



Fundación Centro Experimental
Las Gaviotas

SEE-SAW PUMP GAVIOTAS



Installation, Operation and Maintenance Manual at community level
2010

Presentation

This document presents the findings of 12 years work devoted to evaluating the technology available and the management options for implementing large-scale water supply systems for the community.

Among the low-cost options with better chances are the systems include extraction of underground water using reciprocating pumps, see-saw pump, this being one of the most affordable and sanitary means of lifting groundwater to the surface.

A more direct benefit of the improved water extraction systems is the reduction in time and energy to take the water. Combining this work with the recreation of the children using beam pumps, makes the task of water recollection in less than an hour a day, compared with the many hours that women and children spend on transport, causing a major limitation in the use of water when the distance to the source is very big.

The pump was designed as an instrument for women and children work because traditionally in our country, this responsibility of domestic work falls on them.

For applications in schools, children farms, family welfare centers, it was developed an even longer arm to match the capacity and weight of children. It provides a substantial margin of storage to absorb the seasonal variations in supply and demand. It enables staged development without incurring high upfront costs for storage concept, distribution lines, treatment plants, etc. necessary to meet satisfactorily the end demand in a distribution system fed by surface water.

The beneficiary communities are able to assume the maintenance of the pump. The key element in this type of management is the option for the community and its organization for the maintenance and repair of pumps. Its success is linked with a sense of community's priority of the well and pump, and it can only be achieved when the community has a capacity for organization and availability of the basic tools, spare parts and basic knowledge for maintenance.



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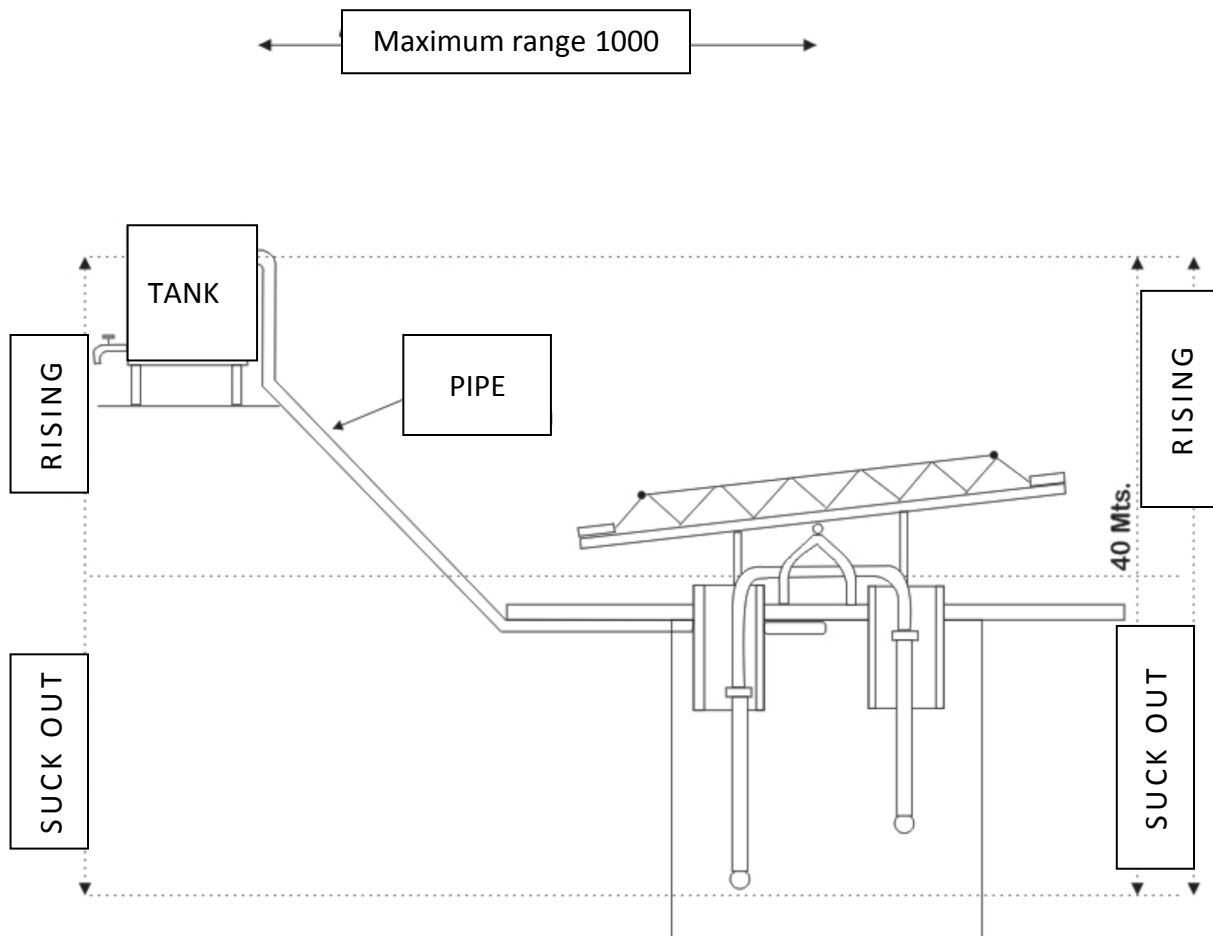
Website: www.centrolasgaviotas.org

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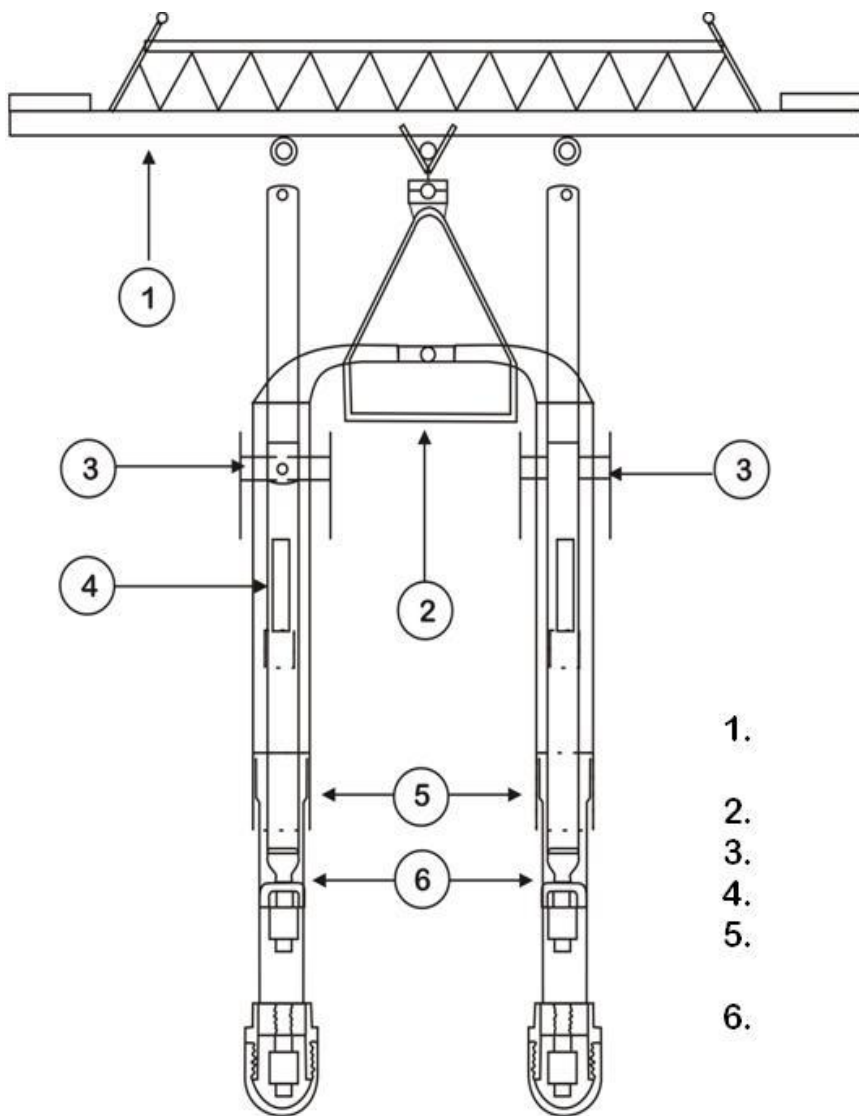
CRITERIA FOR THE INSTALLATION AND OPERATION OF THE SEE-SAW PUMP

WHAT TO DO	NOT TO BE DONE
<ul style="list-style-type: none">• Locate in a clean site away from garbage dump.• Make drainage around the well to prevent puddles.• Locate latrines and septic tanks away from the facility (100 meters minimum distance)• Water main should be buried and the storage tank must be removed from the installation of the see-saw to avoid puddles formation.	<ul style="list-style-type: none">• Let trees grow near the well (minimum distance 10 m.)• Littering in or near the well• Let puddles and swamps form around the well.• Build latrines or septic tanks Near and above the water table where the pumps are installed• Leave in the open the driving hose, bathing or washing near the well.

MAXIMUM OPERATING RANGE



See-Saw pump parts



1. Pump lever
or arm
2. Support
Collar
3. "U"
4. Sleeve
(Cylinder)
5. Piston
- 6.

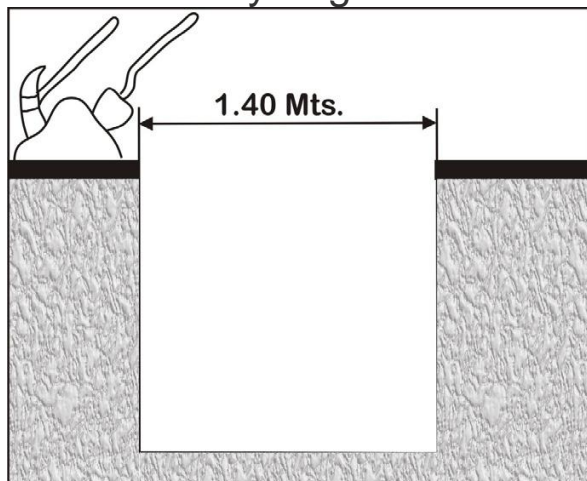
Construction of the well or cistern

There are two systems for the construction of the well. Pick and shovel dug or drilled with drill bit or auger.

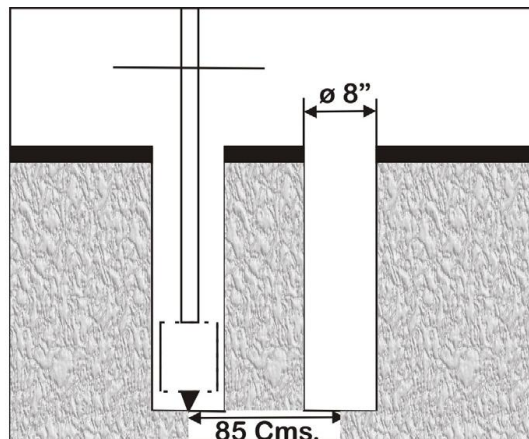
Pick and shovel well

NOTE: The diameter at the excavated pit should be 1.40 meters, for the pumps sleeves do not rub against the walls thereof, and also make it easier for future maintenance and cleanliness.

Well drilled by auger



Drilling 8 inches diameter each well with 6-inch sanitary pipe. Keep a distance of 85 centimeters between centers of the well's mouth.



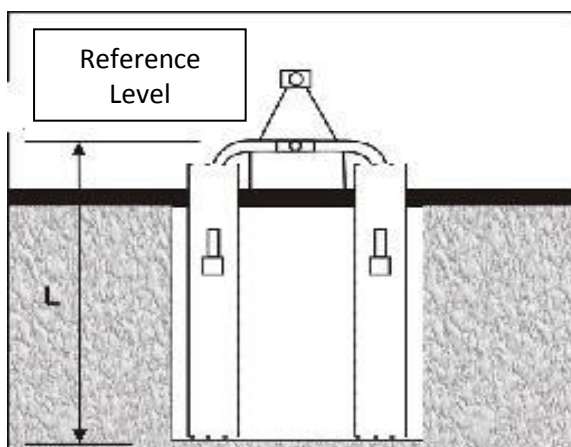
Recommendations for placing the well

- Check the existence and depth of wells in its vicinity.
- Identify the topography: Slopes, hollows, tops.
- Slopes and tops are not favorable.
- Recognize all springs, swamps, clumps of water to 1 km radius.
- Recognize the type of terrain: sandy, clayey, rocky.
- Look for places where rainwater is deeper in the soil (runoff). The best infiltration occurs in sandy soils where there are large rocks and loose soil or covered with vegetation. Location and drilling wells more than a science is an art.

STEPS IN THE ASSEMBLY

1. Measure the depth of the well with a plumb-bob

The measure taken will be there from the top of the U-tube attached to the base of the SEE-SAW to the bottom of the well.

**How to measure the length of the pipe**

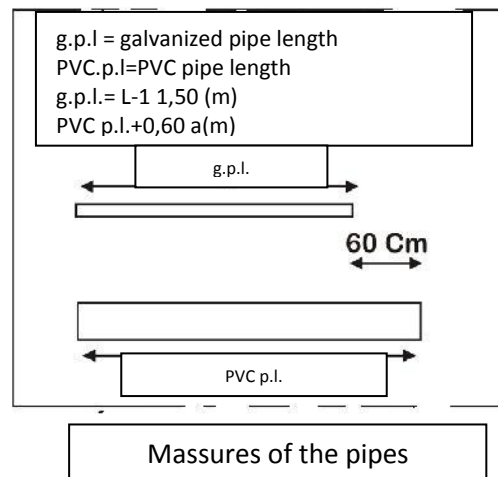
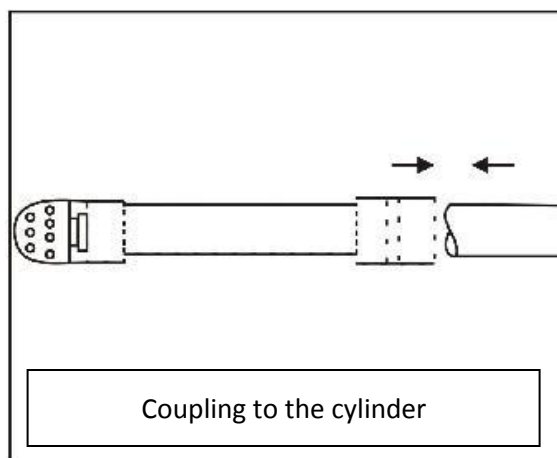
Length of one inch galvanized pipe.
From the depth measure of the well deduce one meter 50 cm this will be the measure for all the pipes in the See-Saw pumps. These pipes should be threaded.
Note: the pipe should keep this proportion otherwise you could cut or add a piece of pipe and use a bind and Teflon tape.

2. Calculating the length of the sleeve

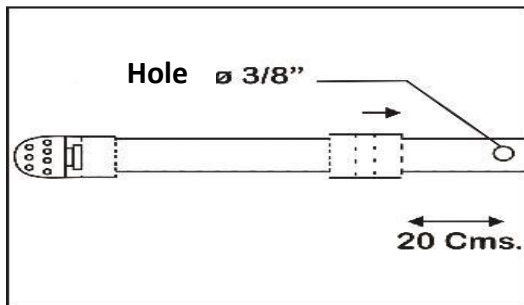
To the 1" galvanized pipe length "previously calculated, add sixty icm(60)

This will be the length of both the 2" PVC pipes for the sleeves.

Note: if the sleeve length is longer than 6 m make the pipe longer welding it with liquid weld for PVC.

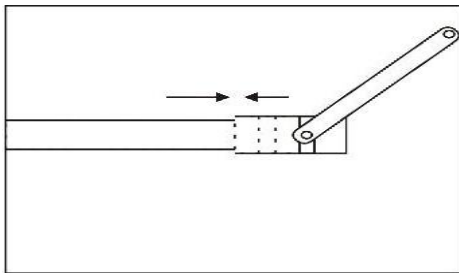
**3. Stick the cylinder to one end of the 2" PVC pipe**

4. Make a 3 / 8" diameter vent hole on each sleeve at 10 or 20 Cm. of the previous coupling.



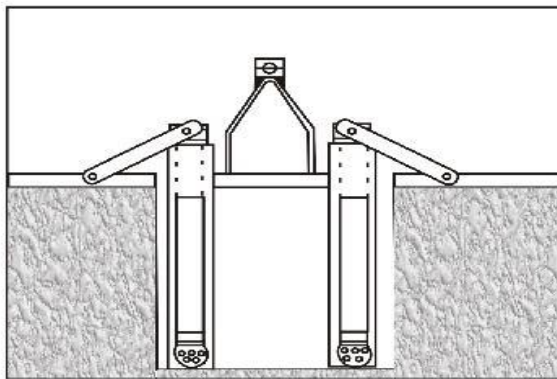
Vent holes

5. In the last section of PVC pipe 2 "from each shirt, paste the respective collars.



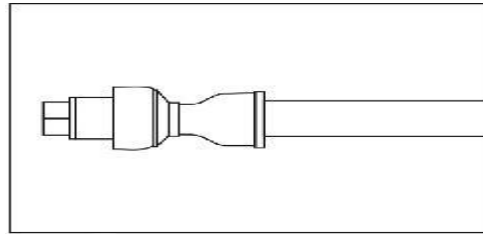
Coupling of the collar

6. Enter the sleeve (PVC pipe attached to the cylinder and the collar) in the well.



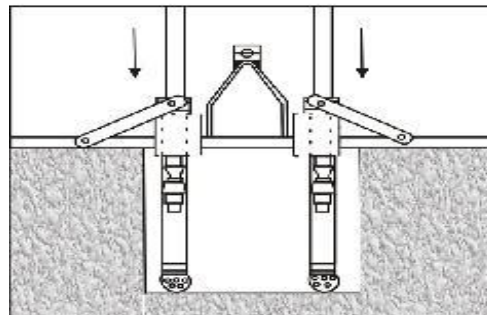
Introducing the sleeves into the well

7. At one end of the 1 "galvanized pipe couple the piston.



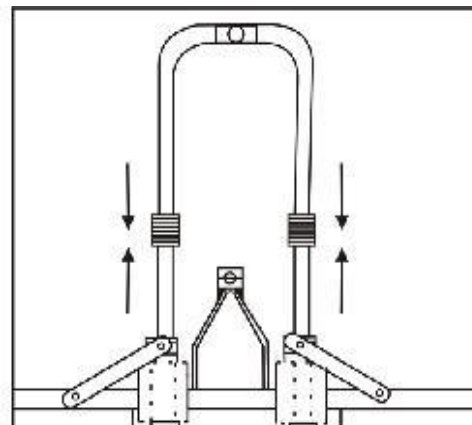
Coupling of the piston

8. Enter the one-inch galvanized pipe (1 ") into the two inches (2") PVC.



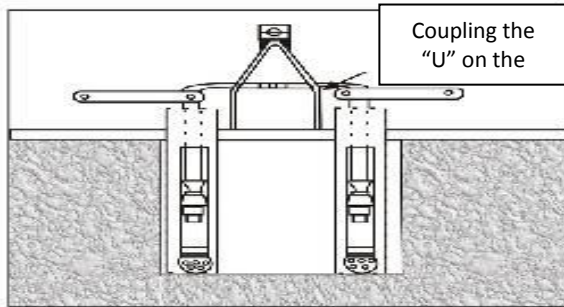
Introducing galvanized pipe into the sleeves

9. The final section of the galvanized pipe is coupled to the U. Repeat same operation on the other end.



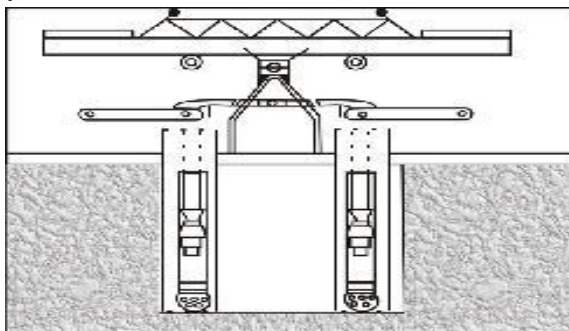
Coupling of the pipes with the "U"

10. Fix the "U" to the base of the See-Saw cast in the cement board.



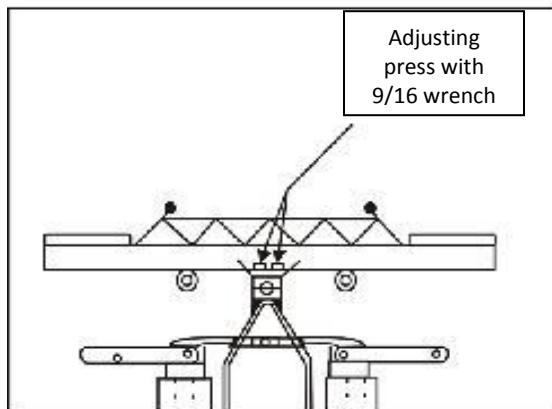
Coupling of the "U" on the base

11. Attach the pumping arm axis on top of the base of the See-Saw



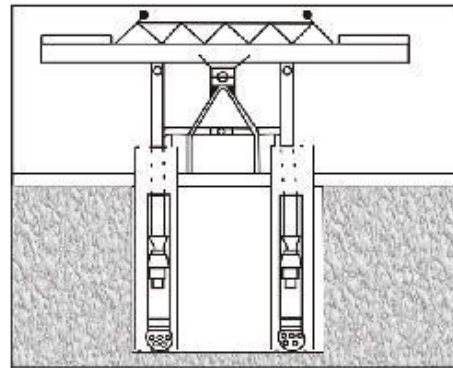
Arm pump coupling

12. Use 9 / 16 "combination wrench to fix the press that holds the pumps arm axis.



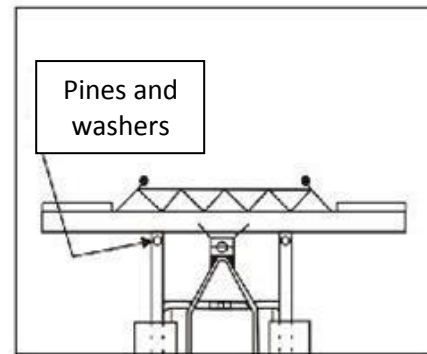
Adjusting the press

13. Enter the axes of the straps on the pump arm bushings.



Coupling of the straps on the arm of the pump

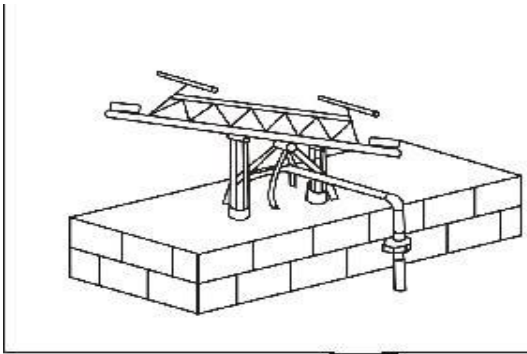
14. Place the washers and pins on the axes of the straps.



Pins and washers

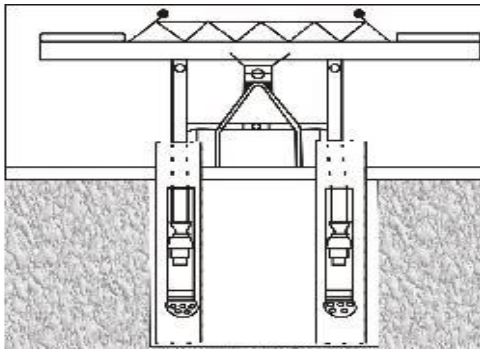
15. Check if the pumps are charging. Operate pumping arm and cover the water outlet of the "U" so that the pistons expand and raise pressure.

16. Attach the line pipe and the outlet of water in the "U" with a 1 "galvanized universal joint.

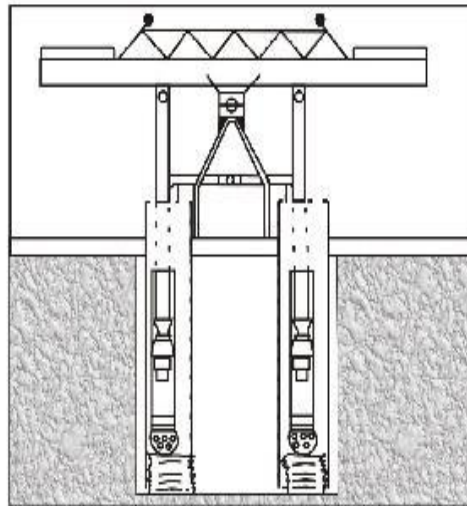


Driving hose coupling

Like this should be a supply of water using
See-saw pump swing, if the well is drilled



Water supply in a drilled well



Water supply in a dug well

Final review

It must meet the following objectives:

- Charge pumps until it is clean water.
- Check that water is clean.

- Note that in a recently built well, the water can have a different flavor at first that will change as the supply is used.

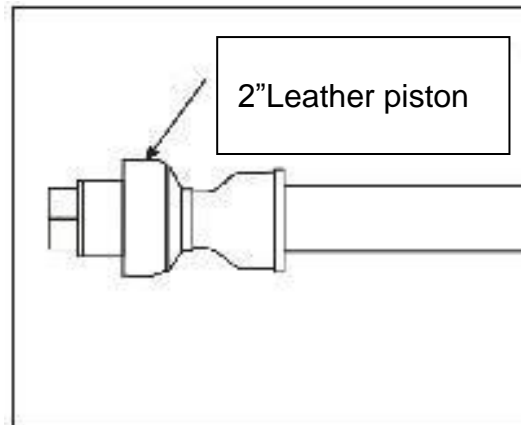
Maintenance

When the water supply has been built and is in the utilization phase, is very important the implementation of a regular and appropriate maintenance of the facilities and installations, for ensuring a water supply that meets the community requirements and the basic hygiene regulations.

A water supply in bad conditions can deteriorate very fast and affect the health of the community. Thus it is necessary to take necessary corrective measures to ensure clean water conditions. We should not forget that civilization is a constant dialogue between man and water.

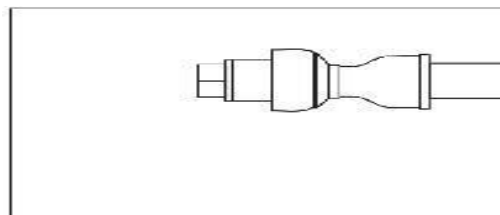
Review of the leather plunger:

- Follow steps 7 to 14 in counterclockwise to get the one inch galvanized pipe
- Before changing a check or 2" leather plunger, note how it is coupled to assemble it properly.
- If the plungers of the two pistons are damaged, they must be changed,



Review of the leather plunger

Review of check valves:
- Following the step 6, but in the opposite direction, remove pumps sleeves and proceeds to reviewing the check valves, either for cleaning or change them.



Check valve review

Preventive maintenance

- Check the hole cleaning and pumps. It is necessary to organize one day a month dedicated to general cleaning drain-places,

Storage tanks, and drive pipes in order to avoid marsh or stagnant water around the well.	Grease periodically the hubs of the See-Saw. It is recommended to cover the strains for avoiding accidents of children and animals
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PROBLEM	CAUSE	SOLUTION
The See-Saw does not work or does not provide enough water		
The pump has no pressure and cannot pump water	<ul style="list-style-type: none"> -Damaged Leather plunger -Dirty check valves - Broken or worn PVC sleeves 	<ul style="list-style-type: none"> - Change the leather plunger - Clean the check valves. - Glue the pipe if possible, otherwise change it.
It draws little water.	- Leather Plunger loose	- Tighten check valve of the piston.
The SEE-SAW arm jerking (goes down gently and returns quickly without removing water).	- The check valve is too tight against the PVC plug.	- Tighten the check and relax a little pomegranate, so that remains a light of 1.5 Cm. between check and 2 "PVC wall plug
SEE-SAW arm (Pump lever) not moving.	- Cylinder imprisoned in sand or mud.	- Bail the well and remove sand or mud, then review the checks and leather plunger.

SEE-SAW PUMP EFFICIENCY DATA

A SEE-SAW operation will be 40 cycles /minute and 20 L minimum consumption per person/ day.

The delivery rate and number of beneficiaries will be:

OPERATING TIME (Hours)	FLOW SUPPLY (Liters)	PEOPLE BENEFIT
1	1.500	113
2	3.200	227
3	4.300	340
4	5.800	454
5	7.400	567
6	8.600	680
7	9.300	794
8	11.500	907

FOR MORE INFORMATION ON PRODUCTS AND ACTIVITIES CENTRO LAS GAVIOTAS PROGRAMS, See WEB PAGE: www.centrolasgaviotas.org



Vichada Colombia, Gaviotas Center panoramic view



Gaviotas, that world over there "a community to reinvent the world " as Alan Weisman called Gaviotas in his book, was emerging spontaneously from chaos to cosmos, always believing in freedom, without a predertermined schema different from sustainability. The human race originated in the tropics and in the tropics must be one homo sapiens sapiens reborn, to help stop the extinction, a man vital and a lover of life, capable of lighting a new future.

"Maturity is to make dreams come true "

Paolo Lugari