

BURGLAR ALARMS

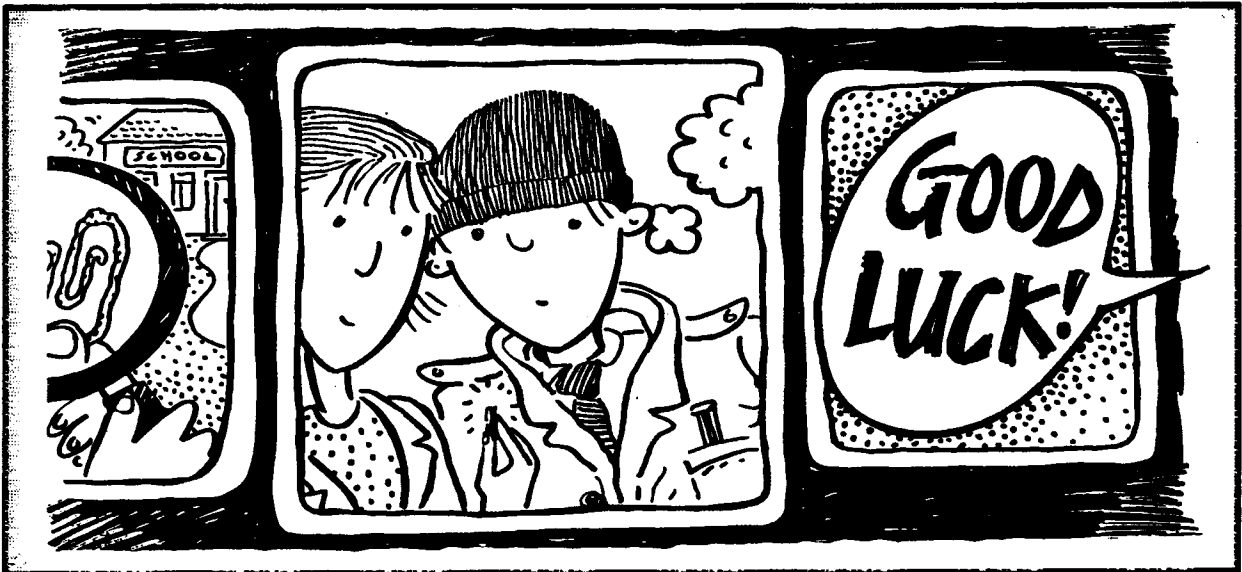
The school has discovered an antique paper clip, one of the first used in a school anywhere on the planet. As it is such a valuable item, a secure burglar-proof area must be designed and made to store this artifact!

Your mission is to design and build a burglar alarm.

In view of the tough economic times, you may only use the following materials:

- a 1.5v battery
- wires (maximum of 4)
- bulb or buzzer
- a box or other type of container
- foil, clips, etc. to help with switches
- other materials (you must enter into bargaining negotiations with the teacher)
- a paper clip (NOT the valuable one. An imitation one will be provided until your alarm is tested and proven.)

It would be most useful if you have a working knowledge of pressure or contact switches.



WIND-POWERED MILKSHAKE MAKER

TEACHER ACTIVITY NOTES

MATERIALS NEEDED

- Gears
- Pulleys
- Wool or cotton
- Construction material (wood, balsa etc)
- Adhesives
- Nails
- Card or plastic (ice cream lids)
- Wire
- A copy of the challenge for each student

HINTS

This activity is technically demanding because it requires the design and building of efficient windmill blades, efficient pulleys, and a pulley/gearing system to change the drive at right angles.

POSSIBLE SOLUTION

To build a windmill wheel from card or plastic

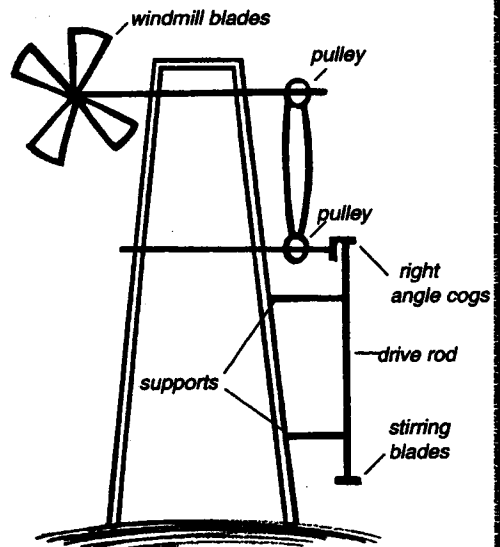
Build a tower. Attach a fixed axle to the windmill wheel and attach the tower so that it can turn, first attaching a fixed pulley.

At the midpoint of the tower, attach another axle (free of the tower) with a single pulley. Attach a loop drive belt to the two pulleys.

From the lower axle a right angle gear needs to be attached, that is fixed to the end of the axle. The other gear should be fixed to the milkshake maker drive rod, and held perpendicular to the ground with some clearance to put the drink underneath (these gears could be made from card or plastic - they are available in Lego, from toyshops etc).

Make a blade arrangement for the milkshake maker.

Test your design with an artificial wind source, a hairdryer, fan or turn it by hand.



WIND-POWERED MILKSHAKE MAKER

Trapped on a deserted Pacific island, you have been lucky to meet all of your basic needs through objects that you have found. However, after a month on the island you are starting to miss some of life's little luxuries. Your main desire is for a strawberry milkshake.

You have found wild strawberries and you have coconut milk. You have tried shaking the milk but you can't get it to froth properly. You long for a milkshake maker to develop the bubbles that give you that lovely pink moustache.

While sitting under a coconut palm you are struck on the head by a coconut. Leaping to your feet you yell "**E = MC²!**" (why, you don't know). Then suddenly your mind flashes back to when you lived on a farm. You see, a little mistily, the old windmills that you had on the farm. Suddenly it all becomes clear. You know how you are going to make that milkshake maker!

WE'LL GO AHEAD, MAKE ONE!

