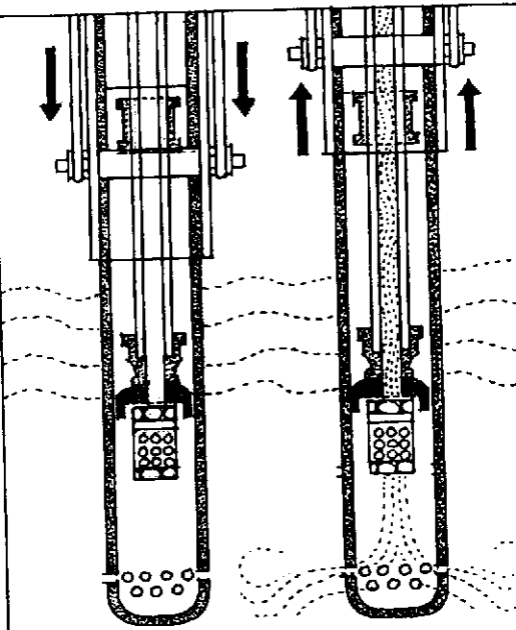


Gaviotas Manual Sleeve Pump



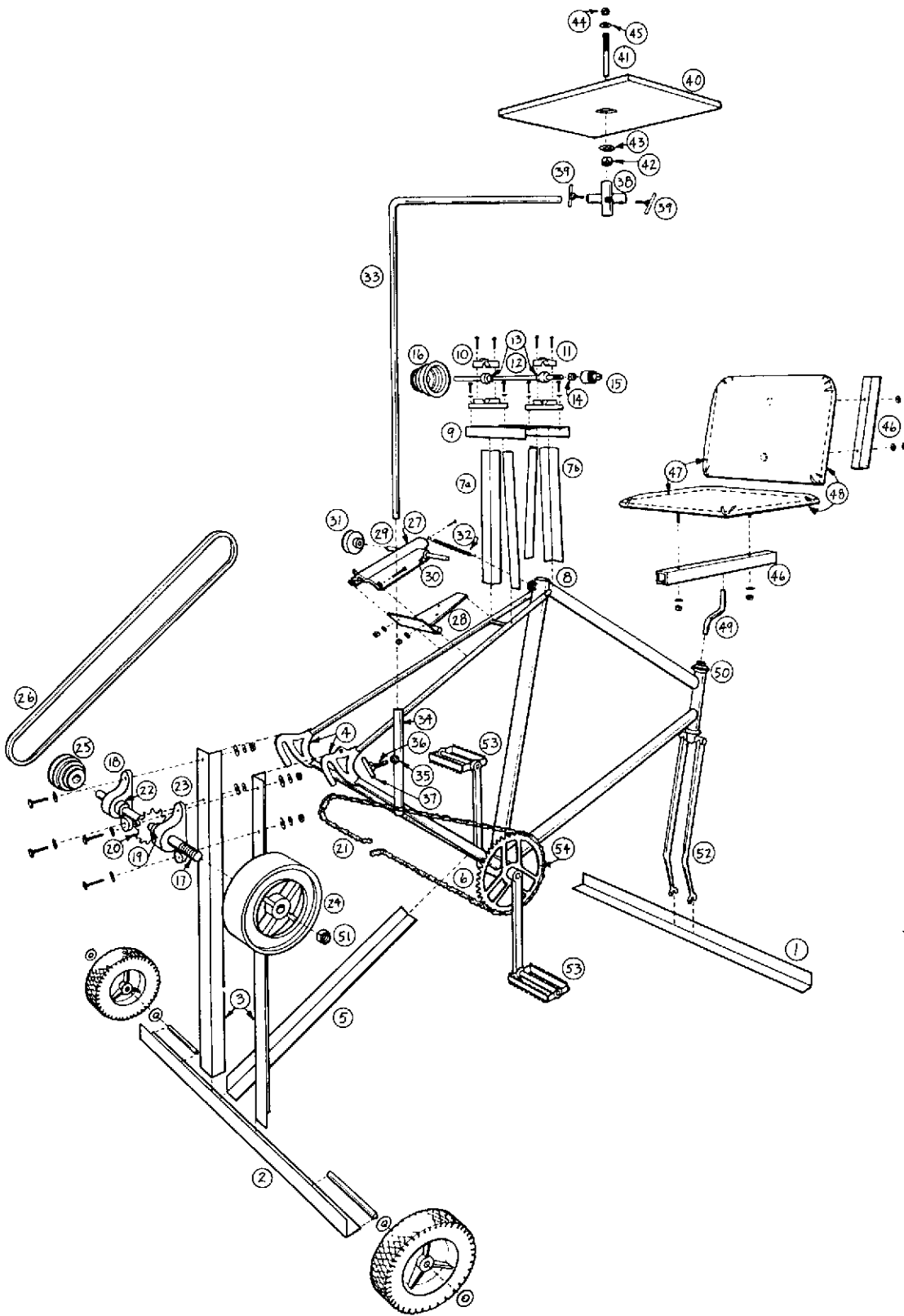


Figure 3-25 Exploded view of homemade Energy Cycle

used on small steep plots in France and Italy for hauling a plow up a slope, the plow then being dragged down again by hand. At the National College of Agricultural Engineering at Silsoe in Bedfordshire, a recent development is the Snail, an engine-driven mobile winch which is driven along on two wheels, paying out the cable. The winch then stops and hauls in the cable and the process is repeated.

The pedal winch should be capable of tackling much the same type of work, and where manpower is plentiful, as in most less-developed countries, a two-man winch can be used at either end of the plot. The pedalers could have a rest in the shade between spells of hard work! Hand-pushed plows, cultivators, and hoes are available which would be suitable for cable traction with little or no conversion.



Figure 2-16 Foot-operated diaphragm pump developed by the International Rice Research Institute

Pedal Drives for Irrigation Pumps

In Bangladesh and other parts of the Third World a requirement exists for pumping water from a river to the fields. The foot-powered pump developed by engineers at the International Rice Research Institute in the Philippines can lift large quantities of water several feet using only moderate amounts of labor. The operator simply stands on two foot rests at either end of the pump and rocks back and forth. That effort compresses a diaphragm which forces water from the outlet valve. By operating the pump in a rhythmic manner, a continuous flow of water is pumped. This is quite an efficient unit.

Efficient as the bellows pump is, it is perhaps possible to propose a pedal-driven irrigation pump, particularly one that could leave water at considerable heights. Further requirements would be:

- (a) low cost but long life with minimum maintenance,
- (b) use of local materials or standard bicycle parts,
- (c) portability (the pump must not only accommodate to varying river levels but be capable of being moved to different sites as

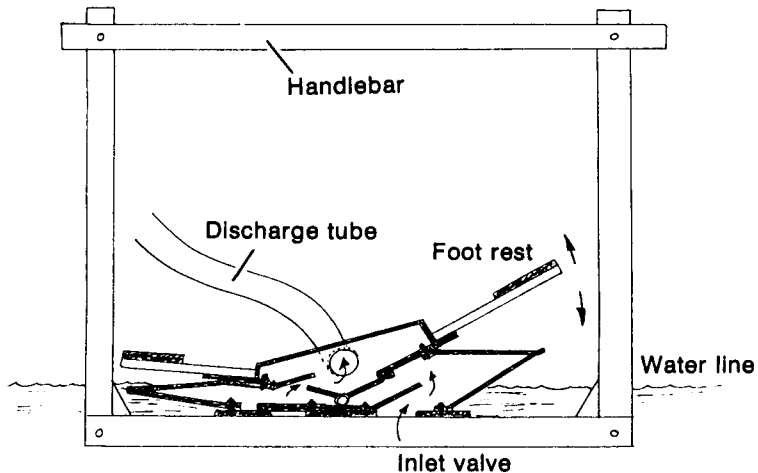


Figure 2-17 Schematic drawing of a bellows pump

required and perhaps dismantled and stored during flood times),

(d) use of pedal power rather than manual operation, since it is two to three times more effective, and

(e) if possible, a two-man operation rather than one, for increased and smoother output as well as for social reasons.

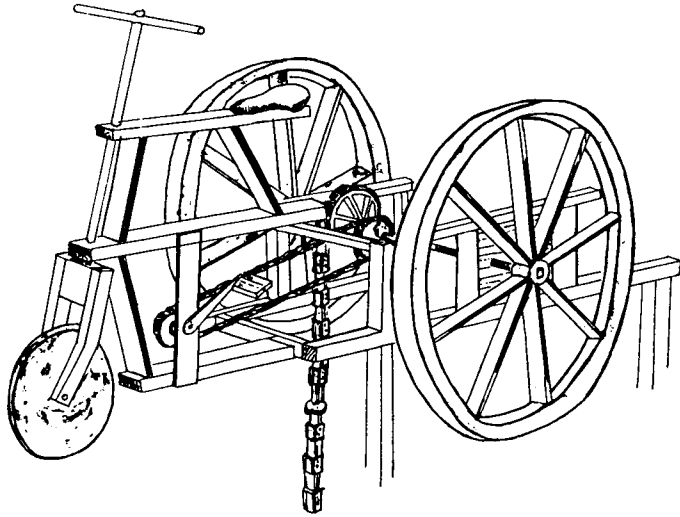


Figure 2-18 Chinese "tricycle" water pump in which wheels also serve as flywheels

Figure 2-21 shows a proposed design of two very traditional elements in a new way. The pedal unit is of a type used in China for hundreds of years and still in use for a variety of purposes, including low-lift pumping by means of a "square pallet chain pump." This type of pump is not altogether suitable for Bangladesh and similar areas because at

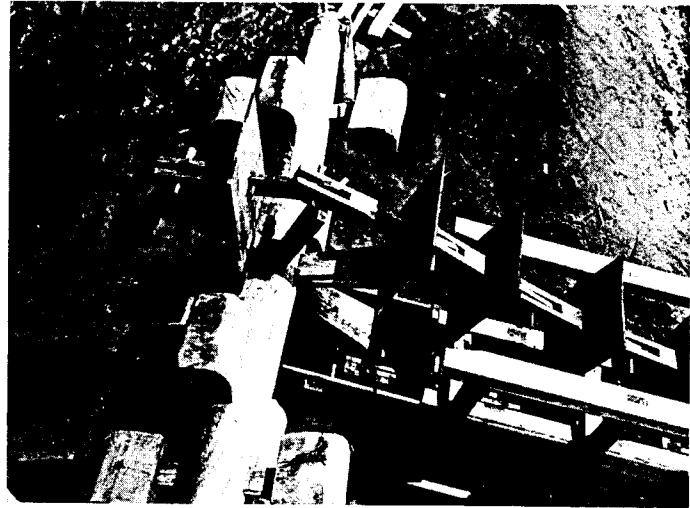


Figure 2-20 Close-up of Figure 2-19



Figure 2-19 Chinese wooden water pump used for raising sea water into salt-evaporation beds

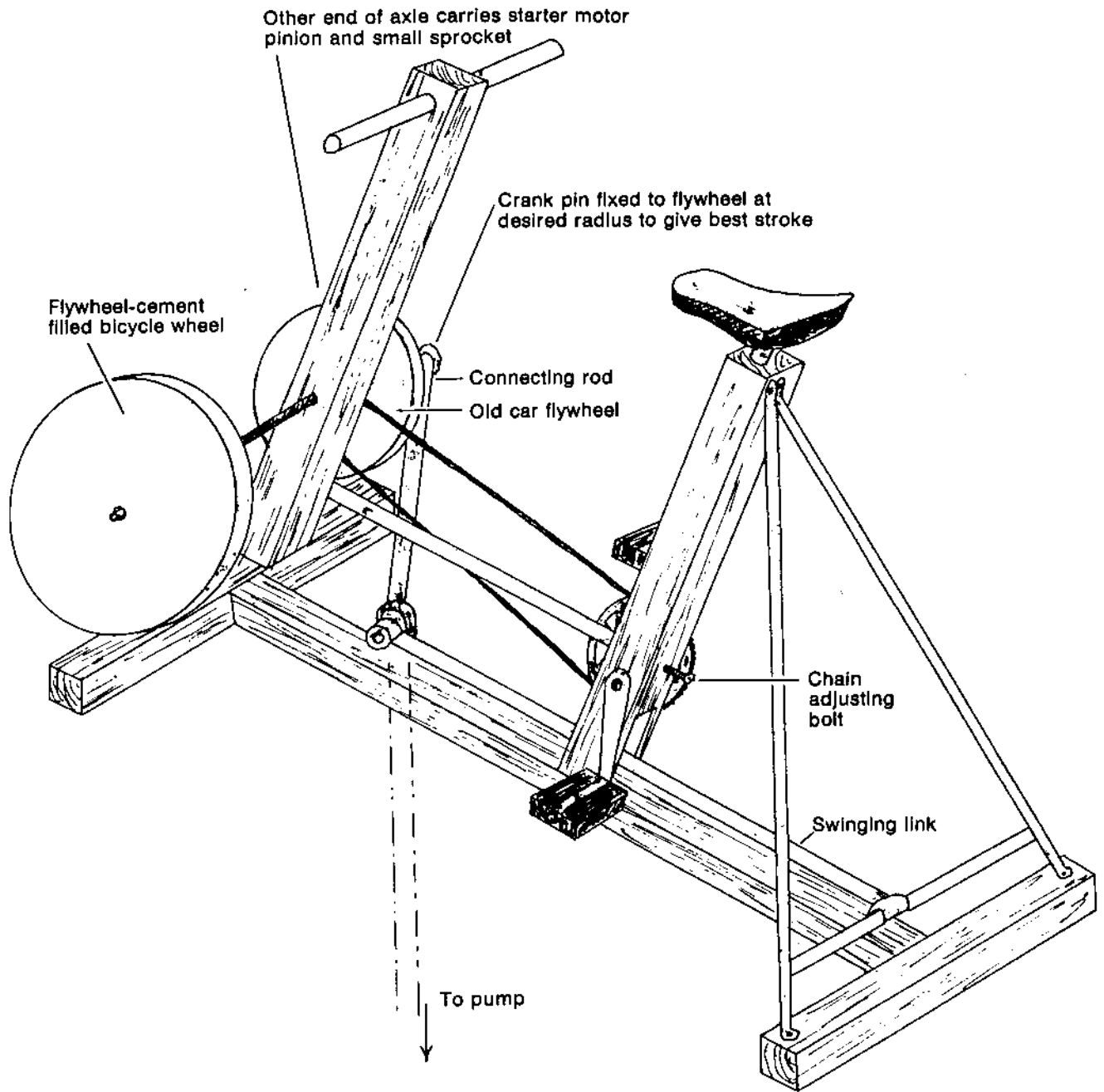


Figure 2-24 Pedal drive for deep borehole pump (prototype)

The Rower Pump, MF 14-368, reports and brochures, 1984 and later, available from Mirpur Agricultural Workshop and Training School (MAWTS), Mirpur Section 12, Pallabi, Dacca-16, Bangladesh; or Mennonite Central Committee, 1/1, Block "A" Mohammadpur, Dacca, Bangladesh.

Rower Pump Installation for Irrigation

