

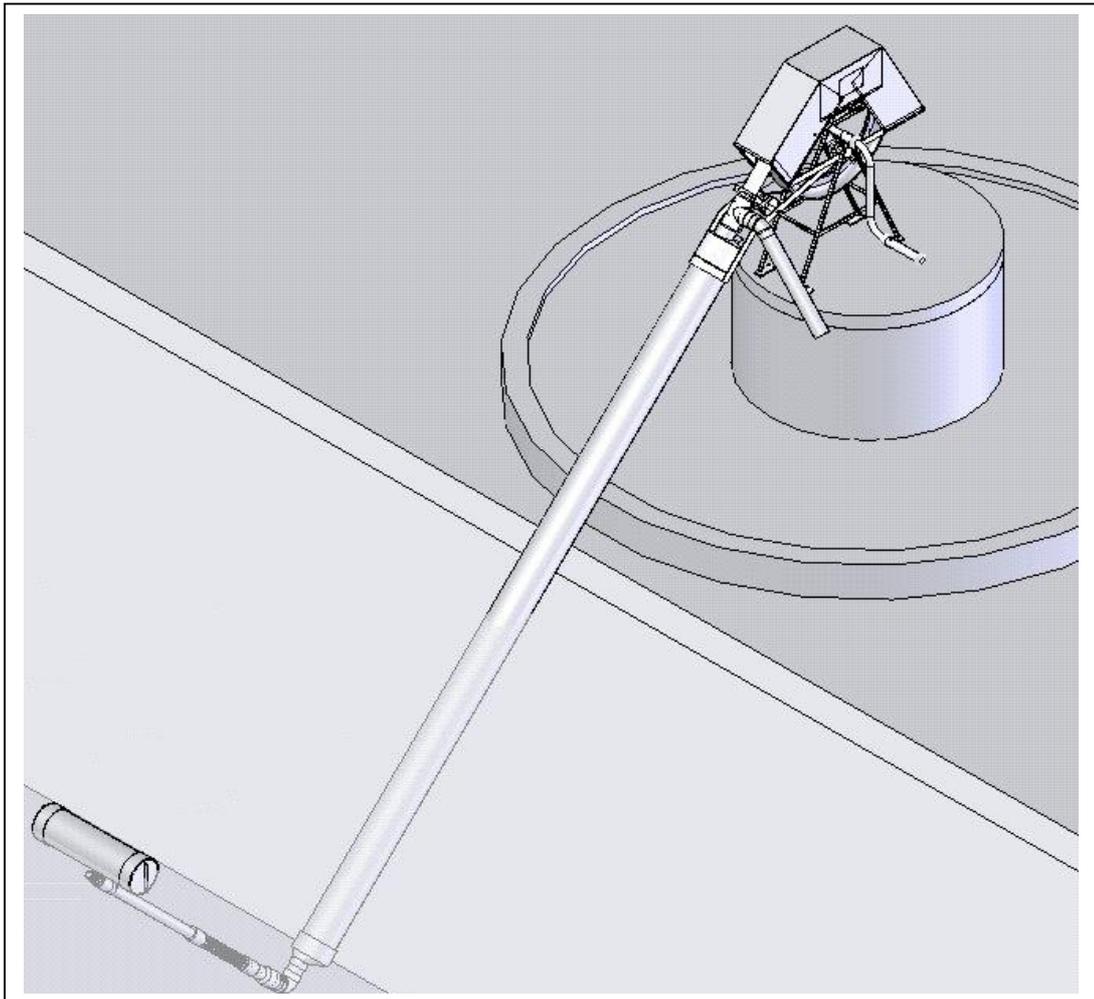
**Ideas at Work (IaW)**  
#5, Street 21,  
Tonle Bassac,  
Phnom Penh



**Phone : +855 (0)23 350 911**  
**Mobile: +855 (0)12 593 973 (Khmer)**  
**Mobile: +855 (0)12 700 482 (Eng)**  
**Email : [info@ideas-at-work.org](mailto:info@ideas-at-work.org)**  
**Web : [www.ideas-at-work.org](http://www.ideas-at-work.org)**

# THE 'ROVAI' POND PUMP - RP6

(The Cambodian version of the Rope Pump)



## OPERATION AND MAINTENANCE MANUAL

V. Whitehead, March 2008

<p>Details of Rovai Pond Pump</p> <p>Pump No.: .....</p> <p>Date installed: .....</p>
---

**Introduction**

This manual has been produced to help the pump caretaker to carry out basic maintenance and repairs. By following the instructions in this manual it will help to ensure that the pump lasts as long as possible with the least amount of problems.

This Rovai pond pump manual may also be useful to village chiefs, water user group staff or project managers when setting operation and maintenance training for pump caretakers.

**Contents:**

**The main components of the Rovai Pond pump..... 3**

**Operating the pond pump..... 3**

**General maintenance & care ..... 3**

*Cleaning the pump..... 3*

*Checking the rope condition and that it is adjusted correctly ..... 3*

*How to tie the knot in the rope..... 3*

**Changing the rope and pistons..... 3**

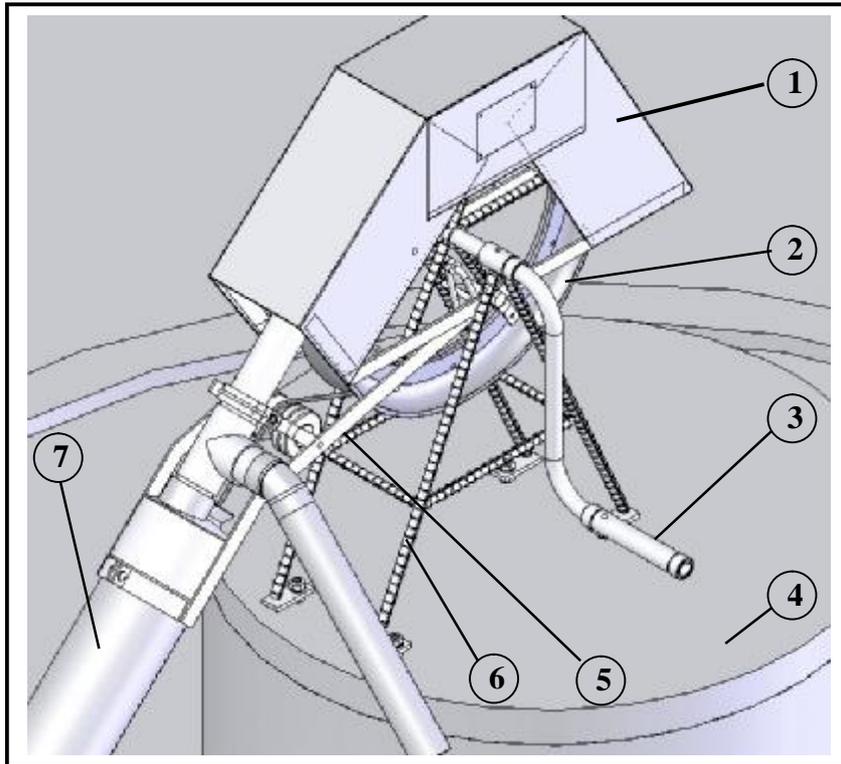
*Changing a rope that is worn ..... 3*

*Replacing a rope that has broken ..... 3*

**New pistons ..... 3**

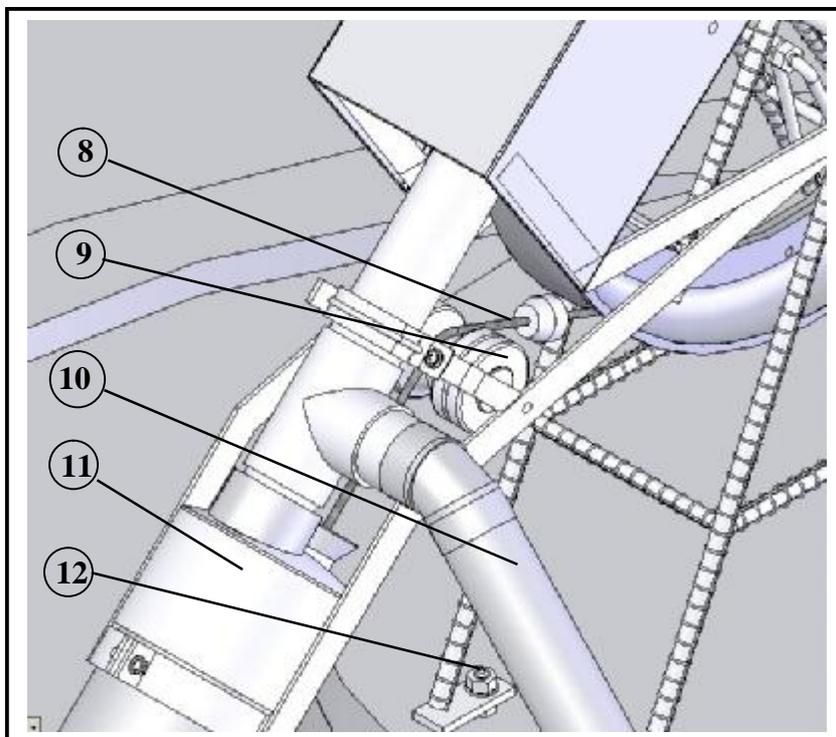
**Care of the paintwork..... 3**

## The main components of the Rovai Pond pump



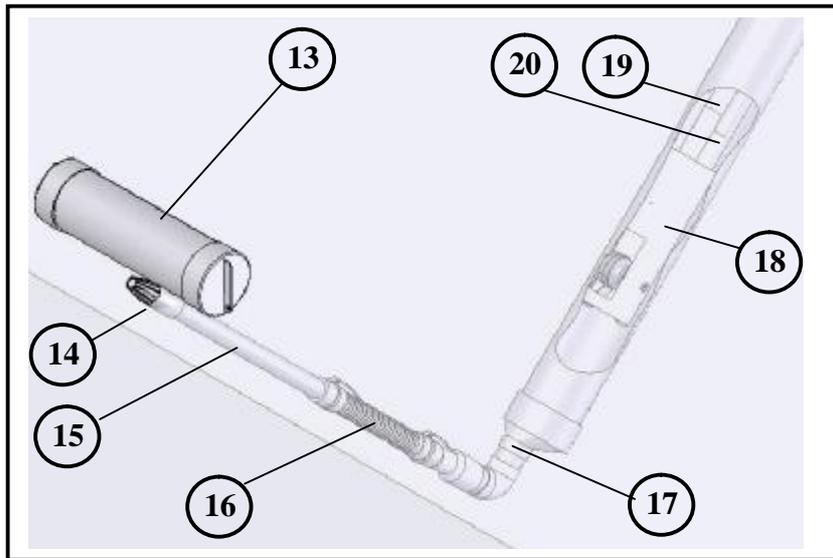
1. Wheel cover
2. Wheel
3. Handle
4. Cement cover
5. Adjustable pipe clamp
6. Pump frame
7. Protection pipe

Figure 1 Main components of the Rovai Pond pump's upper parts



8. Rope & pistons
9. Ceramic guide
10. Outlet pipe
11. Upper guide box
12. Frame bolts (x4)

Figure 2 Details of the Rovai pond pump's outlet assembly



- 13. Float
- 14. Strainer
- 15. Inlet pipe
- 16. Flexible rubber joint
- 17. Elbow and reducer
- 18. Bottom guide box
- 19. Riser pipe
- 20. Return pipe

Figure 3 Cutaway view of inlet assembly

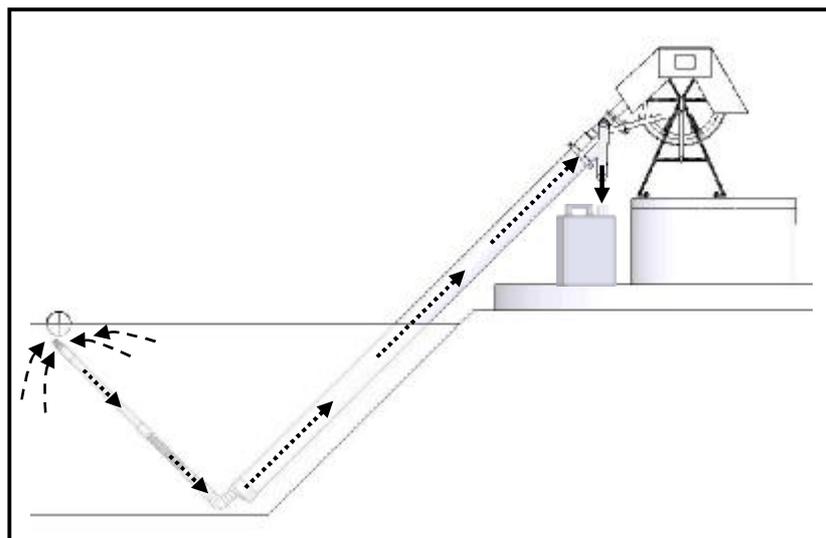
---

### The Rovai pond pump

The Rovai pond pump is designed to lift water from sources such as ponds, lakes and very slow moving rivers. The pond pump is similar to the standard Rovai (used on hand dug wells and tube wells) and uses many of the same parts, but there are two distinct differences:

- the riser pipes are fitted inside a protection pipe and that this can be angled to suit the pond or river embankment, and
- It has a floating strainer which only allows water from the top of the pond to enter the riser pipe. The water at the top of the pond is usually the least turbid.

When the pump is operated water enters the intake pipe through the strainer. The strainer prevents leaves, small fish or other debris from getting in to the pipes.



As the water level in the pond changes over the dry and wet seasons the flexible rubber joint allows the float to rise and fall with the water level. So the water at the top of the pond is used throughout the year.

## Spares/tools kit

A 'spares/tool kit' is available from the manufactures of the 'Rovai pumps'. It is recommended that one of these is made available to the person responsible for maintaining the pump. Below is a list of items that will be needed help maintain the pump,

- § Spare rope – approximately 30m
- § Spare pistons - approximately 26 pistons
- § No. 6" adjustable Spanners: - 2 spanners
- § PVC glue – small tube
- § Sandpaper – 1 sheet
- § Thin string & weight (fishing line) - approximately 24m long
- § Oil - small container approximately 100ml
- § Cigarette lighter (for burning end of rope)
- § Ø34mm PVC straight connector – 1 pieces

If the items above are used up or maybe lost, make sure these are replaced as soon as possible. This will make sure that the pump can be repaired quickly.

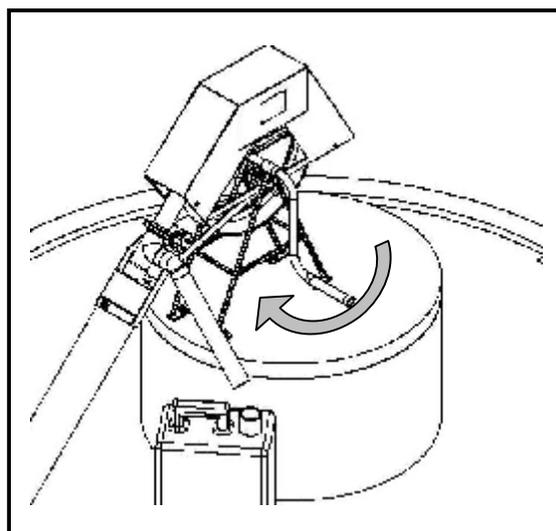
## Operating the pond pump

The pond pump is operated by turning the handle in a clockwise direction.

This rotates the wheel which moves the rope inside the pipe. The pistons fitted to the rope lift the water up the pipe and this flows out through the outlet pipe.

The handle should be turned at about 1 revolution per second. If the handle is turned at a low speed the flow of water will be low, if the handle is turned faster the flow of water will be greater. Turning the handle too fast is unlikely to damage the pump but this puts stress on the rope and may cause it to stretch which will make the rope loose. So avoid turning it too fast.

A mechanism is fitted to the pump wheel to prevent the wheel from being turned in the wrong direction.



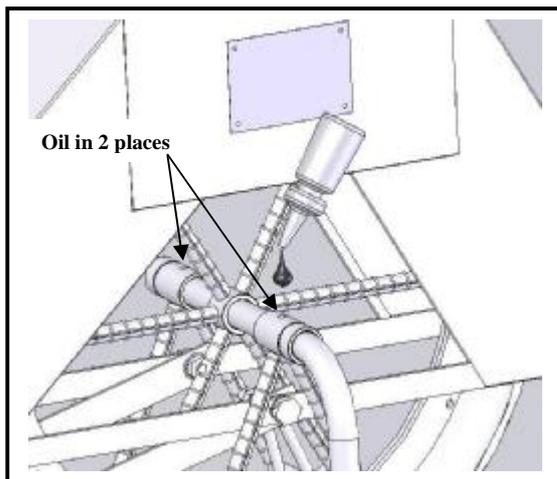
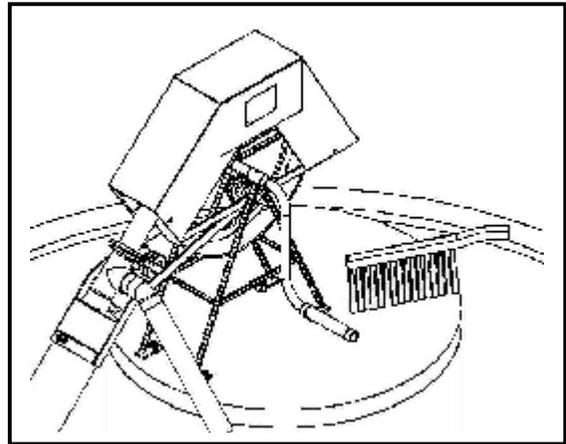
## General maintenance & care

There are four basic maintenance points that need to be carried out. 1) Keeping the pump clean, 2) oiling the handle 3) making sure the rope is in good condition and that it is kept reasonably tight and 4) checking and cleaning the intake and protection pipe.

### 1) *Cleaning the pump*

During operation of the pump some water will be sprayed off the wheel and on to the cement cover, the plastic pipes and the pump frame. If the water is left in direct sunlight a green algae will naturally develop. Although this is unlikely to affect the pump or contaminate the water it should not be ignored and left to grow.

A stiff brush (not steel) and a clean cloth should be used to remove the algae from the cement cover, the plastic pipes and the pump frame each week.



### 2) *Oiling the handle bushes*

Applying oil to the bushes makes it much easier to turn the handle and the bushes will not wear as quick. This should be done regularly each week and will make the pump last much longer. The oil holes can be found on the handle bushes at either side of the wheel.

Apply some oil to these holes by using a small oil can as shown or by dipping a thin piece of wire into some oil and then letting a few drops enter the holes. Use a clean rag to wipe off any oil that has spilled or run on to the frame.

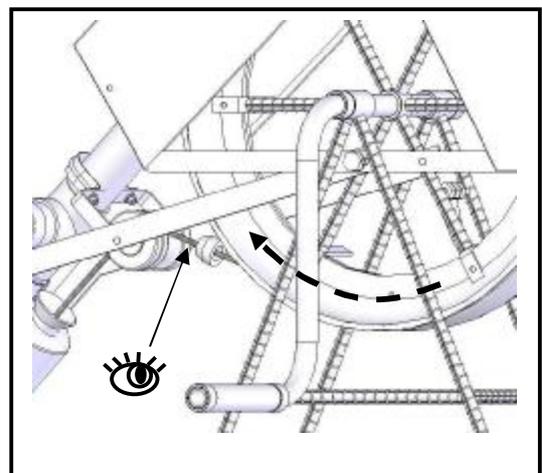
Always use clean oil rather than old engine oil. If the pump squeaks when you turn the handle you know that it has not been oiled!

### 3) *Checking the rope condition and that it is adjusted correctly*

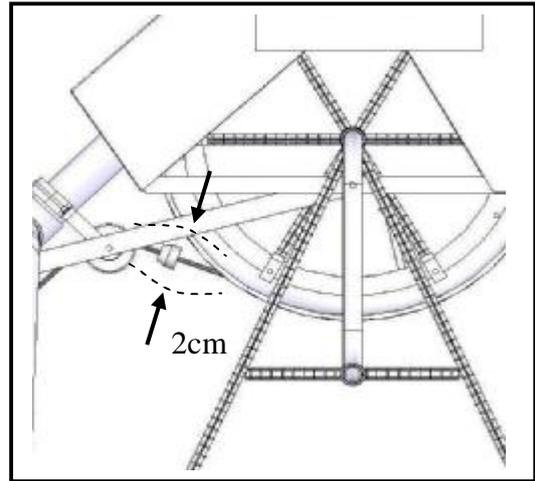
Check the rope at least once a month to see if it is showing signs of wear.

To do this turn the handle until the knot can be seen below the wheel. Then slowly turn the handle and look at the full length of the rope, and stop when the knot comes round again. If the rope is frayed even slightly arrange for it to be changed (see Section 3 on how to do this).

**NOTE:** it is much easier to replace a rope that is still working, but worn, than one that has broken and fallen down the pipes!! So check this frequently.

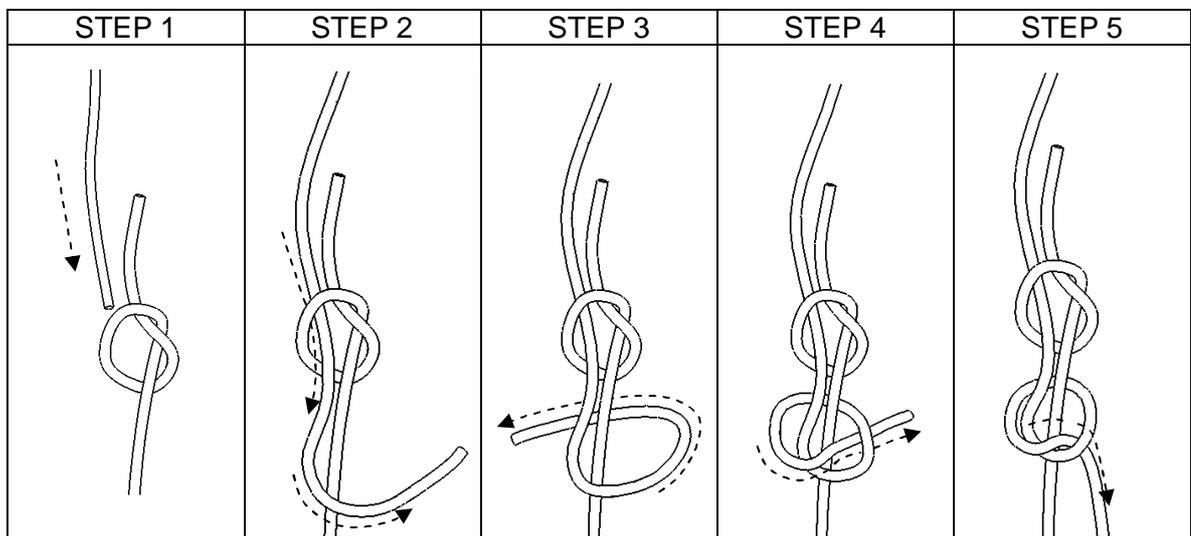


Check to see if the rope has the correct tension. To do this pull up and push down on the rope lightly as shown by the arrows opposite. There should be around 2-4cm of movement. If it is more than 4cm turn the handle to find the knot. Untie it and take out the slack out of the rope by gently pulling each end of the rope, re-tie the knot again as shown below. If the rope moves less than 2cm then the rope is too tight and this will make it stiff and it wont be easy to turn the handle.



**How to tie the knot in the rope**

Follow the five steps as shown below for tying a knot in the rope. After step five pull the rope tight and check that it will not come undone by pulling hard on each side the knot.

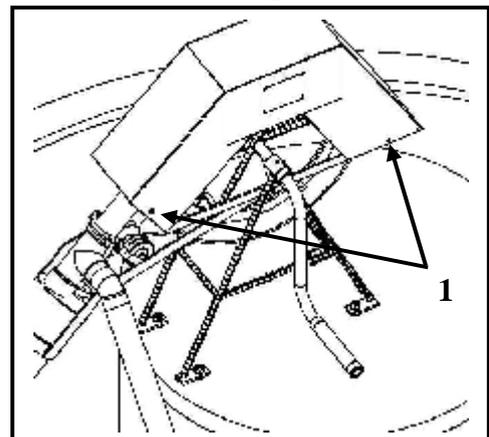


**NOTE:** After cutting the ends burn the ends of the rope with a small flame to stop them from fraying. Make sure the rope is dry first!

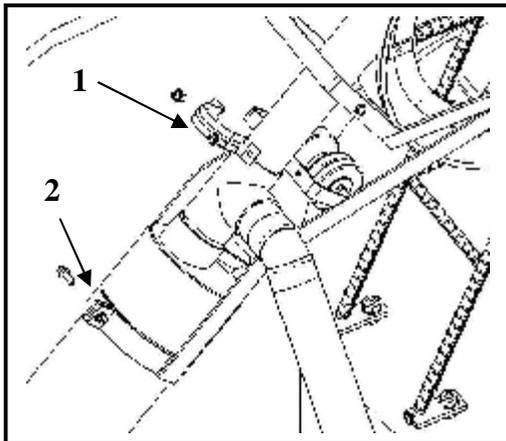
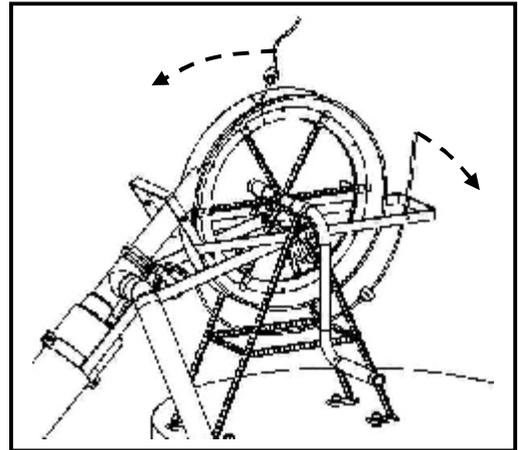
**4) Checking and cleaning the intake pipe and protection pipe**

At least once a year the protection pipe and strainer will need removing from the water to check if there is a build up of sediment in the pipes. If there is sediment inside this will need to be cleaned out. If the water is very dirty this may need doing more often.

1) Remove the four screws from the corners of the wheel cover (1)

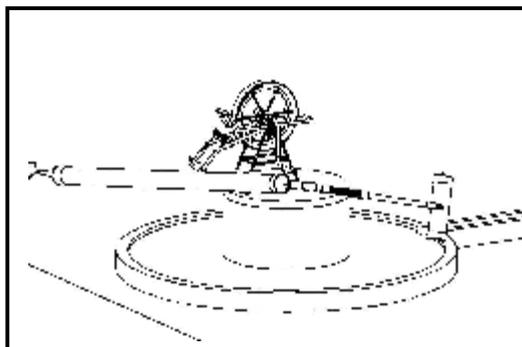
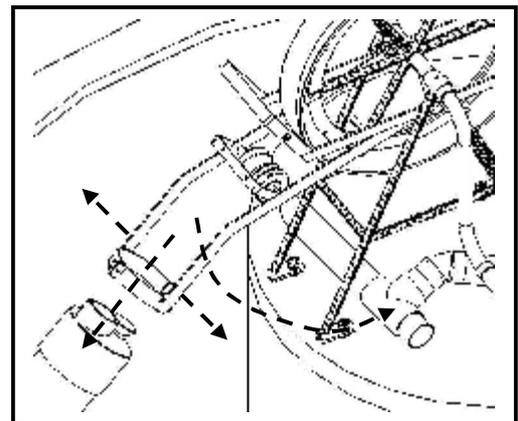


2) Turn the handle until the knot in the rope is at the top of the wheel. Untie the knot ropes and pull the ropes to the side. Loosely tie these together so that they don't slip down inside the riser or return pipes.



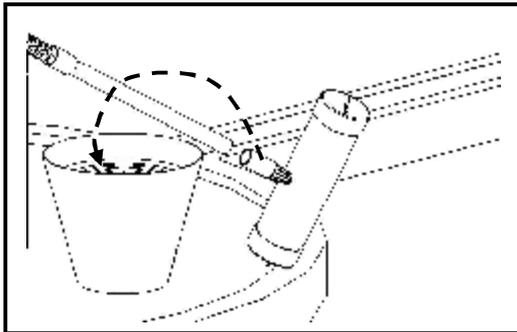
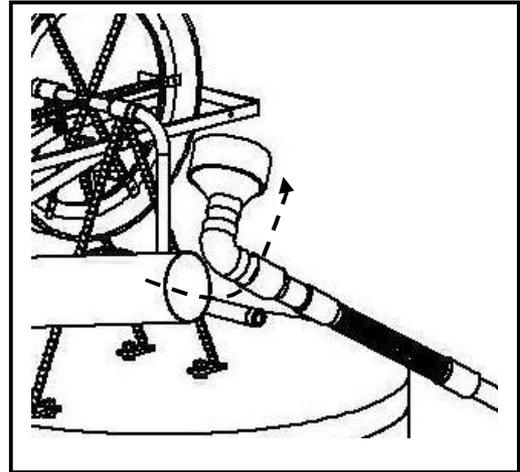
3) Remove the screws holding the pipe bracket (1) and the protection pipe clamp screws(2)

4) Remove the outlet pipe and gently lower the protection pipe and upper guide box down through the clamp hole. The arms of the clamp frame can be opened to do this.

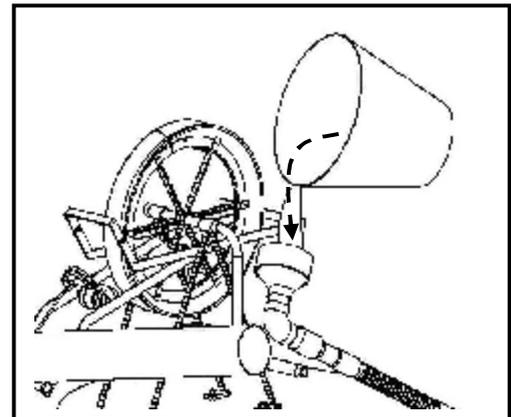


5) using at least two people slowly pull the protection pipe out of the water and rest the intake end on the cement cover. Put the upper guide box end on a clean area of ground preferably with some plastic sheets to keep the pipes and rope clean.

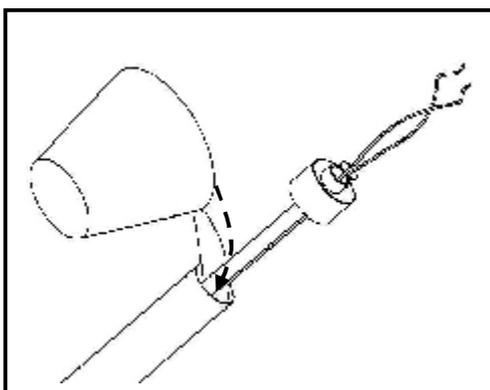
- 6) Remove the reducer cap from the bottom end of the protection pipe.



- 7) unscrew the end of the strainer from the bottom of the intake pipe and wash it in clean water.



- 8) Pour enough clean water down inside the end of the intake pipe to flush out any accumulated sediment.



- 9) Pour enough clean water down inside the end of the protection pipe to flush out any accumulated sediment.

- 10) When everything is cleaned out the intake and protection pipe will need putting back in the reverse order, so do the following:
- a) replace the upper guide box on to the protection pipe,
  - b) re-fit the strainer on to the end of the intake pipe,
  - c) push the elbow and reducer back on the bottom of the protection pipe,
  - d) lower the protection pipe back in to the water,

- e) push the upper guide box up through the adjustable clamp arms.
- f) re-fit the rope back through the outlet assembly and loosely around the wheel
- g) fit the clamp screws to the pipe bracket and clamp arms
- h) pull the rope until there is around 2cm of slack in the rope then tie a knot as shown on page 7
- j) Slowly turn the handle to check that the rope is free to move all the way through the pipe.
- h) finally refit the wheel cover on the pump with the 4 screws and nuts on each corner back

## Changing the rope and pistons

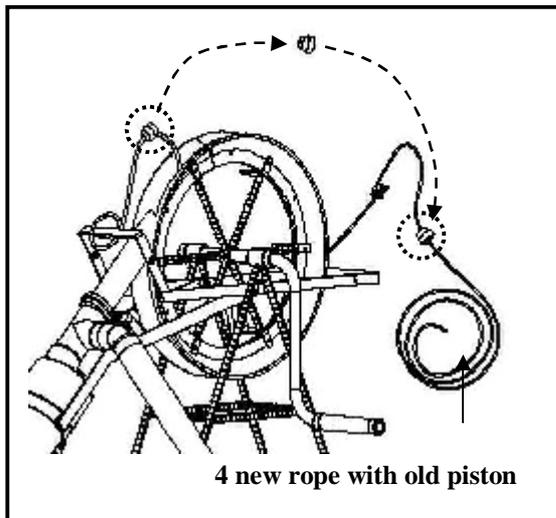
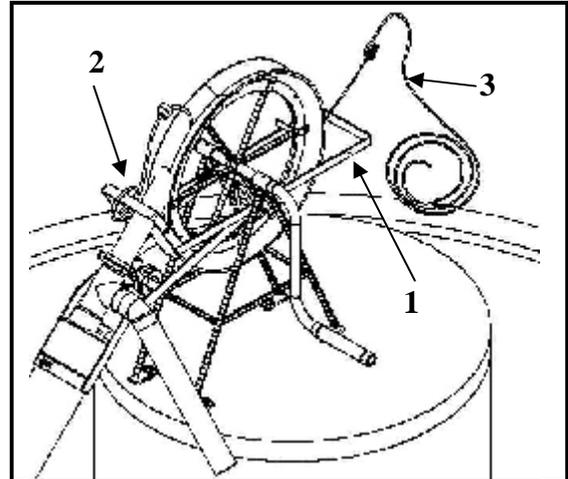
This section covers 1) changing a rope that is worn and 2) removing a rope that has broken and fallen down inside the riser or return pipes.

### Changing a rope that is worn

Prepare a new length of 5mm diameter rope in advance – around 30m should be long enough

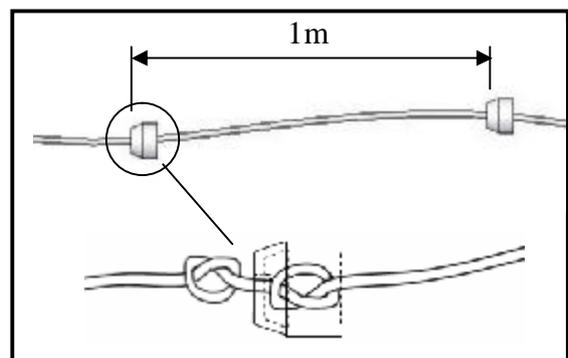
1. Take the wheel cover off by removing the four nuts and bolts at each corner (1).
2. Turn the handle until the knot can be seen at the top of the wheel. Untie the knot then tie the end that comes out of the riser pipe to the front cover frame (2) to stop it from falling back down the pipe. Tie on a new piece of rope (3) on to the end that leads down into the return pipe.

If a set of new pistons are to be fitted then these can be added to the new rope now. If this is done pull the new rope through and follow instructions from step 6 below, check that the pistons are facing the right way.

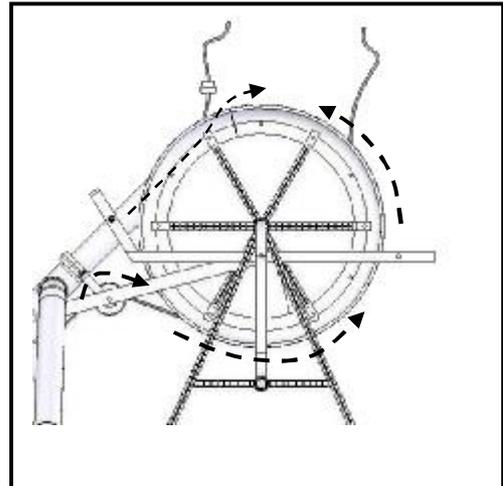


3. If the pistons are still in good condition these can be used again. Simply remove them from the old rope one at a time and tie these on to a new piece of rope as shown below. If new pistons are needed these can be added to the new rope.

4. Tie the old pistons on with two knots, one above and one below the piston. The pistons should be placed 1m distance apart from the next piston. Make sure all the pistons face the same way.



- Before tying the ropes together pull on each rope to check that it is free to move inside the pipes and that it is not caught on anything inside the pipes or guide box. Wrap the rope around the wheel and thread it through the guide pieces as shown opposite. Allow some overlap and cut off any spare rope. Tie a knot in the rope as shown on page 7. Don't forget - **don't** make the rope too tight. Carefully turn the handle slowly to check that the rope and pistons are free to until water comes out of the outlet pipe and that the flow rate is acceptable. Finally re-fit the wheel cover.



-----

### ***Replacing a rope that has broken***

If the rope has broken and fallen down inside the pipes then the riser pipe and guide box will have to be removed from the pond. Follow the steps and diagrams below to remove the pipes and to fit a new rope.

NOTE: some ropes do not last as long as others so try wherever possible to buy rope similar to the original factory fitted rope.

Make sure that the following tools and materials are available before starting the repair:

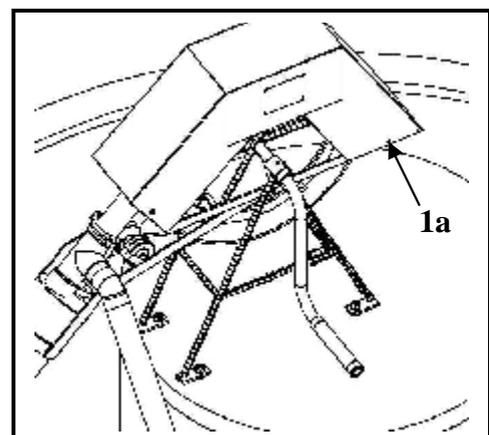
#### **Tools:**

- 2 x adjustable spanners),
- A lighter or matches (to burn the end of the rope)
- A thin string e.g. fishing line, with a small weight attached to one end (to drop down the pipe and pull the new rope through)

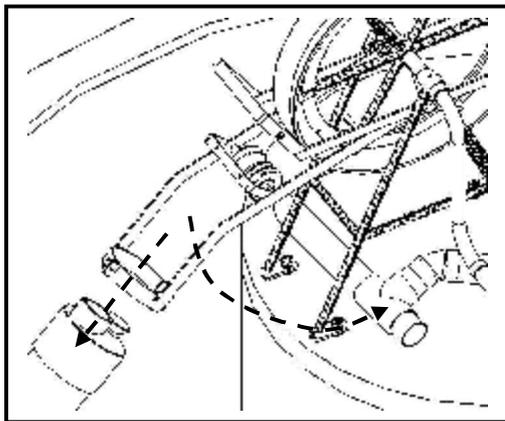
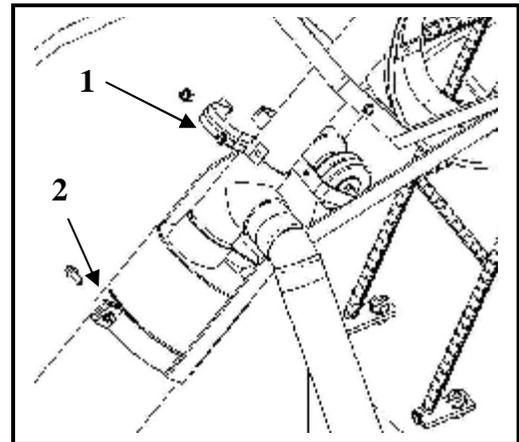
#### **Materials:**

- A new rope fitted with pistons (unless the broken rope can be refitted)

- Take the wheel cover off by removing the four nuts and bolts at each corner (1a)

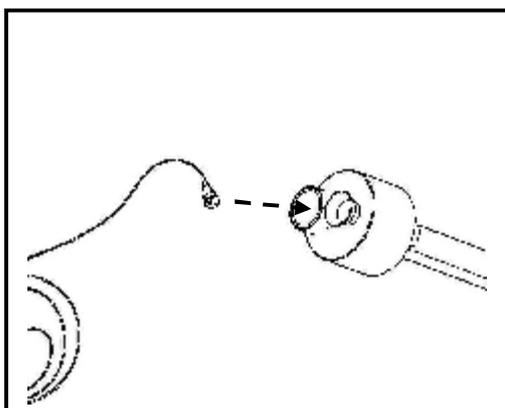
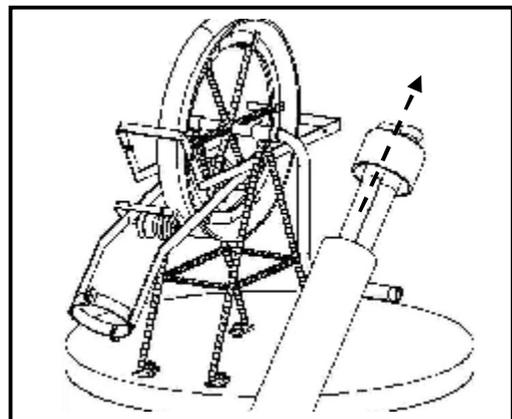


2. Remove the two screws on the top pipe bracket (1) and remove the two screws from the bottom clamp that holds the large protection pipe (2) on at the front and one at the back of the pipe. Keep the screws in a safe place!



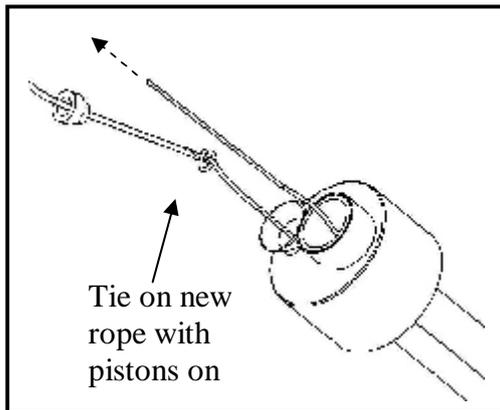
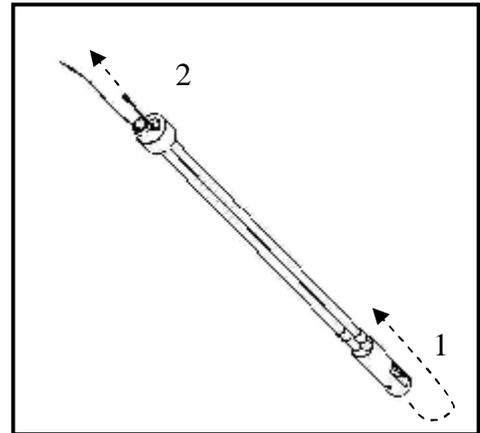
3. Remove the outlet pipe and gently lower the protection pipe and upper guide box down through the clamp hole. The arms of the clamp frame can be opened to do this.

4. Pull the protection pipe to the side of the Rovai pump and gently remove the riser and return pipes out of the protection pipe. Put the riser and return pipes on a clean area of ground preferably with some protection like plastic sheets to stop sand particles sticking to the pipes or guide box.



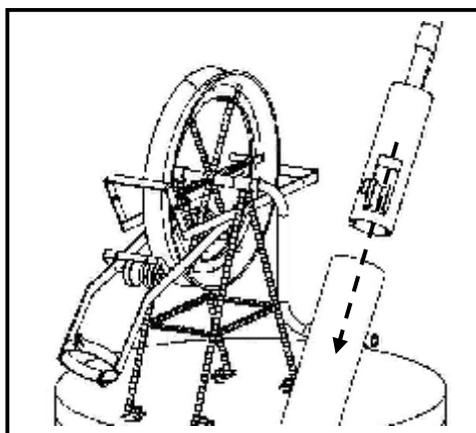
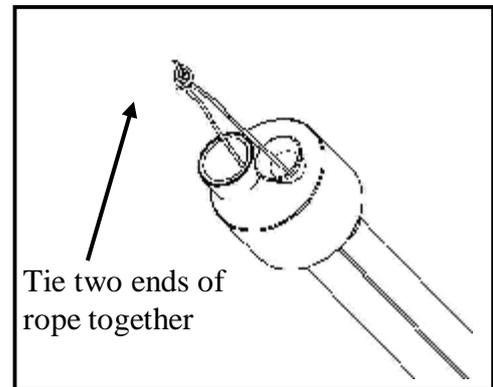
- a. Remove the old rope then use a piece of fishing line about 30m long with a weight on the end and drop this down the riser pipe (largest hole in the upper guide box).

- When the weight on the fishing line comes out of the bottom end of the riser pipe wrap it round the white ceramic guide. Then drop the weight down into the return pipe (1) until it comes out of the top end of the return pipe (2) as shown in the diagram opposite.



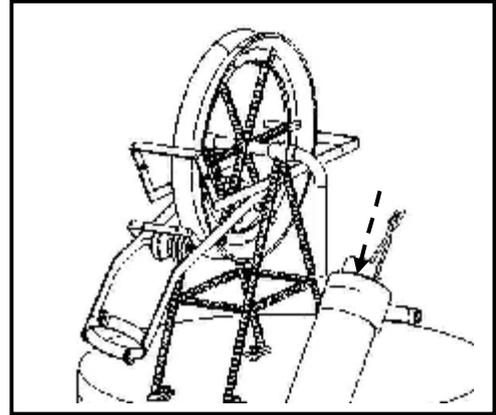
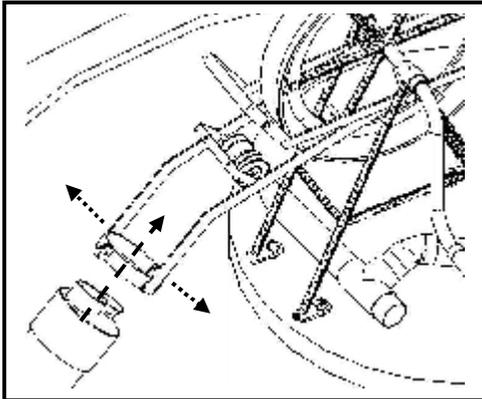
- Attach the new rope with pistons on to the fishing line that goes inside the small flared return pipe of the upper guide box. The small cone side of the piston should be facing towards the flared pipe. Pull on the fishing line to pull the new rope through – make sure the pistons are about 1m apart and all facing the same way.

- When the two ends of the rope are level with each other remove the fishing line from the new rope. Then tie the ends of the new rope together to stop them from falling down inside the pipes.



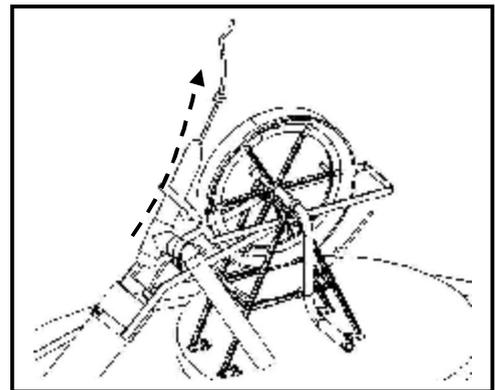
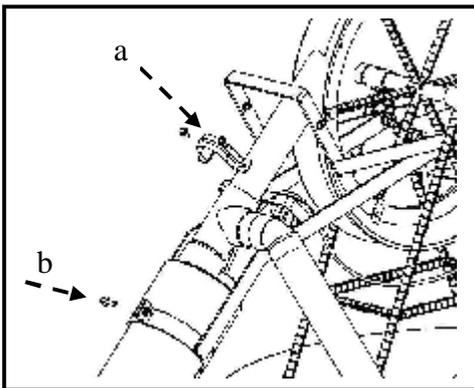
- Refit the pipes into the protection pipe by lowering the bottom guide box into the pipe as shown opposite.

9. Re-fit the upper guide box assembly onto the end of the protection pipe (do not put glue on it). With the rope ends still tied together check that the rope will pull through the riser pipe without getting stuck or being tight. Keep pulling the rope until the tied ends of the rope appear again.



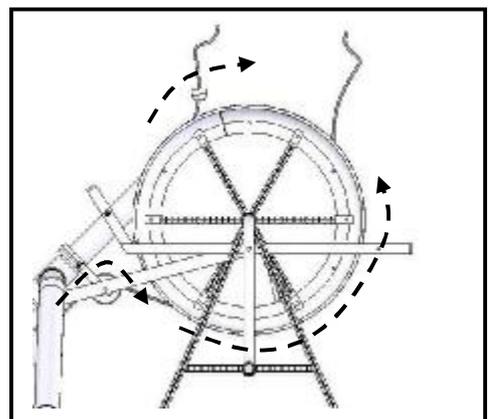
10. Pull the clamp arms apart slightly and push the upper guide box and protection pipe back on to the small piece of pipe on the well cover.

11. push the rope through the outlet pipe and push the outlet assembly into the upper guide box assembly.

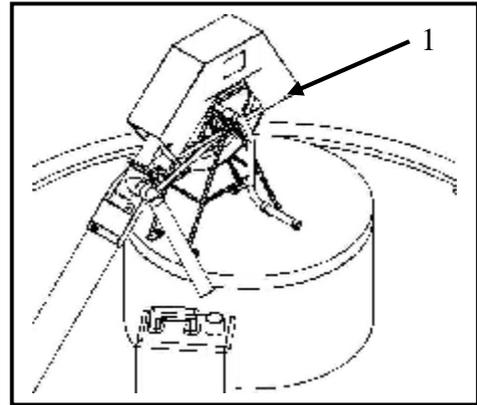


12. Re-fit the pipe bracket with its two small screws and nuts (a). Also refit the screws that clamp the protection pipe at front and back (b).

13. Pull the rope and thread it round the wheel as shown then tie the two ends together as described on page 7.



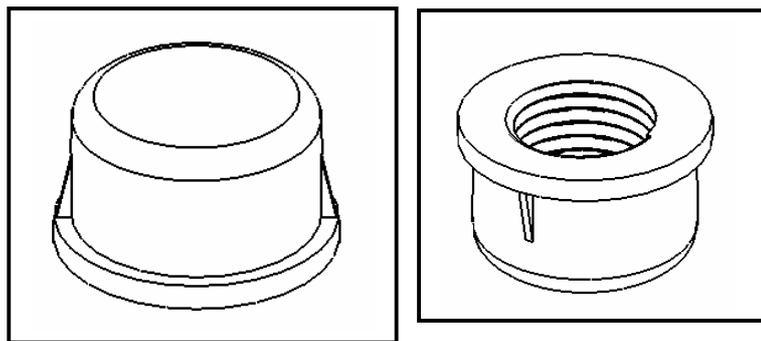
14. Re-fit the wheel cover and four small screws on each corner of the cover (1). Carefully turn the handle slowly to check that the rope and pistons are free to move through the pipe. Increase the speed until water comes out of the outlet pipe and that the flow rate is acceptable. Then re-fit the wheel cover.



**Don't forget to tidy up around the well after you have finished ...  
... It demonstrates you care!**

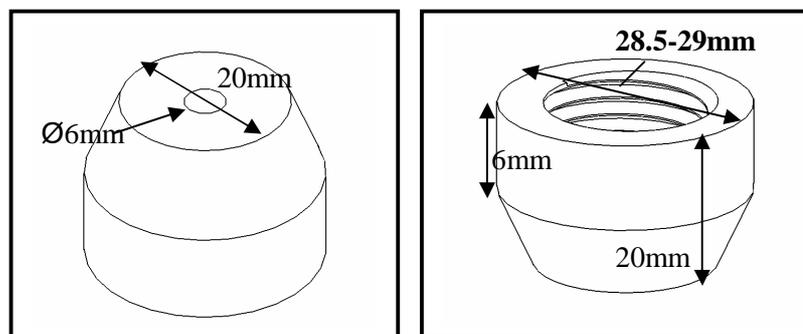
### New pistons

The pistons are made from standard 21mm PVC screwed end caps and can be bought from most hardware shops at local markets. These are shown below...



**Figure 4 standard 21mm PVC screwed end caps (top and bottom view)**

The 21mm PVC screwed end caps are made in to Rope Pump pistons by grinding (or cutting) the sides of the end cap to the shape and size as shown below. It is suggested that you use a local workshop that has the equipment to help make these. Take a set of 26 new PVC end caps (as shown in figure 4), a small piece of the rope, a small section of the riser pipe and a sample of the old piston to the workshop so that they can make the pistons correctly.



**Figure 3 Modified 21mm PVC screwed end caps (top and bottom view)**

NOTE: There should be a gap of around 0.5 and 1.0mm between the piston and the inside diameter of the riser pipe. If the gap is too big, water will pass down around the piston and the flow of water will be less than it should be. If the gap is too small the pistons may be tight inside the riser pipe, this can make it stiff to turn the handle.

### **Care of the paintwork**

The frame work will eventually get scratched through normal usage. If this is left it will soon become an area where rust will appear.

To help minimise this rub any rusty areas with sand paper and wipe with a clean dry cloth. Apply a coat of paint to the area and leave to fully dry before operating the pump.

-----

This manual should be kept in a safe place with the person responsible for taking care of the pump.  
If a spares box, or tool box, has been purchased for the pump this manual should be kept inside that box as well.