

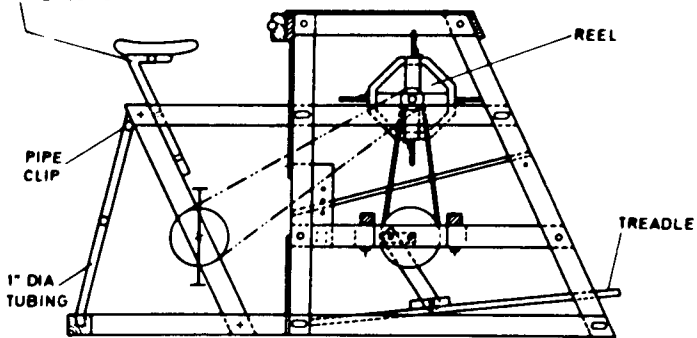
Pedal Power, article, 18 pages, S. Wilson, 1975, in **Lectures on Socially Appropriate Technology** (see review on page 34).

This is the most valuable article on pedal-power we've seen. 26 drawings and photos. The author discusses the energy efficiency of the bicycle compared to other modes of transport; and we discover that a person on a bicycle is the most energy efficient moving thing that exists (measured in calories per unit of weight per unit of distance). By measuring the energy output of a bicyclist, Wilson has found that "the normal cyclist has an expenditure of about 75 watts—roughly 0.1 horsepower...the fullest sustainable output of the human body, using the right muscles, right motions, and the right speed."

The author gives consideration to stationary pedal-power, used to operate pumps, for example. A rotary pump is shown with pedal attachments. "It is such a simple type of pump and suitable for direct pedaling for heads of 3 to 8 meters that it is, I think, worth developing." Wilson notes that some traditional water-lifting devices in India require 4 men to raise the same volume of water that one man on a pedal-power pump could lift.

An optimum stationary pedal-power unit, called a 'dynapod' is described. "It takes the drive forward and you can gear it down for something like a winch or gear it up for a winnowing fan...One of the requirements in a stationary application is a flywheel to steady out the torque, and here the flywheel is made from a bicycle wheel with cement filling in between the spokes."

1" DIA TUBING
FIXED BY TWO
PIPE CLIPS



Peanut thresher showing options for either pedal-drive while seated or treadle-operation while standing

Other pedal-powered machines shown are the traditional Chinese square pallet chain pump (also called the 'water ladder'); a two-man powered milling machine; a hand-driven winnowing machine which could be adapted to use pedal-power; a peanut thresher (see drawing); and a cassava grinder.

Notes on an improved cycle rickshaw (three-wheeled pedicab) are included, explaining how two bicycle 'freewheels' are combined to form a differential—a device that allows a rickshaw with two rear wheels to turn corners with the two wheels rotating at different speeds. The author suggests a design for local production of bicycles in developing countries, relying on sheet steel and angle iron instead of imported steel tubes; he has built prototypes. The 'Oxtrike,' a rickshaw using these materials, also has a very low-cost 3-speed gearbox to allow easy starting and climbing hills.

Highly recommended.