7 Bubble Pulser

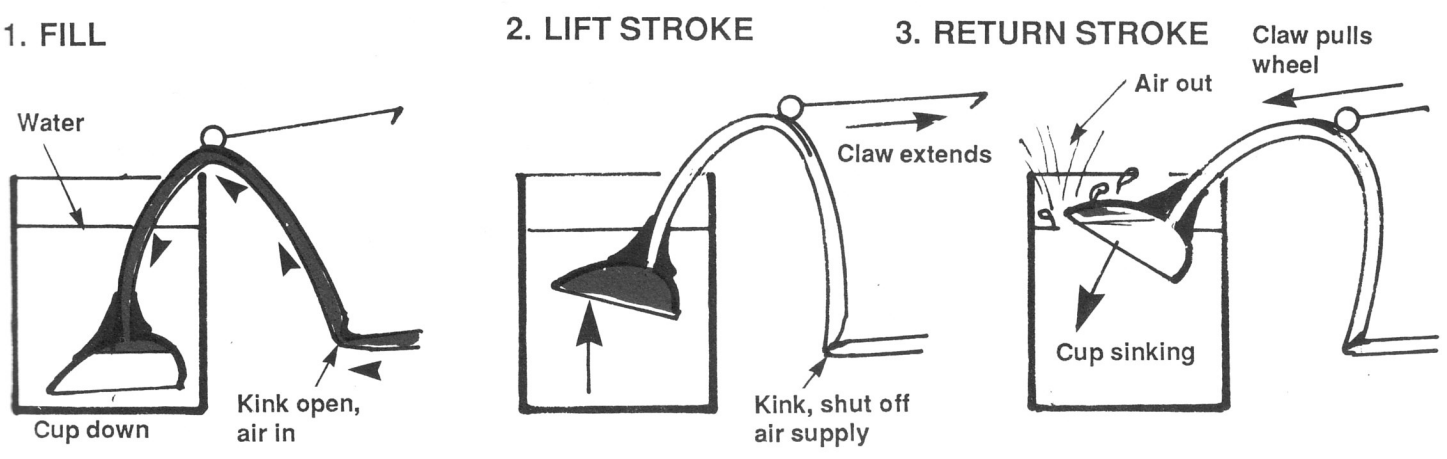
HOW about an engine that uses one bubble at a time? The Bubble Pulser does just that. It carries a tiny tank so, in spite of the fact that it is not very powerful, it creeps along. It also makes a static power plant for rocking items like paper swing boats (if you are still in the fairground scene) or a paper cut-out of a pecking chicken.

The fascinating sequence of events is shown in the drawings. A weighted cup sinks to the bottom of the tank of water. As it reaches the bottom, a straw arm carrying it unkinks, letting air in from a balloon. This makes it light enough to rise but, as soon as it starts to lift, the tube kinks again and shuts the air off.

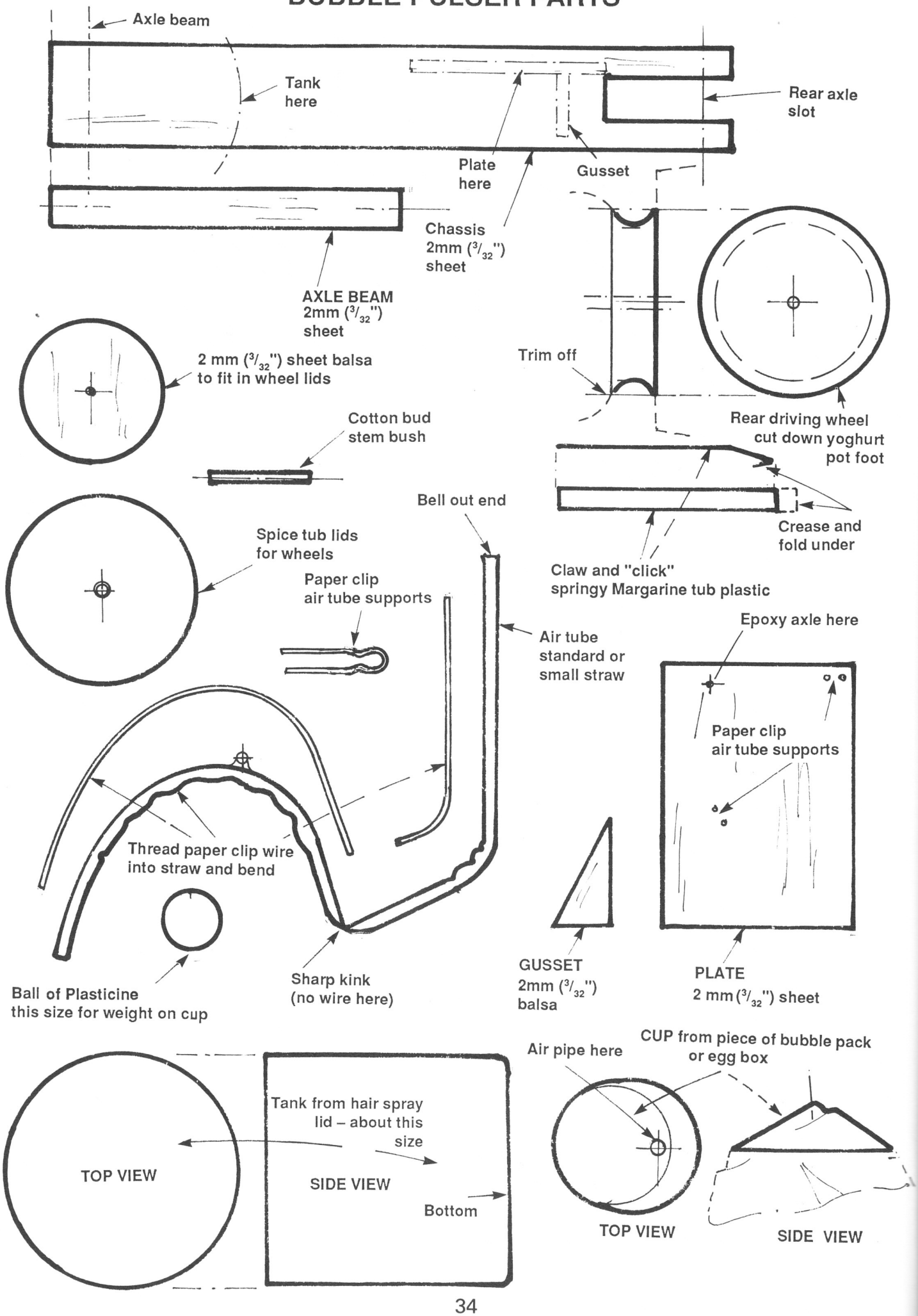
The cup continues to rise to the surface of the water but, because it is on an arm, it is at a different angle, so the air spills out. The cup is no longer buoyant, so it sinks again and the sequence is repeated until the balloon is empty.

There is no need for a throttle clamp, because the air tube can be pushed down to make the kink tighter, letting less air into the cup, or lifted to let more through.

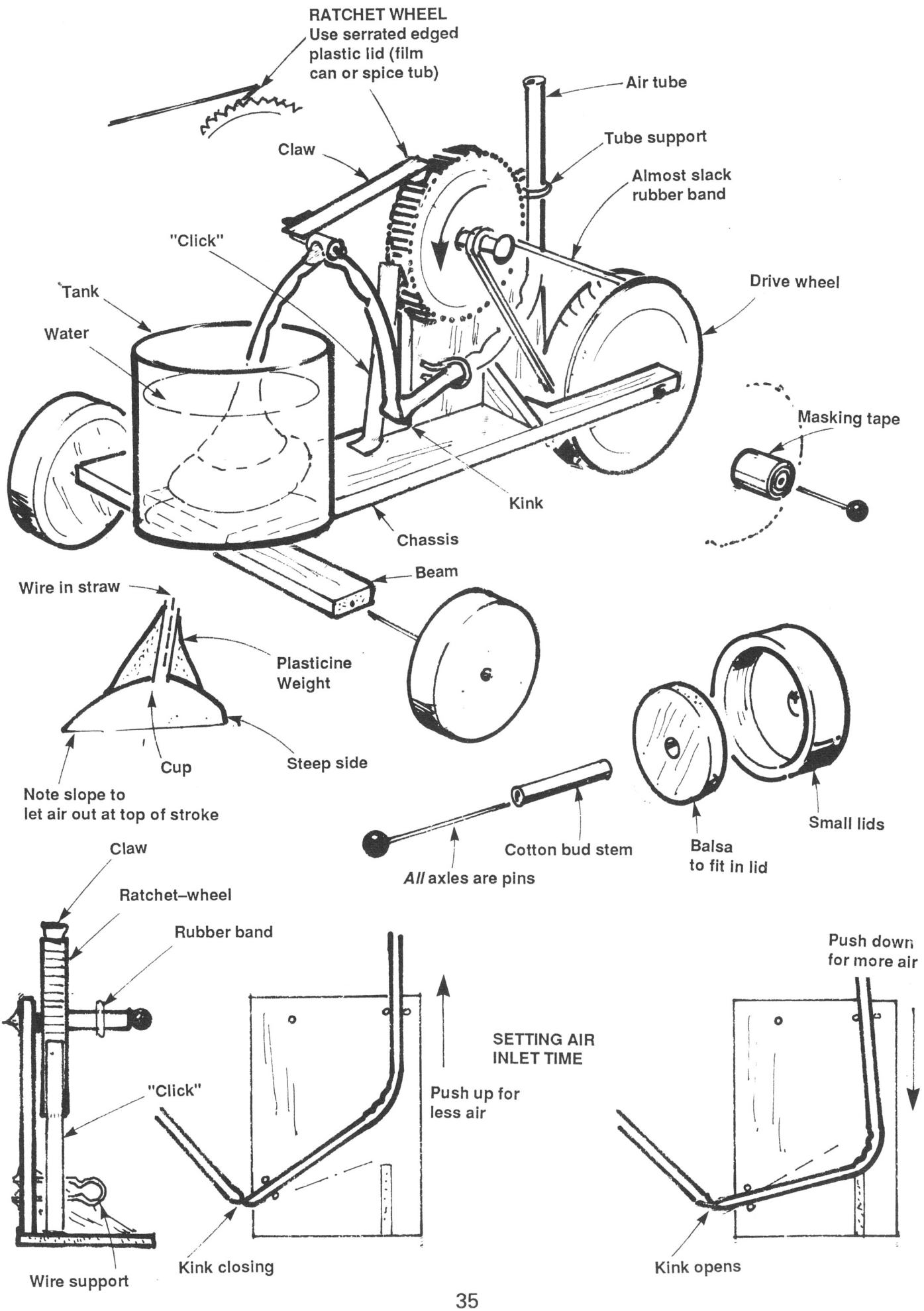
The action is a push-pull one. It cannot be converted to a rotary one by a crank and rod like a steam engine, because the distance it moves varies from time to time. Instead, the drive is made via a claw and ratchet like some early electric clocks. It moves in a series of short steps, about 1.5mm (1/16″) at a



BUBBLE PULSER PARTS



BUBBLE PULSER



time. Far more satisfying is the static job of rocking to and fro. The prototype will tick over for nearly an hour on a good balloonful, with attention to the throttle as the air pressure varies.

ASSEMBLY

Here again is something that has to run freely on wheels that spin true, but this is not important if it is a static engine with a simple push-pull link or a piece of thread to keep a display swinging. In this case, there is no need to bother with the ratchet wheel, claws or wheels and axles.

The size of the tank and cup are not very important, but the cup has to clear the side of the tank easily, to let the air bubble out properly. Choose the shape of the cup to form a flat surface on the water yet to catch the air when at the bottom. A piece of plastic egg packing or one of the six foot-blisters from a lemonade bottle is a good starting point for gentle trimming.

Epoxy the straw in after a trial run. The angle of the cup on the straw is important, so set it with the modelling clay weight shown on the diagrams. When it is right, let it dry and epoxy from inside the cup. Any slight adjustment can be made by bending the straw near the cup.

The rest is simple balsa construction, to which may be added those ratchet and claw drive parts should they be required. The prototype uses a serrated lid from a 35mm film container. The serrations are about 1mm apart.

Cut the claw, and the "click", which stops the wheel from slipping back, from the very springy plastic lid of a margarine container. Double these over to form hooks which catch on the "teeth" around the wheel. They touch very lightly. Tweak the "click" with pliers so that it only just catches. The claw is lying on the wheel by its own weight alone, being pivoted in a tube at the straw end. If a belt drive is taken to the wheel, it should be only just gripping (position the axle to suit). Any tightness will slow the action or stop it.