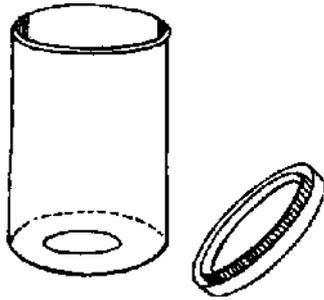
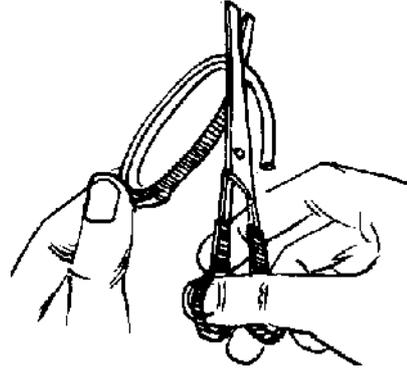


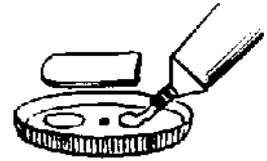
## HANDPUMP



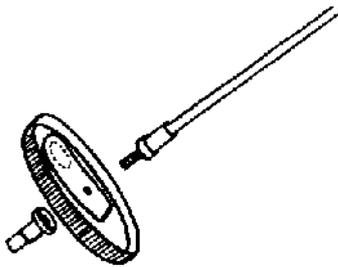
1. For making this pump you will require a black film-reel bottle, one more cap, a cycle spoke, old cycle tube, an old refill, simple hand tools and Fevibond - a rubber adhesive.



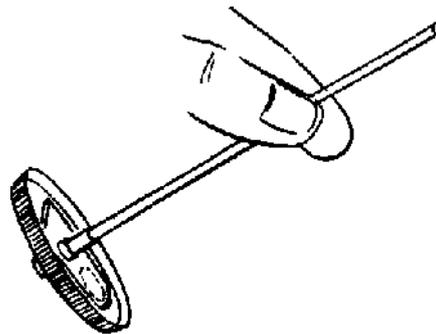
2. With a sharp scissors cut and remove the outer circle of the cap. The inner circle will make a superb piston. Rub it a little on sandpaper so that it is free inside the bottle - **the cylinder**.



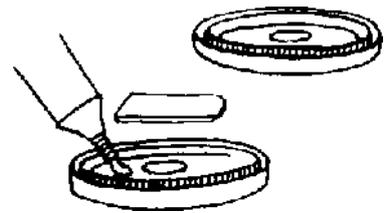
3. Make a 2-mm hole in the centre and a 6-mm hole for the **delivery valve** port. Apply Fevibond to a 2-cm x 1-cm piece of bicycle rubber tube and stick it to cover the hole. This rubber will act like a hinge and open and close like a valve.



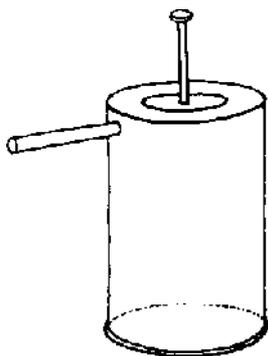
4. Cut a 12-cm long piece from a bicycle spoke. Fix the piston on the spoke threads with two nipple nuts.



5. This is the **piston, delivery valve** and **connecting rod** assembly.



6. Take another film-reel bottle cap and make a 6-mm hole in it. Apply Fevibond to a 2-cm x 1-cm piece of tube rubber and stick it on one side to cover the hole. This is the **suction valve**.



7. Make a 3-mm hole in the centre of the bottle base so that the cycle spoke can move freely in it. Make another hole on the curved surface near the base and fix an old refill or Frooti straw in it. This is the **delivery pipe**.

8. Insert the spoke through the bottle base and snap the suction valve lid to complete the hand pump assembly. Keep the pump in a bowl of water and move the spoke up and down. After a few priming strokes large quanta of water will gush out of the delivery pipe with every upward stroke of the spoke. Both the rubber washers - stuck only on one side as hinges, act as very efficient valves. This is a superb model to understand the working of a real hand pump.

