

ANILA-I AND POGHIL, TWO LOW-COST WIND PUMPS

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OBJECTIVE

To foster self-reliance and to provide quantum improvements in life-style, two types of low cost wind pumps have been designed and installed in and around Madras. Ten numbers of such devices have been commissioned. These are used for nursery irrigation, domestic use, shrimp farming, energy forestry etc.

METHOD OF ATTACK

For the coastal area, it was felt that a bidirectional upwind sailing wind pump would capture the force for most of the year. Such a device is ANILA-I. To take advantage of the multidirectional winds in the interior, a downwind sailing device - POGHIL, was fabricated. Both these devices are made by village level artisans, except for a minimum of welding in the POGHIL device. The structural parts of both devices are made of locally cut casuarina trees (or palm trees) and nailed together with struts.

The rotor part of both devices consists of a wooden hub whose thickness is such that the leading edge and trailing edge of the sails are separated in the wind direction. The sails (3 in number) are made of HDPE backed by a fish-net and are hung on 6 wooden spokes. The power transmission is by an eccentric wooden wheel and the end thrust is taken up by planetary wheels acting on a thrust box.

ANILA-I (Fig.1)

(N.R.D.C. Award - 1979)

A straight wooden shaft, either chiselled out or turned in a lathe, takes up the rotor hub cum fly-wheel is secured to it with a wooden rectangular key. The M.S. stub-axles roll in the wooden bush-bearings at the top of the main poles.

Three wooden arms are fastened to each other, to form an equilateral triangle at the centre. Two such sets of spokes are placed on either face of the circular wooden hub and fixed rigidly with screws. These six arms together with the wooden hub form the rotor. The triangular sails are taken up by these arms.

While the vertical loading of the shaft is transmitted to the structure through the stub axles, the end thrust is transmitted through a pair of wooden planetary wheels to the end 'thrust box' fixed on to the main pole of the structure.

An eccentric wooden wheel with suitable circumferential groove is fixed to the shaft. An 'L' type shear-pin transmits the torque from the shaft to the eccentric wheel which actuates the connecting rod through an M.S. ring encircling the wheel along its groove.

The shaft with the rotor is held horizontally at the suitable height by means of casuarina or teak poles or, alternatively, by means of palm trees with separate wooden blocks inserted at the top as bearings. The stub axles roll in the augured holes at the top of the poles.

POGHIL (Fig.2)

This windmill has a sail rotor with horizontal iron shaft mounted on a swivelling wooden box. The rotor is in the down wind position.

The swivelling arrangement is made possible with a pair of iron tubes closely fitting as the 'sliding pair'. A wooden cam attached to the main shaft takes up the rotor torque and actuates the 'F-lever'. The flat arm of the F-lever in turn operates the pump rod to lift water through a "twin-eye link".

The main horizontal iron shaft rolls in the wooden bearing pillar blocks and a pair of planetary wooden wheels attached to the shaft running on the box face holds the rotor against the impinging wind. A wooden fly-wheel attached to the other end of the shaft balances the rotor.

A pair of wooden brake wheels is keyed to the main shaft and by pulling a rope from the ground the brake shoes press against the wheels to halt the rotor.

SIGNIFICANT CONCLUSION

Two and half years of experience has shown that the wind force can be harnessed by these inexpensive devices and provide substantial assistance to the rural areas.

NOTE

Engineering drawings and fabrication details are available at the Research Centre, Tharamani, Madras 600 042.

The design knowhow of Anila-I and Poghil is (Patent applied for) available free of charge as a public service to all those interested in its utilization.

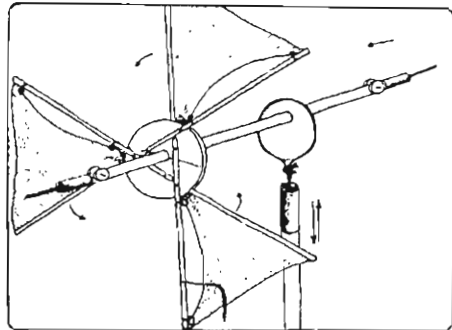


Fig-1 (ANILA-1)

This drawing shows the sail rotor with its horizontal wooden shaft provided with M.S stub axles.

On either end is one pair of planetary wooden thrust wheels to take up the axial load of the rotor.

Also is shown the wooden eccentric grooved wheel with M.S. ring encircling it to transmit the power from the shaft to the connecting rod.

TECHNICAL DETAILS

	<u>Anila-I</u>	<u>Poghil</u>
Rotor dia	366 cm	335 cm
Solidity ratio	31.3	31.3
Tip speed ratio	1.50-2.00	1.50-2.00
Cut-in wind speed	10 km/hr	10 km/hr
Rated wind speed	20 km/hr	20 km/hr
2" dia pump stroke	15.25 cm	11.5 cm
Pumping head	8 metre	8 metre
Discharge	1750 lph @ 20km/hr	1500 lph @ 20km/hr
Cost (1979)	Rs.1500/=	Rs.2250/=

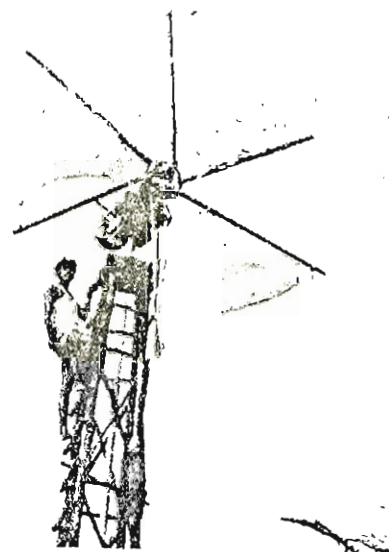


Fig.2 (POGHIL)

The photograph shows the POGHIL working at Vadakadampadi Village (Thirukkalukundram Taluk) for home consumption and vegetable farming.

The sail rotor with its fly-wheel and the swiveling wooden box are clearly visible. Note the M.S. tube supporting the box onto the tower.

The fishnet backing the sails can be seen and the planetary wooden wheels holding the rotor against the wind, is on the "fly-wheel-side" of the box (not visible in this photo).

The F-lever, wooden cam, brake lever and the pump rod are also clearly visible.