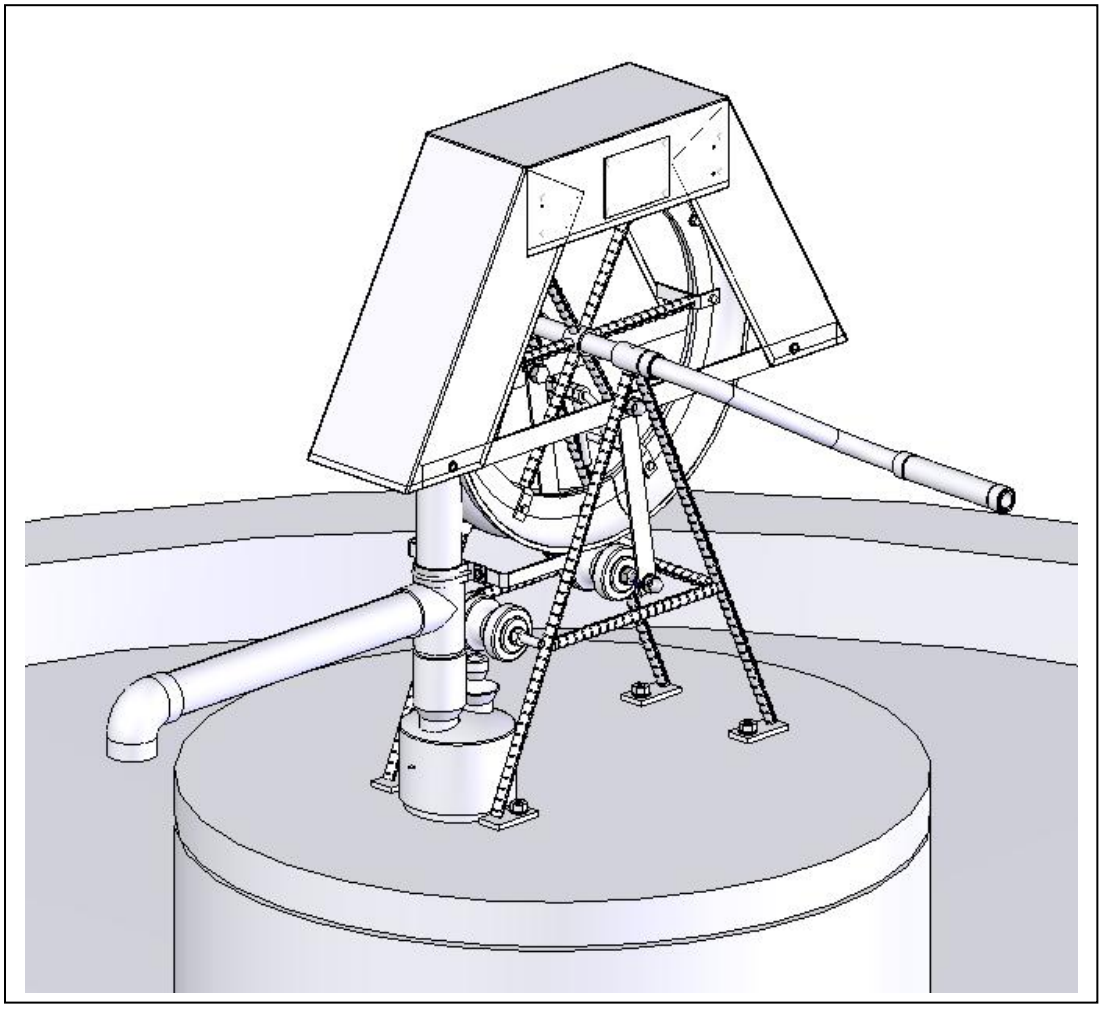
Ideas at Work (IaW)
#5, Street 21,
Tonle Bassac,
Phnom Penh

Phone : +855 (0)23 350 911
Mobile: +855 (0)12 593 973
Email : info@ideas-at-work.org
Web : www.ideas-at-work.org

THE 'ROVAI' HANDPUMP - RP6

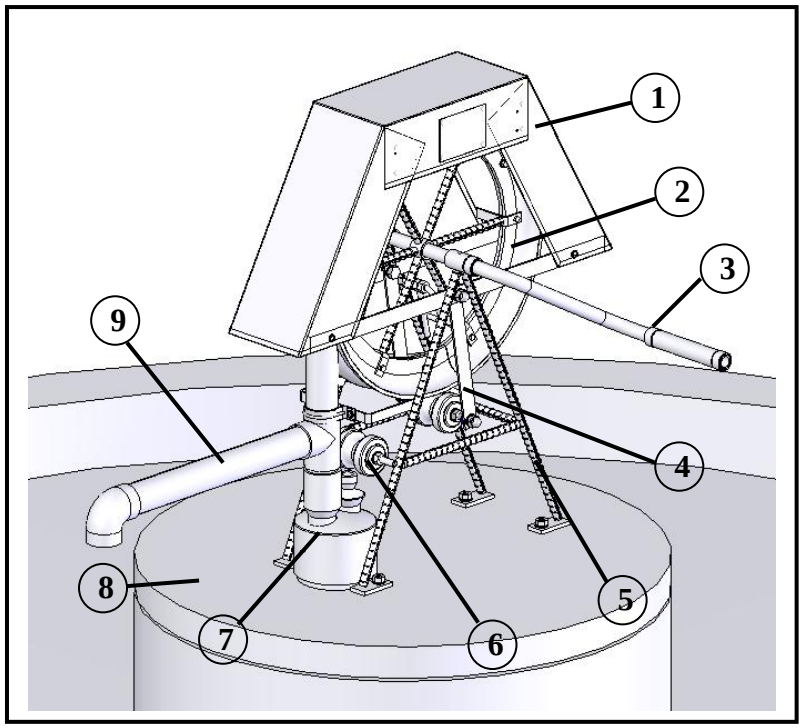
(The Cambodian version of the Rope Pump)



INSTALLATION MANUAL

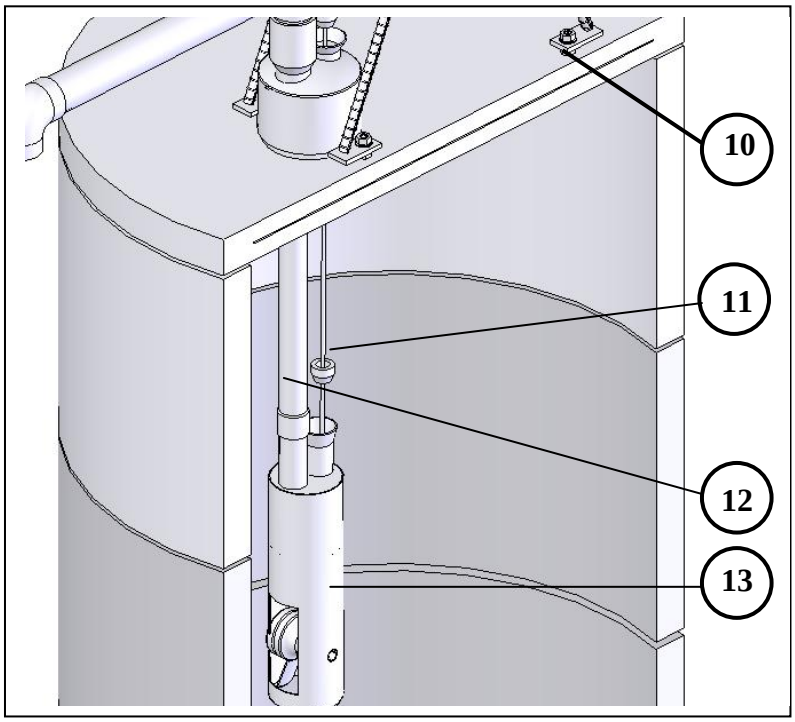
V. Whitehead, December 2007

The main components of the Rovai Pump



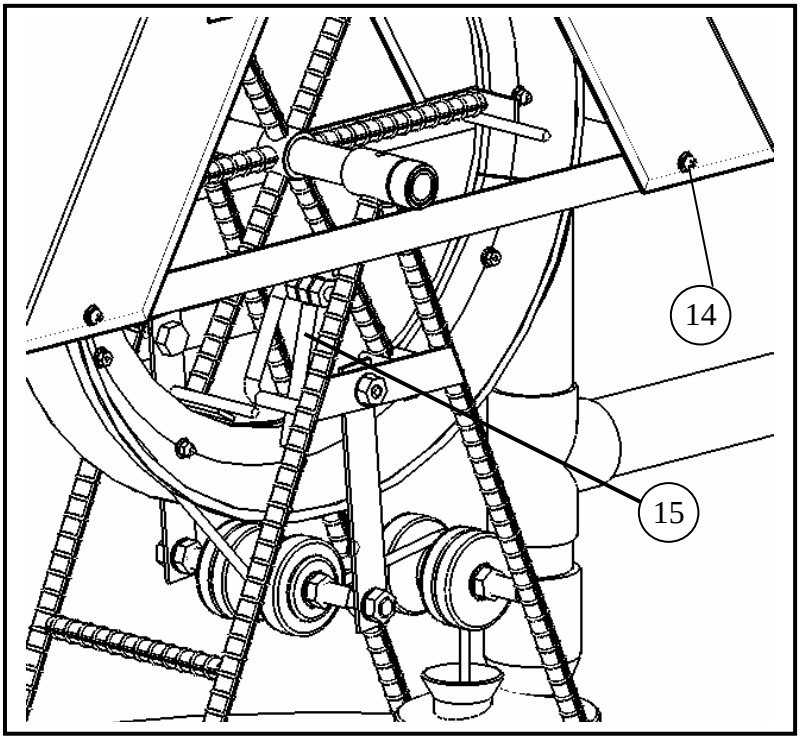
1. **Wheel cover**
2. **Wheel**
3. **Handle**
4. **Rope tensioner**
5. **Pump frame**
6. **Ceramic guide**
7. **Upper guide box**
8. **Cement cover**
9. **Outlet pipe**

Figure 1 Main components of the Rovai Pump's upper parts



10. **Frame bolts (x 4)**
11. **Rope & pistons**
12. **Riser pipe**
13. **Guide box**

Figure 2 Main components of the Rovai Pump's lower parts

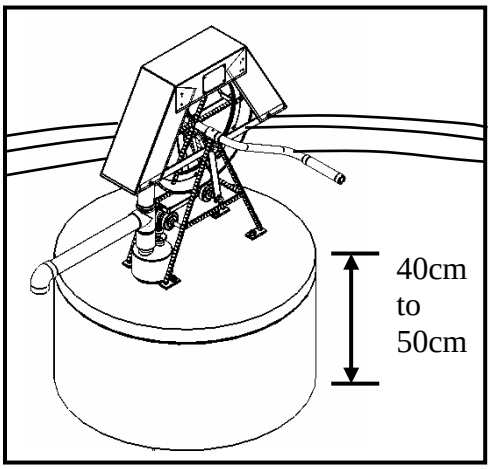


14. Wheel cover nuts (x 4)

15. Ratchet

NOTE: Please make sure all the items listed below are ready before installation starts

Equipment	✓	Tools	✓	Consumables	✓
Rovai Pump head		Spanners No. 6'' adjustable x 2		Sandpaper	
Rope & pistons		Hacksaw		PVC glue	
Riser pipes		Tape measure (10m)		Grease	
Bottom guide box		Scissors or knife		Oil	
Upper guide box and outlet pipes		Thin string & weight (fishing line)			
M10 Nuts & washer		Pliers			
Cement cover		Cigarette lighter or matches			
		Fishing line + weight			

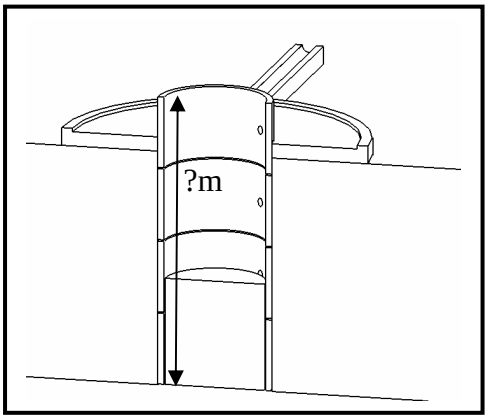


Well construction note:

It is important that users, especially children, can reach and operate the pump comfortably.

It is recommended that when constructing the well the height from the apron to the top of the well is between 40 and 50 cm.

ROVAI PUMP INSTALLATION INSTRUCTIONS



1. **Hand dug well:** Measure the depth of well, this should be from the top of the cement ring to bottom of the well

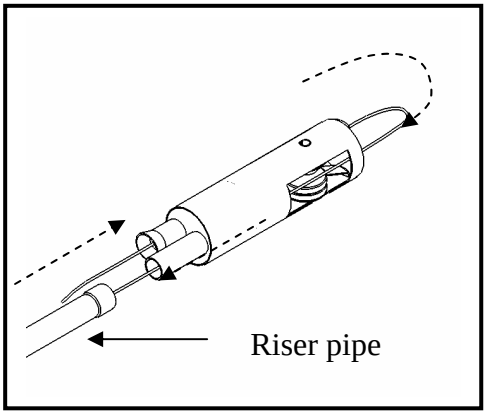
   Take off 0.5m from this measurement and cut the riser pipes to this length. (Example if it is 7.75m to bottom of well, then 7.75m - 0.5m = 7.25m). This makes sure the guide box does not sit in the sediment at bottom of the well.

   Tube well (borehole): Measure the static water level and add approximately 4m to this for the length of pipes to use. This should allow the guide box to be below the water level as the water level will drop during pumping (drawdown). How much this drops will depend on the recharge rate of the well. Also make sure that measurements are taken at the end of the dry season where possible.

Piston and pipe sizes: It is important that the right pipes and piston sizes are used for the various depths of water. The deeper the water level the more water there will be in the pipe and the heavier and harder it will be to operate the pump. The table below will help to guide the installation

Depth range (m)	Piston diameter (mm)
0-10	28
10-20	21
20-30	18
30-40	16

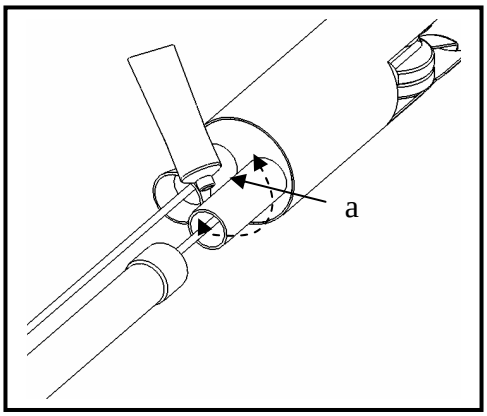
Guide box diameters:
90mm diameter guide box can be used on 100mm diameter or bigger tube well.
75mm diameter guide box can be used on 90mm diameter or bigger tube well.
Rovai pumps can not be used on tube wells that are smaller than 90mm diameter.

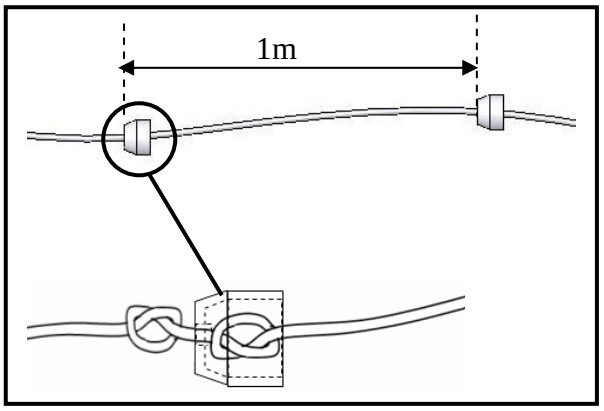


2. Push the fishing line rope and weight through the guide box. Also put this through one length of the riser pipe.
   Drop the weighted line through the next pipe or as many as there is to be fitted.

3. Apply some PVC glue around the end of the pipe ‘a’ and push it on to the riser pipe. Allow a few minutes for the glue to dry. **NOTE:** *<u>Do not</u> put glue <u>inside</u> the end of the riser pipe as excess glue may be pushed inside the pipe and when it hardens the pistons may not fit through the pipe.*

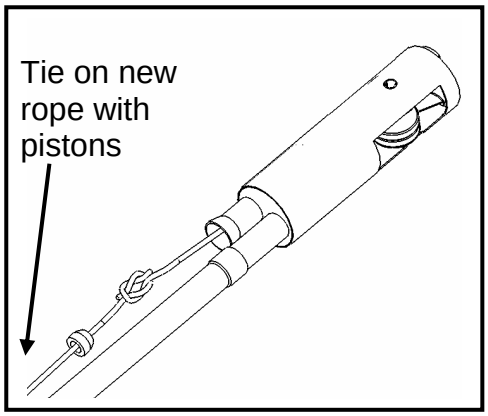
   Glue all the pipes together in the same way that need to be fitted

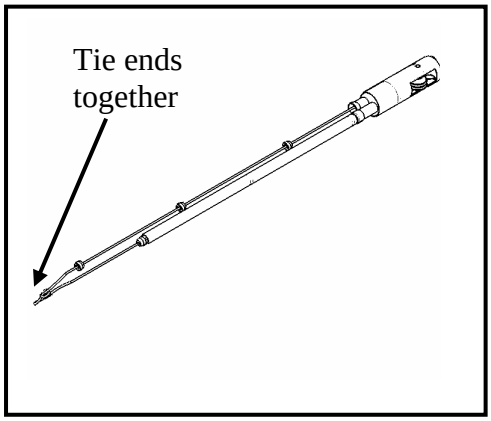




4. Cut the rope to length. This should be 2 x depth (of pipes) + 4m. Example; 2 x 7.25m + 4m = 18.5m. Tie a piston on every 1m with a knot above and below the piston. Make sure they all face the same way.

5. Tie the rope with the pistons on to the fishing line as shown opposite. Then pull the rope through the guide box and up through the riser pipe. Make sure the pistons are facing the correct way as shown, the small cone end should face towards the open end of the return pipe





6. Pull the ropes through until the ends are equal length. Tie a knot in them to stop the rope falling back down the pipes

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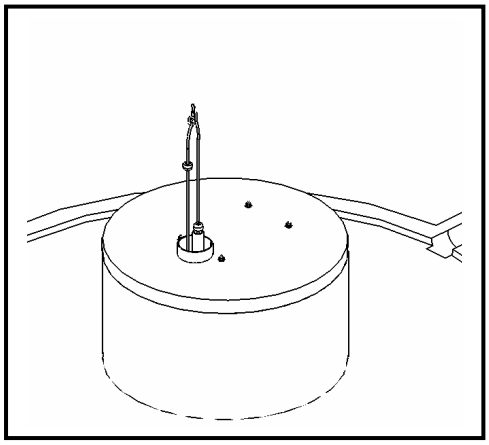
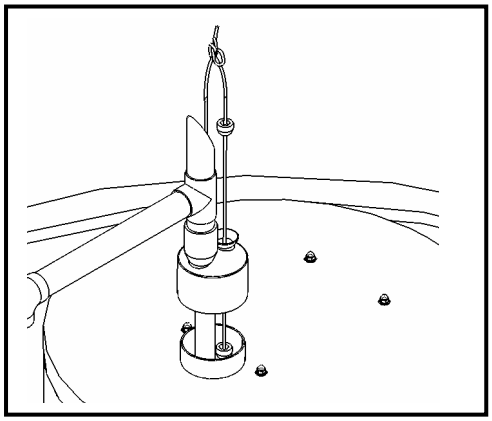
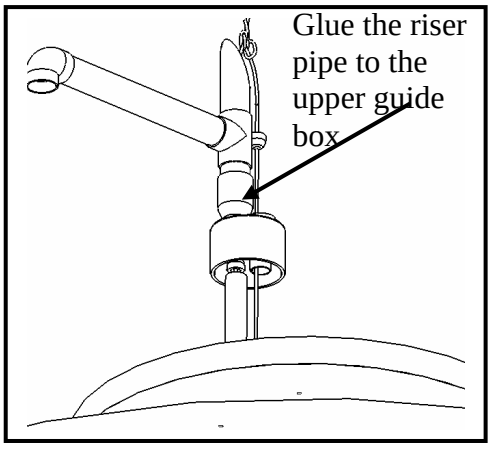
7. Lower the riser pipes and the guide box down into the well. Lift the cement cover on to the well head and pull the ropes up through the hole.
   .

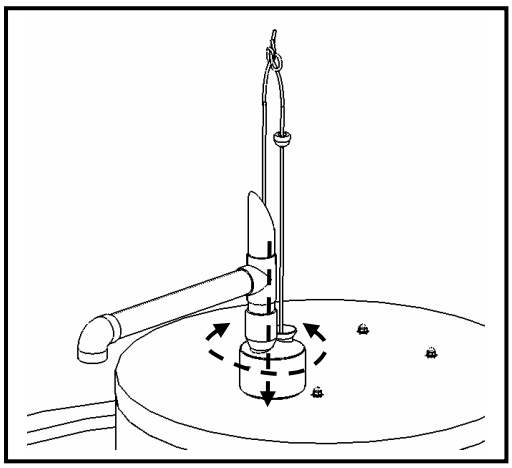




8. Then untie the knot and push the ends of the rope up through the return pipe and the angled riser pipe as shown. Make sure that the rope with the downward pointing pistons goes through the return pipe of the upper guide box.

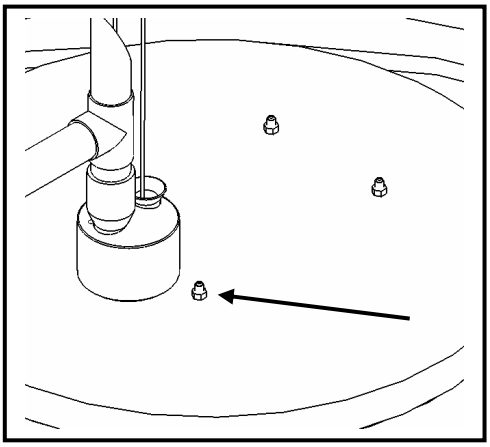
9. Apply some PVC glue to the end of the riser pipe and push it on to the upper guide box. Make sure that the upper guide box and the bottom guide box line up with each other as shown

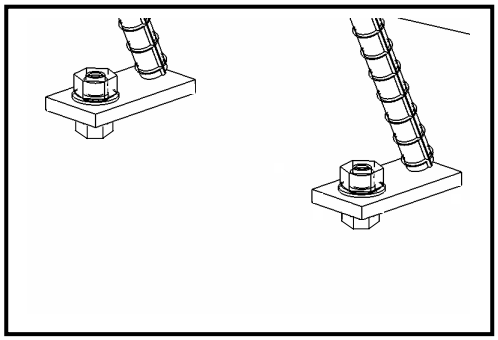




10. Push the upper guide box and outlet assembly down on to the small piece of pipe on the well cover.

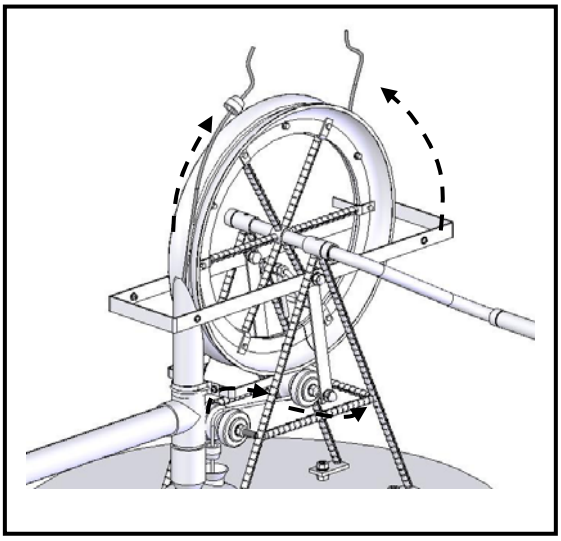
11. Apply some grease or oil to all the four stainless steel M10 bolts that protrude out of the cement cover. Place a stainless steel M10 nut on to each of these and position them level with the cement cover as shown opposite.



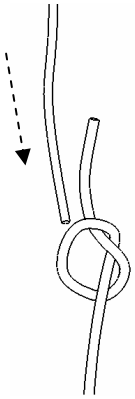
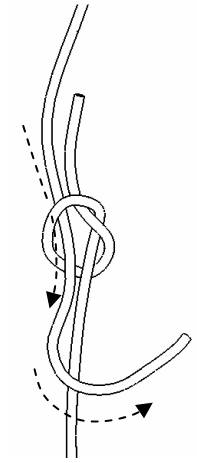
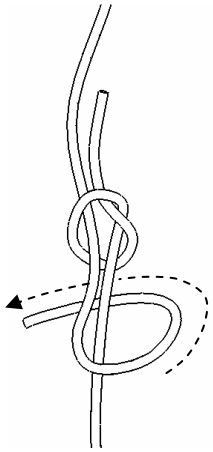
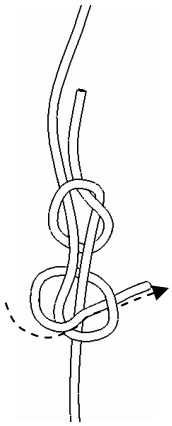
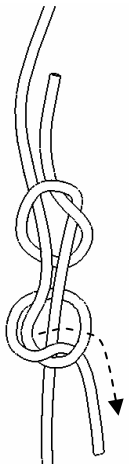


12. Then put the Rovai Pump on to the bolts and fit them with the four more stainless steel washers and M10 nuts. Check that the pump is level on the nuts before tightening the bolts down.

13. Untie the knot in the rope and thread the rope through the guide pieces and wheel as shown opposite. Hold both ends in your hands and pull up and down to check that the rope and pistons are free to move around the bottom guide box.

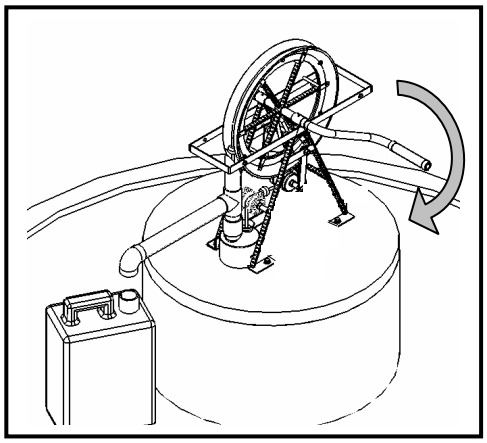


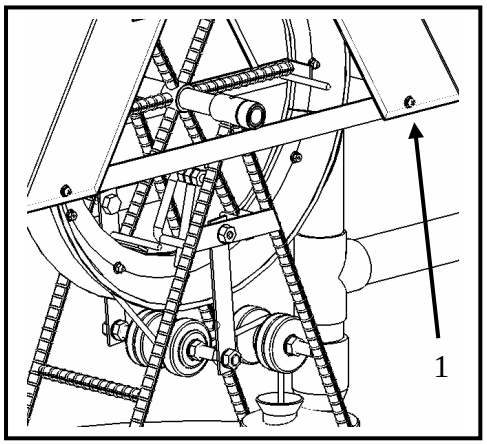
14. Follow the five steps as shown below for tying a knot in the rope. After step five pull the rope tight and check that it will not come undone by pulling hard on each side the knot.

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
				

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

15. Slowly turn the handle 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.





16. Fit the cover as shown using the four stainless steel M5 bolts, nuts and washers on each corner of the cover (1).

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

It is strongly recommended that a responsible person is chosen to take care of the pump. If this is a communal pump then this could be the pump caretaker of the village's 'water user group'. This person should receive training in operating and maintaining the Rovai Pump. There is a separate manual for this and it should be used as part of that training, a copy of the manual should be given to that person for their use.

NOTE: After installation of the pump please refer to the 'RP6 Operation and Maintenance manual'