

# HEAT CONVECTION APPARATUS

1- ITEM

HEAT CONVECTON APPARATUS.

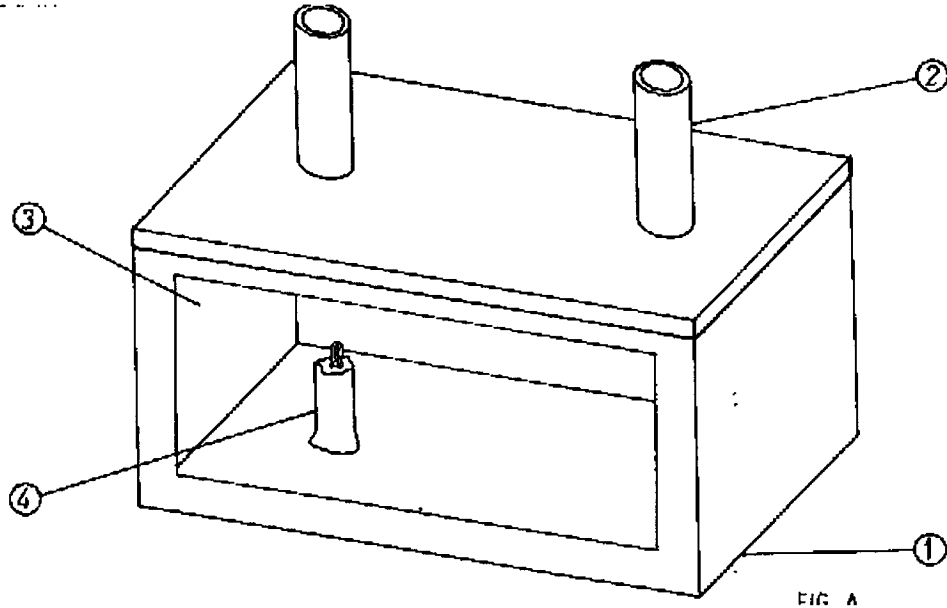
2.-PURPOSE

To investigate convection currents in air.

3- INFORMATION SUBMITTED BY

Pedagogical Academy, Nicosia, Cyprus.

4- LINE DRAWING OF PROTOTYPE



5- MATERIALS FOR CONSTRUCTION

Components	Qty	Materials Required	Dimensions
1. Container	1	Cardboard Box	300mm x 150mm x 100mm
2. Chimneys	2	Glass tubes (or cardboard).	
3. Window.	1	Glass or clear plastic sheet	
4. Heat source.	1	Small candle. Plasticine. Sellotape.	
		Tools: Scissors.	

6- CONSTRUCTION DETAILS

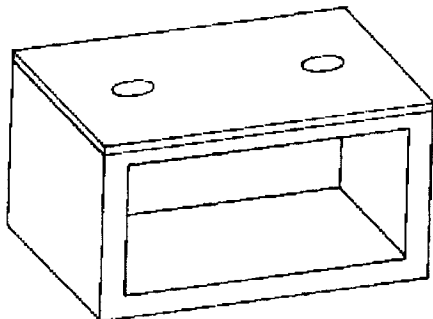


Fig 1.

Obtain a large cardboard box and cut out a window as shown in Fig. 1. Cover this window with a sheet of glass or transparent plastic, using sellotape to hold it in place. In the lid of the box cut two holes to suit the diameter of the tube available.

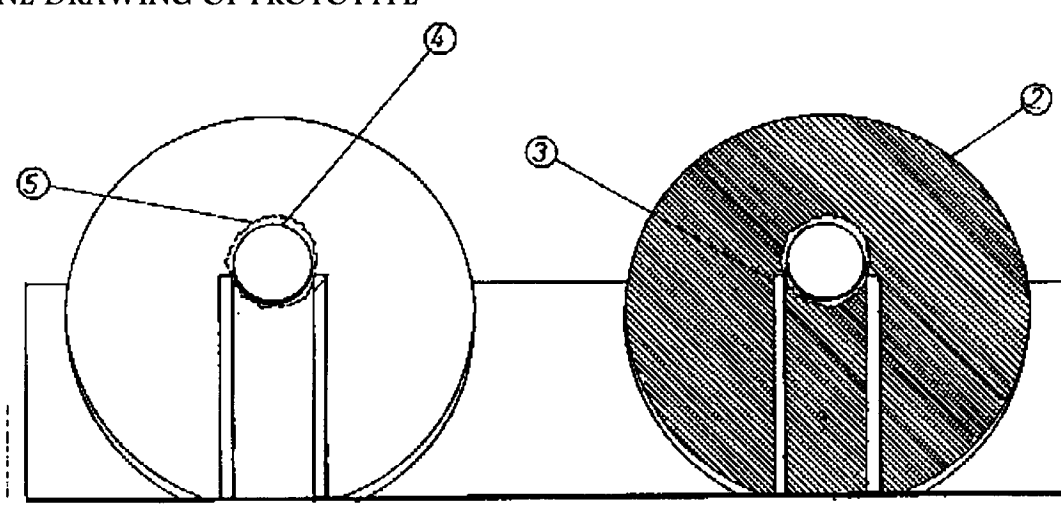
Insert the tubes into the holes and fix them in place using plasticine.

#### 7- METHOD OF USE

Remove the lid of the box and place a small candle under one of the two tubes. Fix it in place using plasticine. Light the candle and replace the lid on the box. Hold a smoldering taper over the top of the tube, opposite to the one above candle. Observe the smoke in the box. Due to the convection currents in the air, brought about by the heat of the candle, the smoke will be seen to pass down one tube and go up through the other (which is above the candle).

#### 8- COMMENTS

# HEAT ABSORTION APPARATUS

1- ITEM			
HEAT ABSORTION APPARATUS			
2.-PURPOSE			
To investigate the absorption of heat from the Sun by two different surfaces.			
3- INFORMATION SUBMITTED BY			
Pedagogical Academy, Nicosia, Cyprus.			
4- LINE DRAWING OF PROTOTYPE			
			
5- MATERIALS FOR CONSTRUCTION			
<b>Components</b>	<b>Qty</b>	<b>Materials Required</b>	<b>Dimensions</b>
1. Stand.	1	Wood (or stiff cardboard).	600mm x 320mm x 3mm
2. Disc	2	Wood.	300mm dia
3. Guides.	4	Wood.	150mm x 6mm x 10mm
4. Sphere	2	Solid plastic ball	approx. 10mm dia.
5. Jelly		Petroleum Jelly (Vaseline). White Paper. Black paper. Tools: Woodsaw; hammer; small nails; scissors; adhesive.	
6- CONSTRUCTION DETAILS			

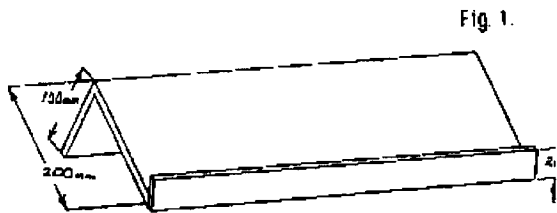


Fig. 1.

Fig. 1:  
Construct the stand from a piece of stiff cardboard as shown in Fig. 1. (alternatively 3mm plywood could be used.)



Fig. 2.

Fig. 2.  
Construct four wooden guides each 150mm x 10mm x 6mm thick.

Construct two wooden discs of approx. 300mm dia. Glue a piece of white paper to one of the discs and a piece of black paper to the other. Fix two guides to each of the discs as shown in Fig. A. The distance between the two guides should be such that the ball can roll between them. Using petroleum jelly stick the two balls to the discs.

#### 7- METHOD OF USE

Place the two discs on the stand end place the apparatus outside to face the Sun. Observe which of the two balls runs down between the guides first. This will demonstrate that, due to the black surface absorbing the heat radiated from the Sun at a greater rate than the white surface, the petroleum jelly melts first and releases the ball.

#### 8- COMMENTS

# HEAT RADIATION APPARATUS

<b>1- ITEM</b>			
<b>HEAT RADIATION APPARATUS</b>			
<b>2.-PURPOSE</b>			
To demonstrate the radiation and absorption of the heat by two different surfaces.			
<b>3- INFORMATION SUBMITTED BY</b>			
Beijing Teaching AIDS Centre, Hengshui Prefecture, Hebei Province, China			
<b>4- LINE DRAWING OF PROTOTYPE</b>			
<b>5- MATERIALS FOR CONSTRUCTION</b>			
Components	Qty	Materials Required	Dimensions
1. Base	1	Plywood.	300mm x 170mm x
2. Support Rods	2	Wood Dowelling	10mm
3. Clamps.	2	Metal Strip	150mm x 10mm dia
4. Heat Source	1	11 watt bulb and bulb holder	as available
5. Vessels	2	Electric light bulbs (used)	To suit bulbs.
		Corks.	approx. 5mm o.d.
		Glass tube.	
		Connecting cable and plug.	
		Black Ink	
		Tools: Wood saw, pliers, tin snips, cork borer, drill & drill bit, wood glue.	
<b>6- CONSTRUCTION DETAILS</b>			

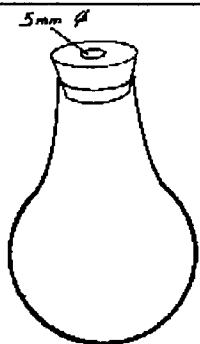


Fig. 1.

Fig. 1.  
Gently heat the base of an old light bulb over a spirit lamp. Gently twist the Fig. 1. bulb whilst heating, and gradually pull the base off from the bulb. With a pair of long nosed pliers break off the air exhaust tube. Using the fine flame of a blowtorch 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. Select a stopper to fit the neck of the bulb and bore a 5mm dia hole, as shown in Fig. 1. Paint one bulb black.

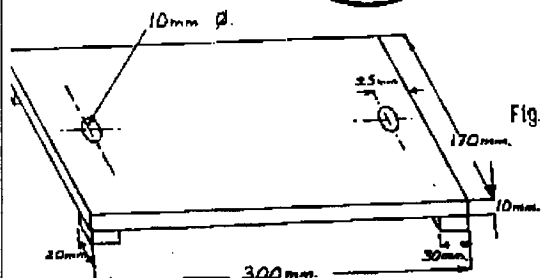


Fig. 2.

Fig. 2.  
From a sheet of 10mm thick plywood construct the base as shown in Fig. 2.

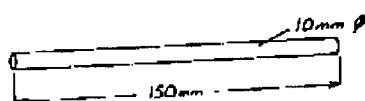


Fig. 3.

Fig 3.  
From a length of 10mm dia dowelling prepare two support rods of 150mm length (Fig3) Glue these rods into the holes in the base.

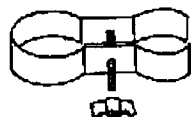


Fig. 4.

Fig 4  
Construct two clamps, as shown in Fig. 4, from a strip of thin metal sheet (packing case banding would be suitable). The diameter of the closed loop should fit the support rod whilst that of the open loop should fit the neck of the bulb.

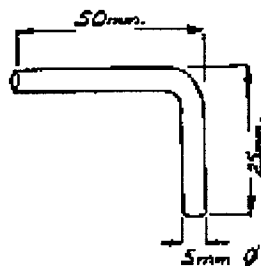


Fig 5.  
Assemble the apparatus as shown in Fig. A. and screw a bulb holder equi-distant between the two supports. Insert a 100 watt bulb.

#### 7- METHOD OF USE

Pour water, mixed with red ink, into each of the two vessels. Switch on the 100 watt bulb (heater), and after a short period of time the water in the blackened bulb will be seen to be rising at a faster rate than that in the non painted bulb. This will show that radiated heat is absorbed quicker by a blackened surface.

#### 8- COMMENTS

Wear eye protectors when working with glass. If a blowtorch 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.