available it may be possible to remove the whole of the cap end of the bulb by scoring a groove around the bulb, below the cap, with an old file.

A CONVEX WATER LENS (ii).

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2.-PURPOSE			
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4- LINE DRAWING OF PROTOTYPE			
			
5- MATERIALS FOR CONSTRUCTION			
Components	Qty	Materials Required	Dimensions
1. Water Container	1	Electrical light bulb.	As available
2. Stand	1	Iron Wire. Black Paint	2mm dia x 500mm
Tools: Long-nosed pliers, spirit burner.			

6- CONSTRUCTION DETAILS

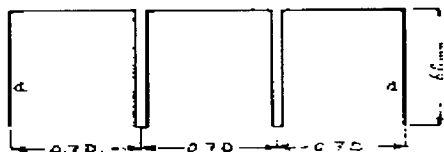
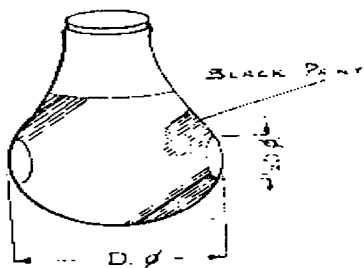


Fig 1.

Gently heat the base of an old bulb over a spirit burner. Gently twist the bulb whilst heating and gradually pull the base off from the bulb. With a pair of long nose pliers break off the air exhaust tube. Using the fine flame of a blow lamp heat the end of the bulb and gradually remove the filament unit. At the same time the entry hole can be widened using a pair of large tweezers.

Paint the bulb black leaving two "windows" which should be diametrically opposite each other. The diameter of the "windows" should be approximately $1/2$ the diameter of the bulb. (Fig.1.)

Fig 2.

From a length of stiff iron wire construct a stand for the bulb as shown in Fig. 2. Bend the frame so that the legs marked "a" meet to form a tripod

7- METHOD OF USE

Set the apparatus on the desk with an unpainted face towards the window. Fill the bulb with water. Using a notebook as a screen adjust the distance of the notebook from the lens until a clear upside down image of the window can be seen (objects outside the window may also be able to be focussed onto the screen).

8- COMMENTS

Wear eye protectors when working with glass. If a blowlamp is not available it may be possible to remove the whole of the cap end of the bulb by scoring a groove around the bulb, below the cap, with an old file.