Republic of Zimbabwe
Ministry of Health

Raising water with different pumps

Pump handout No 2

The Zimbabwe Blair Pump

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Acknowledgements

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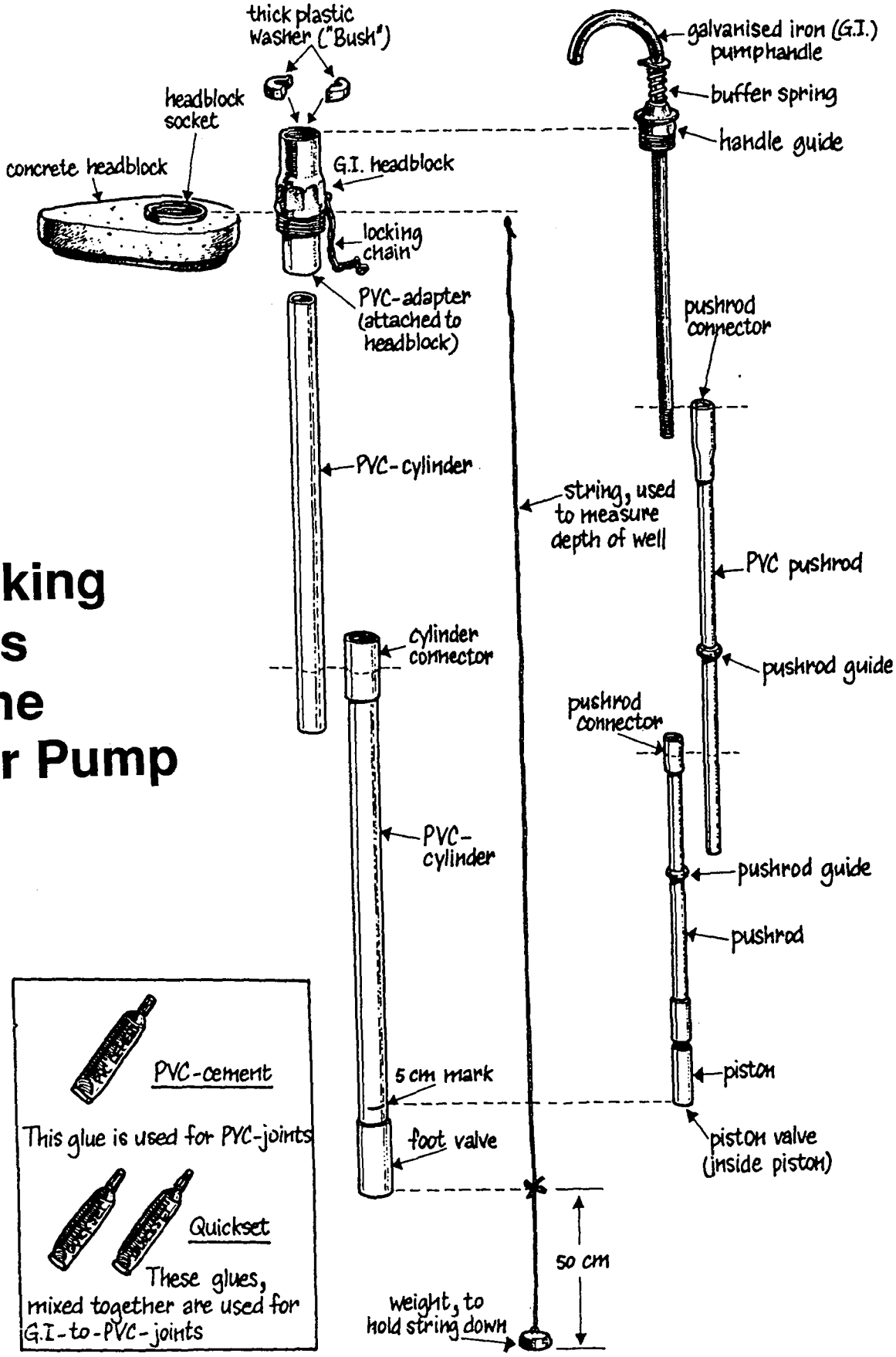
The Zimbabwe Blair Pump

The Blair Pump is a simple hand-operated pump which is used to raise water from shallow wells and tube wells around 12-15 metres deep. It is best suited for family or small group use, is affordable, easy to install and simple to operate. The working parts of the Blair Pump are made from galvanised iron and PVC (which is hardened plastic tubing of a certain size). A tool kit and a maintenance kit is supplied with the pump. Spare parts are also available, and if the pump is carefully maintained it will give good service to its users for many years.

The Zimbabwe Blair Pump* was developed at Blair Research Laboratory, Harare Zimbabwe.

* also manufactured in Harare.

Working parts of the Blair Pump



Instructions for making and fitting the Blair Hand Pump

A Blair Pump is assembled and fitted in different stages.

I. A concrete headblock is prepared

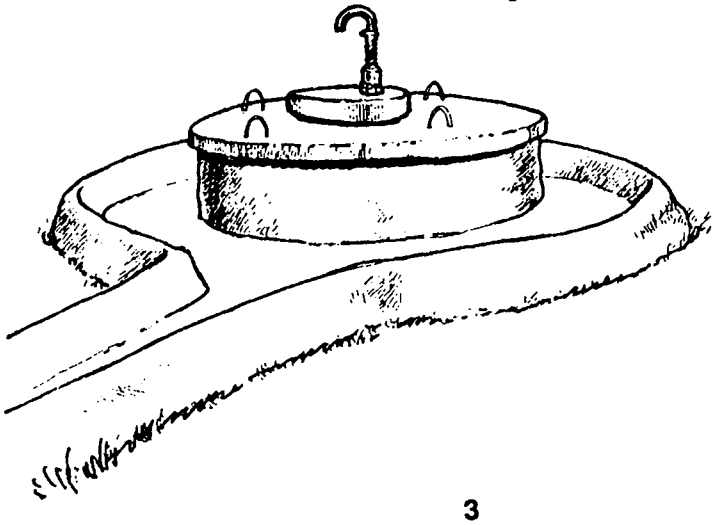
2. The concrete headblock is fitted over the well slab or tube well

3. The depth of the well is measured carefully

4. The working parts of the Blair Pump are joined together

5. The assembled pump is lowered into the well and screwed tightly into the concrete headblock. The Blair Pump is then ready to use.

To do this follow each step carefully

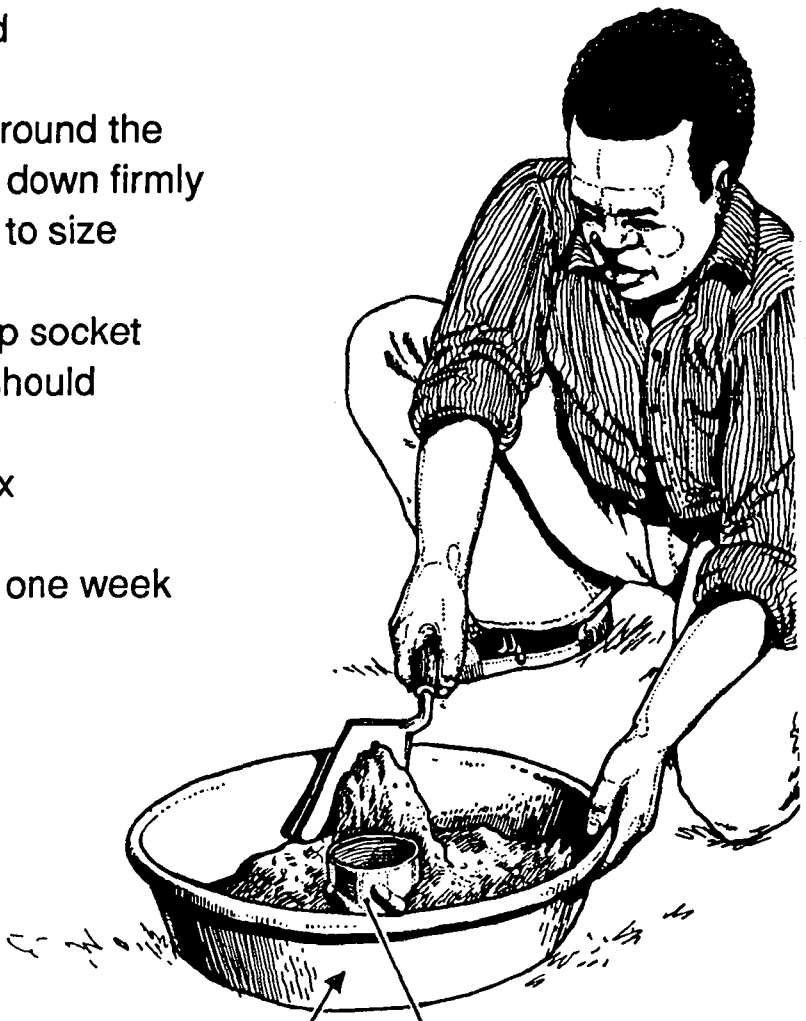


Step 1 Prepare the concrete headblock

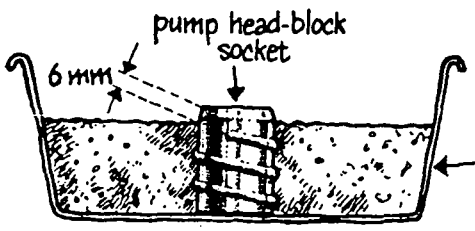
A concrete headblock is sometimes supplied with the Blair Pump, or it can be made. The headblock is fitted onto the well slab or tube well before the pump is installed.

To make a concrete headblock

* Use a plastic basin or similar container as a mould
* Stand the pump **socket** in the centre of the mould
* Make a concrete mix:
  1 part granite chips
  1 part washed river sand
  1 part cement
* Pour the concrete mix around the pump socket and press down firmly
* Add reinforcing wire cut to size for extra strength
* Make sure that the pump socket is level and straight. It should rise 6 mm above the level of the concrete mix
* Cover with wet sacks
* Leave to set for at least one week



Cement mix:
1 part cement
1 part sand
1 part stonechips



Step 2 Position the concrete headblock over the water supply

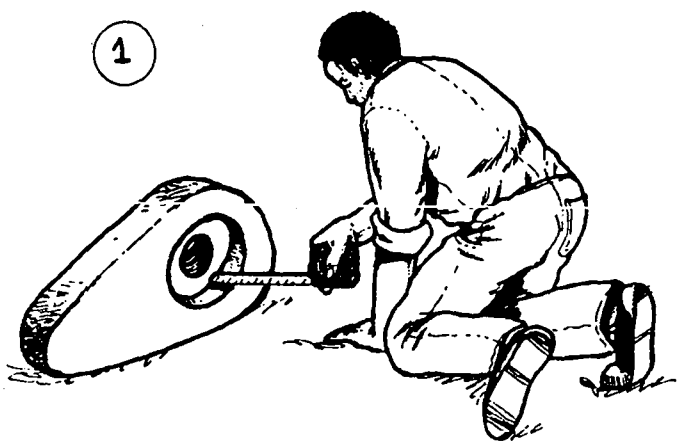
In shallow wells

The concrete headblock is lifted over the well slab and mortared in position. The pump socket inside the headblock must lie directly above the opening in the well slab.

In tube wells supplied with headblock

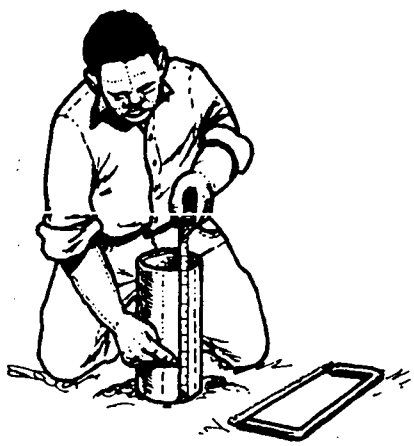
Follow these steps so that the headblock is correctly positioned

1



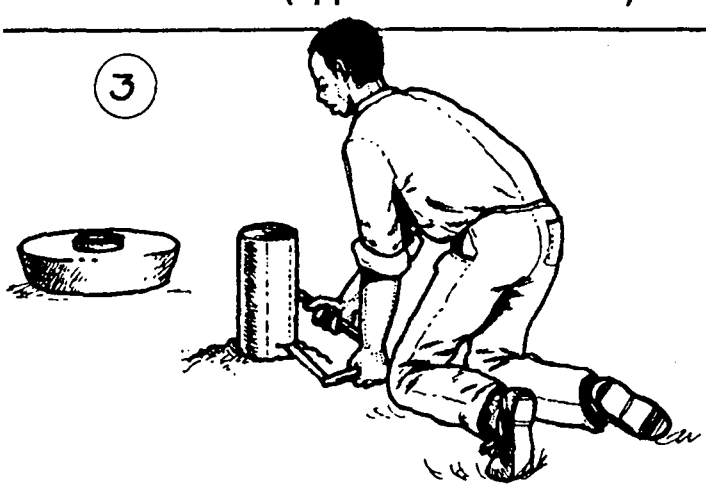
Measure the depth of the pump socket hole in the concrete headblock (approx l0cm/4inches)

2



Record this measurement on the PVC casing

3



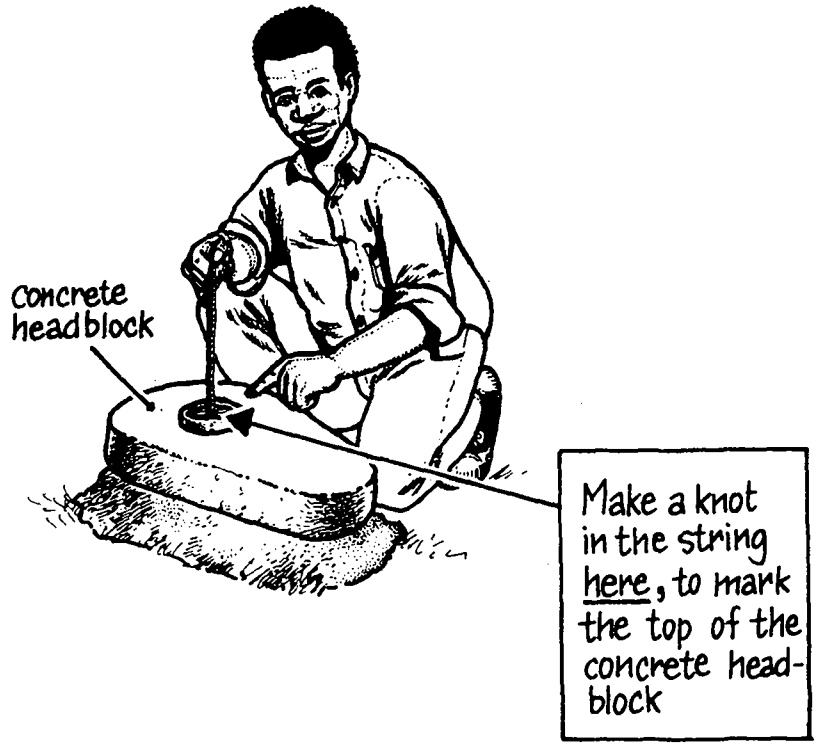
Cut the PVC casing to size

4

Lay cement mortar around the PVC case. Use a spirit level to position the headblock correctly. The PVC casing must fit centrally inside the headblock

Step 3 Measure the depth of the well carefully before joining up the working parts of the Blair Hand Pump

Before the working parts of the pump are assembled, measure the depth of the well. Use the string with a weight on the end to do this. Measure from the top of the concrete headblock to the base of the well.



Now cut 0,5 (50 cm) off the total length of the string.
Lay the string and the working parts of the Blair Pump out side by side on the ground (see diagram on page 2)
Follow instructions for assembly

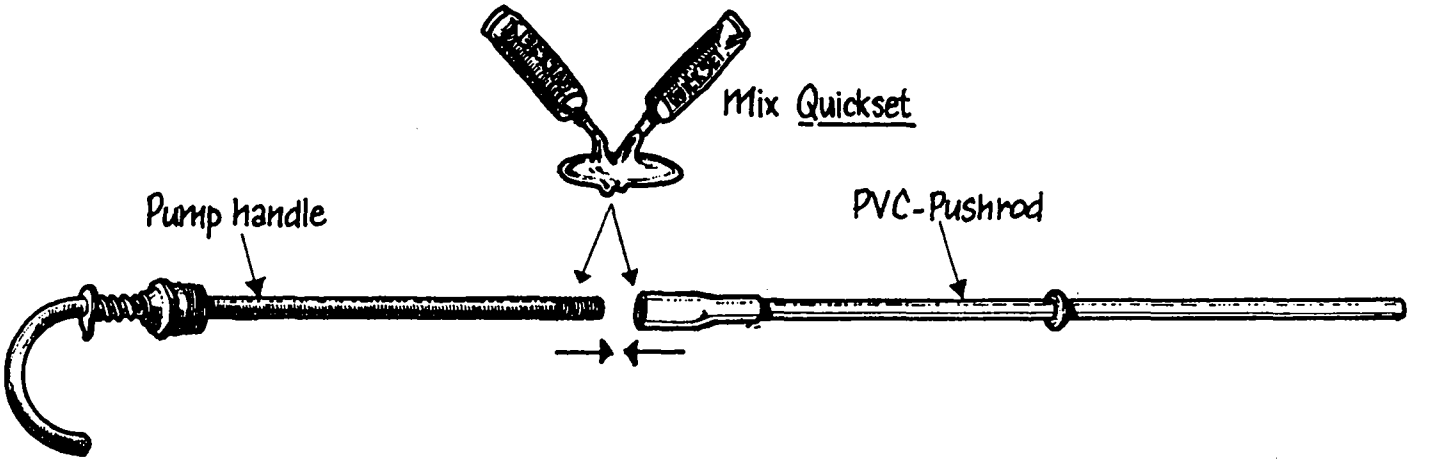
Step 4 Assemble the working parts of the Blair Pump

To do this:

A. Connect galvanised iron pump handle to PVC pushrod connector (see diagram on page 2)

To do this:

* **Check** that the spring and handle guide are in position
* **Glue** inside of pump handle and outside of PVC pushrod connector with Trinepon 6 Quickset Glue
* **Screw** pump handle into PVC pushrod tightly



Follow these instructions for glueing together parts of the pump

* Clean all surfaces thoroughly before glueing
* Apply glue to the end of each joint to be connected
* Use a screwing action to join working parts
* Wipe off waste glue
* Leave the parts to dry for at least fifteen minutes
* Replace top on glue when task is completed
* Store glue away from heat

B. Join galvanised iron headblock to PVC cylinder (see diagram on page 2)

* Use PVC Cement for this task
* Clean joint ends thoroughly
* Clean away extra glue
* Leave to dry

C. Join PVC cylinder at footvalve end

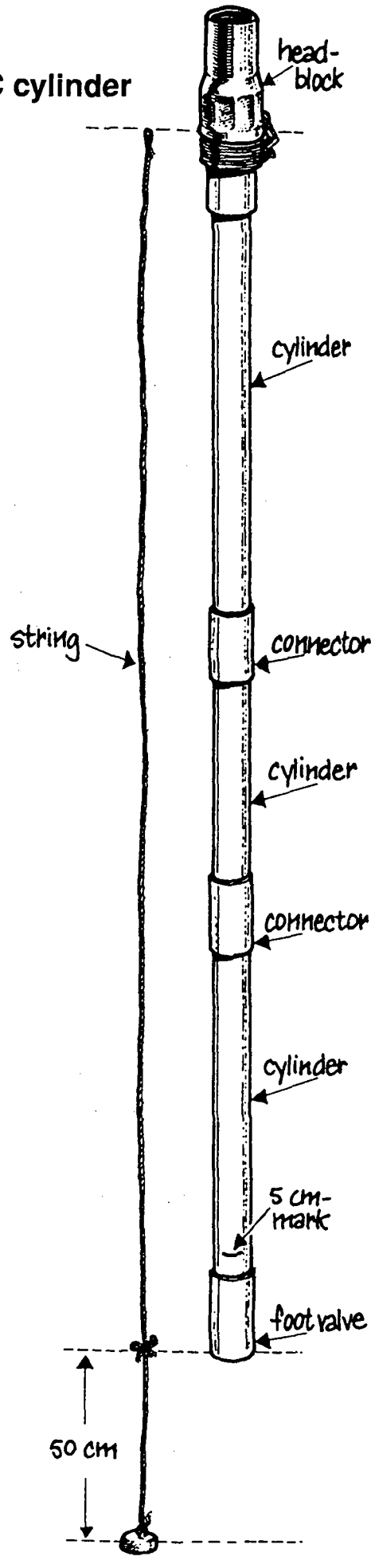
D. Make final cylinder join using a connector

To do this:

* Measure the cylinder length exactly as shown in the picture

When completed the PVC cylinder is exactly equal in length to the string used to measure the depth of the well. (Remember that the string was shortened by 50 cm in Step 3)

The number of connectors depends on the depth of the well.

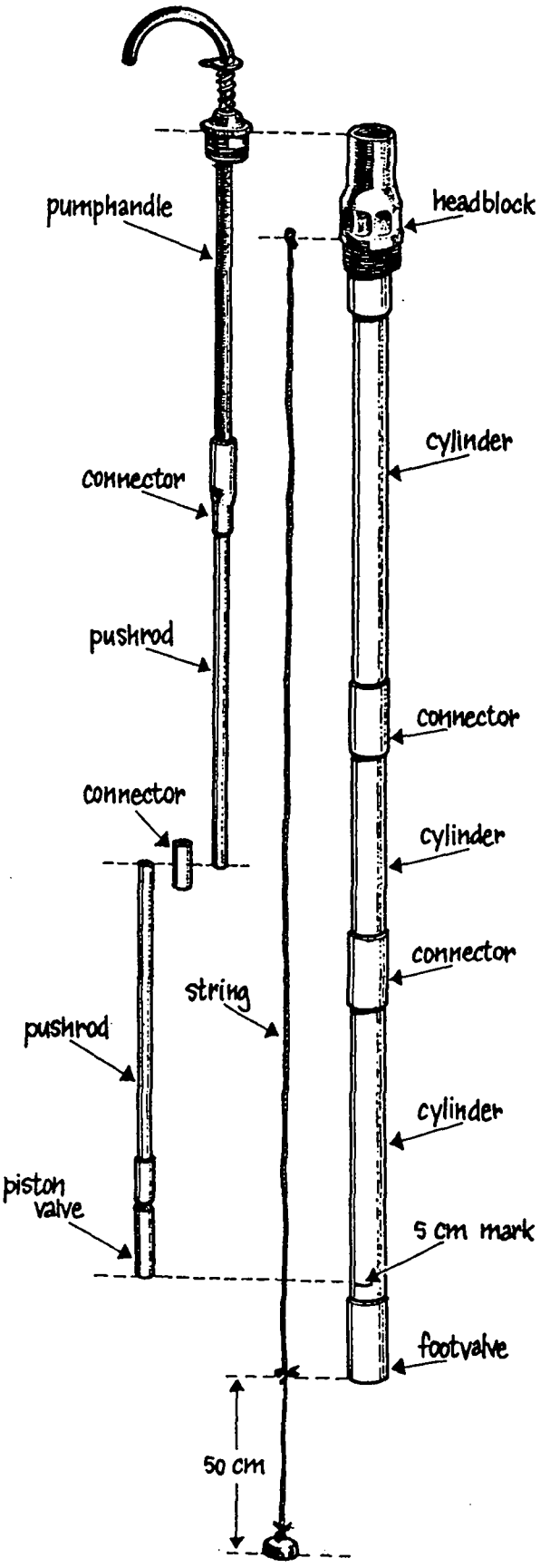


E. Make the pushrod

To do this:

* Push the handle guide against spring of pump handle
* Line up pushrod with cylinder exactly as shown in the diagram

It is very important to do this exactly as shown



Depending on the depth of the well, you may need to use several PVC connectors to join together lengths of PVC pushrod. Use PVC glue to make the final joins.

Step 5 Fit the pump into the water supply

A. Fit the PVC cylinder through the concrete headblock into the well

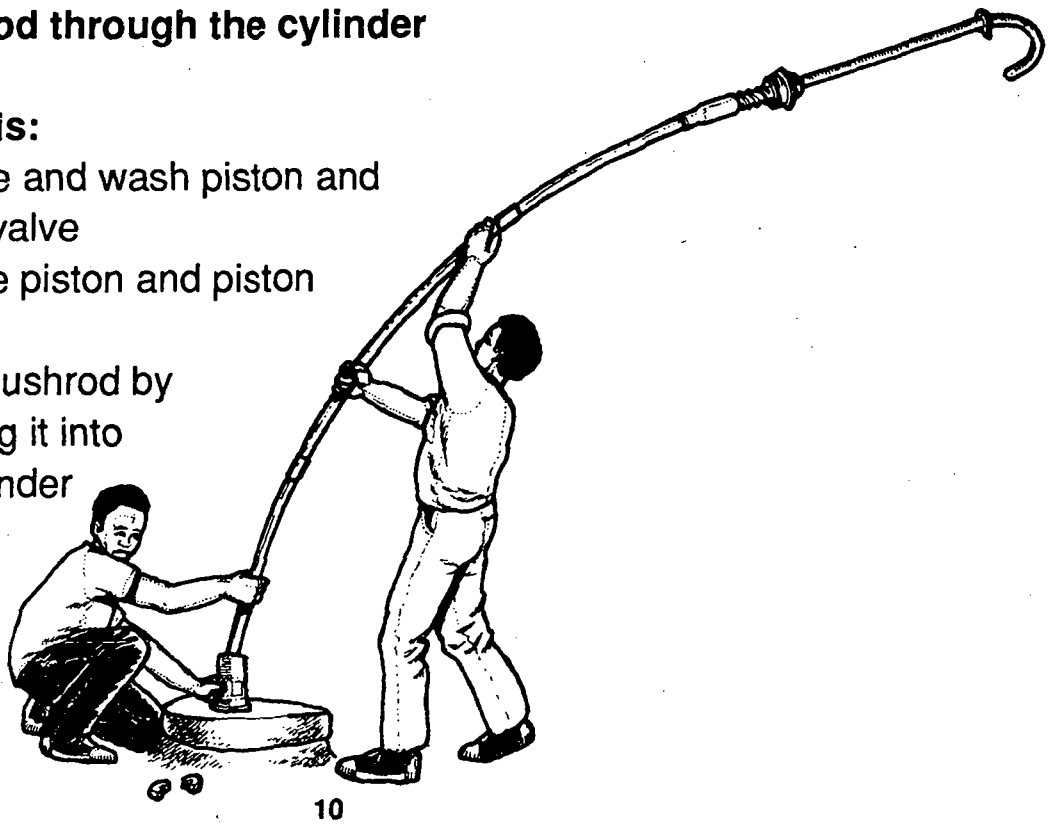
To do this:

* Remove footvalve using the spanner supplied
* Wash the footvalve thoroughly
* Pour water through the cylinder, turning it slowly to make sure that all dirt is removed
* Replace footvalve and screw tight with the spanner
* Fit the cylinder into the well
* Screw the pumphead into the concrete headblock
* Tighten with spanner

B. Fit pushrod through the cylinder

To do this:

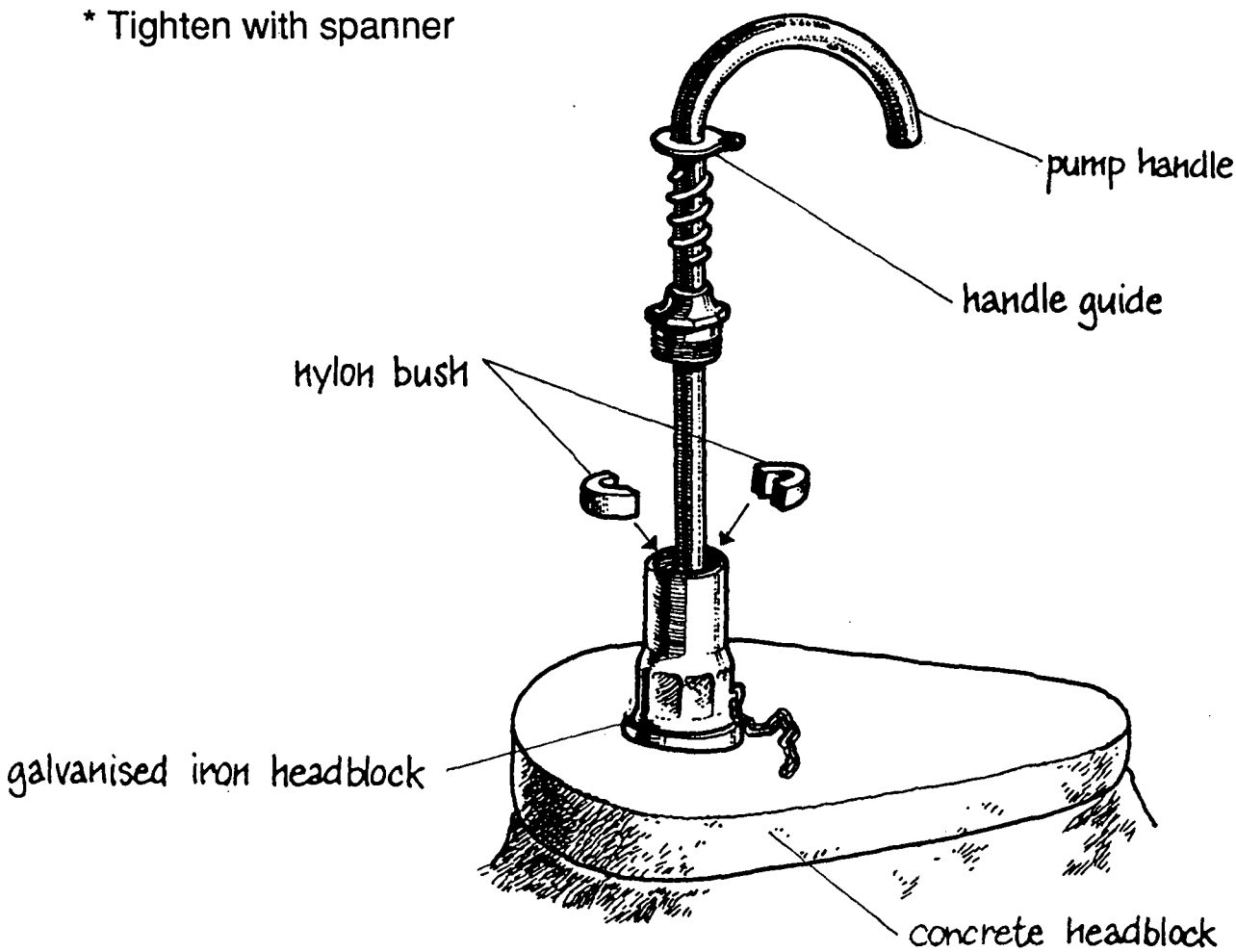
* Remove and wash piston and piston valve
* Replace piston and piston valve
* Install pushrod by lowering it into the cylinder



C. Fit the two halves of the nylon bushes around the pushrod inside the headblock

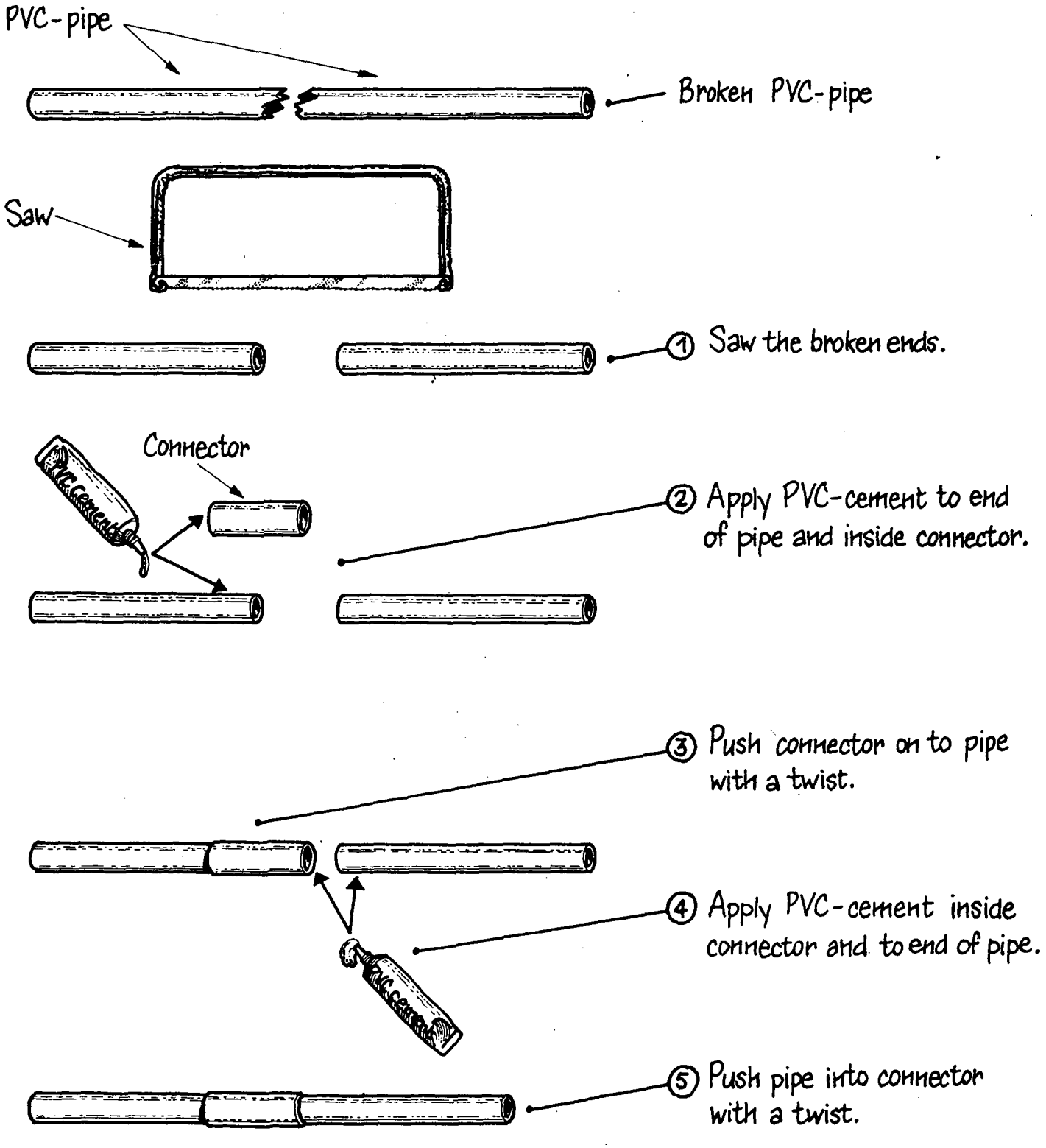
To do this:

* Place two halves of nylon (polyurethane) bush around the top of the pushrod
* Slide the handle guide over this and screw tightly into pump headblock
* Before tightening, test the pump. If the handle does not move freely up and down, unscrew the metal guide, change the position of the nylon bushes refit metal guide
* Test again.
* Tighten with spanner

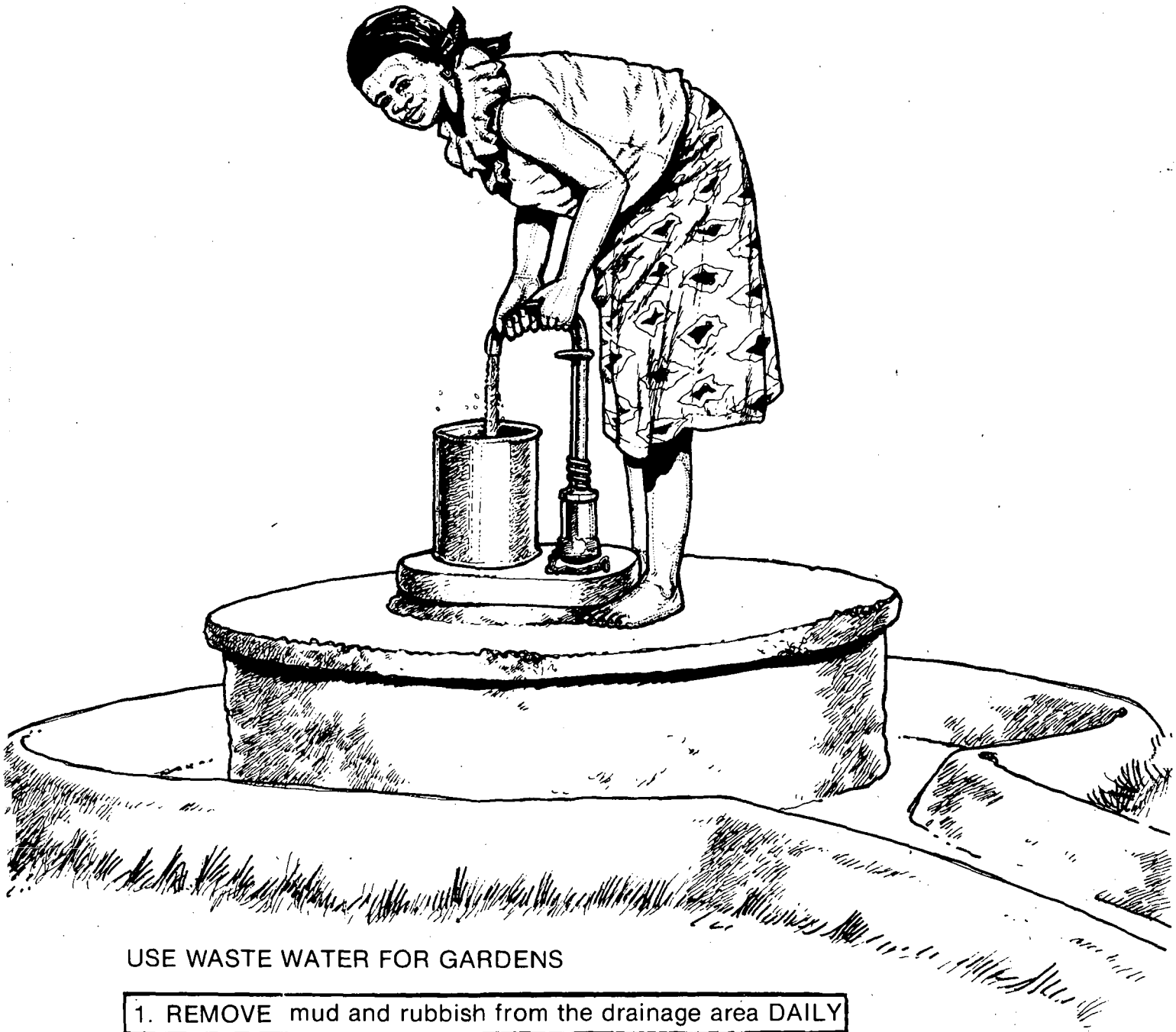


Extra information about maintaining and making minor repairs to the Blair Pump

To repair or change length of PVC pushrod or cylinder:



Complete the project!
Build a drainage area around the supply!



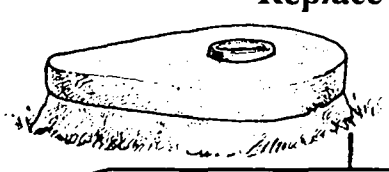
USE WASTE WATER FOR GARDENS

1. REMOVE	mud and rubbish from the drainage area DAILY
2. CHECK	that water can drain easily away from the pump
3. CHECK	the fences
4. KEEP	Cattle away

CHECK THIS PUMP EVERY WEEK
COMPLETE YOUR CHECK BOOK EVERY TIME
SEEK THE ASSISTANCE OF THE HEALTH WORKER IN YOUR AREA IF PROBLEMS ARISE

MAINTENANCE CARD
THE BLAIR PUMP

Check _____ **all working parts regularly**
Remove _____ **the Blair Pump carefully**
Repair _____ **if possible**
Replace _____ **parts when necessary**

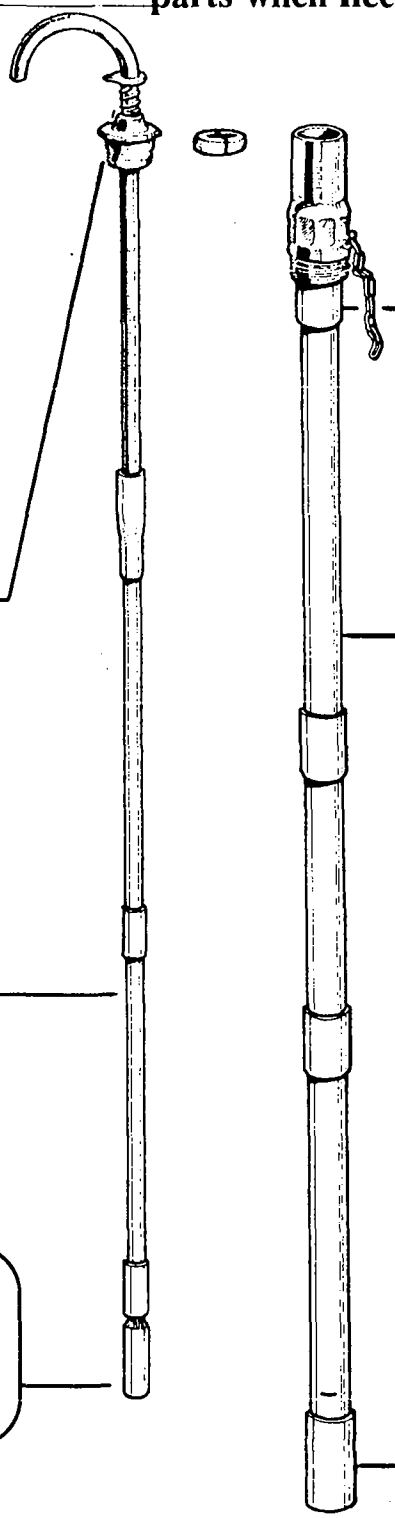


CHECK 1
PUMP HEADBLOCK
* Inspect socket
* Replace if worn
* Tighten

CHECK 2
HANDLE GUIDE AND BUFFER SPRING
* Inspect
* Replace if worn

CHECK 3
PUSHROD PIPE
* Remove
* Inspect
* Repair
* Wash through

CHECK 4
PISTON VALVE
* Unscrew
* Inspect and wash through
* Screw back



CHECK 5
HEADBLOCK TO PVC CONNECTOR
* Inspect

CHECK 6
CYLINDER PIPE
* Inspect
* Repair, lengthen or shorten
* Wash through

CHECK 7
FOOT VALVE
* Unscrew
* Inspect and wash thoroughly
* Replace if necessary
* Screw back on connector

For advice on spare parts, contact the Health Inspectorate of the Provincial Medical Office of Health in your Province