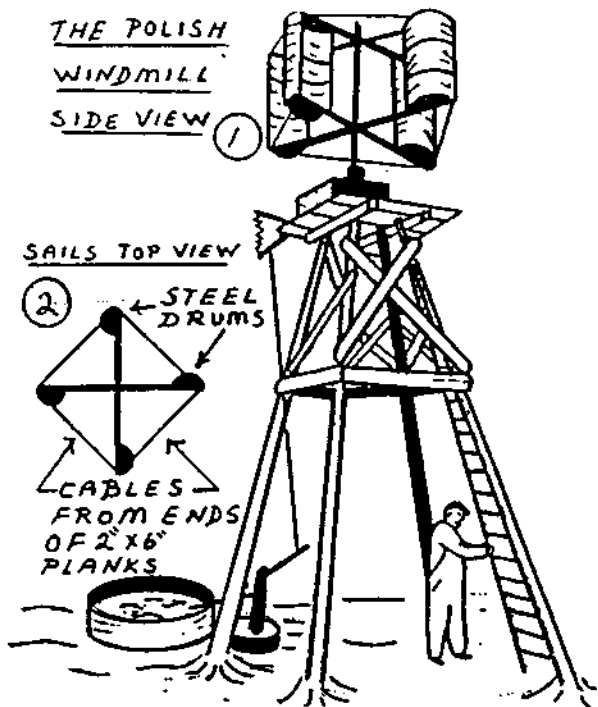


PLATE No. 57

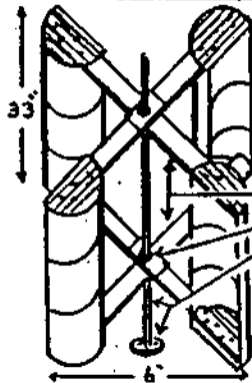
DESIGN ALTERNATIVE III  
THE POLISH WINDMILL I

- VERTICAL AXIS - STEEL DRUM SAILS -
- AUTO REAR END DRIVE - MULTIDIRECTIONAL
- NEEDS NO TAIL VANE

THE POLISH  
WINDMILL  
SIDE VIEW ①



SAILS TOP 3/4 VIEW

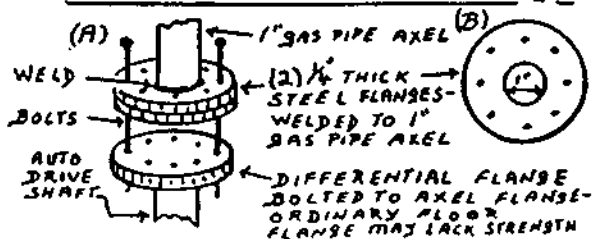


(4) SAILS -  $\frac{1}{2}$  STEEL DRUMS BOLTED TOP AND BOTTOM TO 6 FT PIECES OF 2" X 6" LUMBER

4 X 4 (TOP AND BOTTOM) PIECES OF 2" X 6" LUMBER - ATTACHED TO AXEL WITH FLOOR FLANGE NUTS -

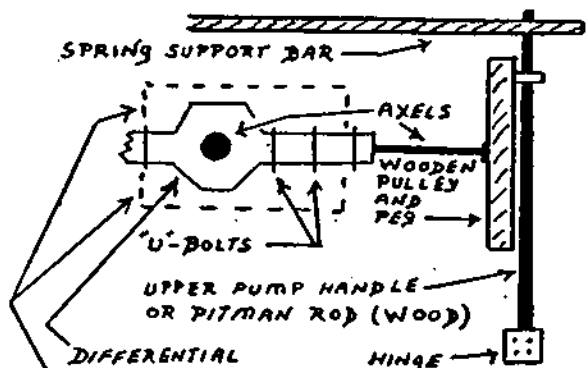
1" GAS PIPE AXEL BOLTED TO AUTO REAR END WITH STEEL FLANGE.

## STEEL VERTICAL AXEL FLANGE



### TOP VIEW

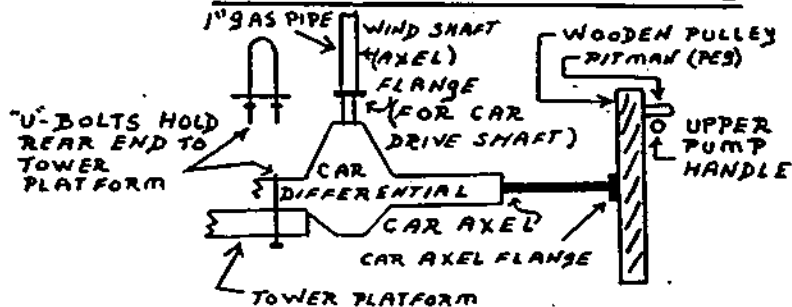
## AUTO REAR END AND PITMAN



BLOCKS HOLD DIFFERENTIAL (REAR END) UPRIGHT - SO WIND FORCE CAN NOT PUSH IT OVER -

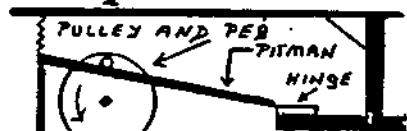
### SIDE VIEW

## AUTO REAR END RT. ANGLE DRIVE



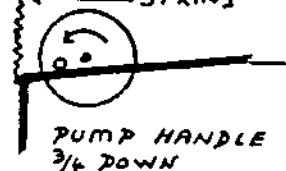
ECCENTRIC PIN ON WOODEN  
PULLEY DRIVES PITMAN

(A) SPRING SUPPORT BAR



PITMAN AND PUMP HANDLE UP

(B) SPRING



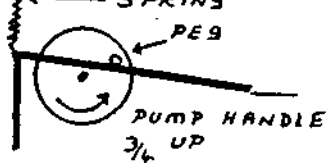
PUMP HANDLE  
3/4 DOWN

(C) SPRING



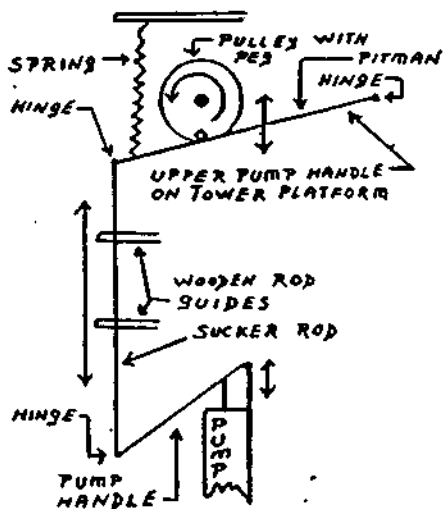
PUMP HANDLE  
FULL DOWN

(D) SPRING



PUMP HANDLE  
3/4 UP

PITMAN CONNECTED  
TO PUMP HANDLE  
WITH SUCKER ROD



NOTE - PEG PUSHES  
PUMP HANDLE DOWN -  
SPRING RAISES IT UP -  
ROTARY → VERTICAL MOTION -

## PLATE NO. 57

The biggest advantage of this design is that it is multidirectional and, thus, requires no tail vane. No matter what the direction of the wind, it just keeps on turning. The only way to stop it is to either tie it down or block it from the wind.

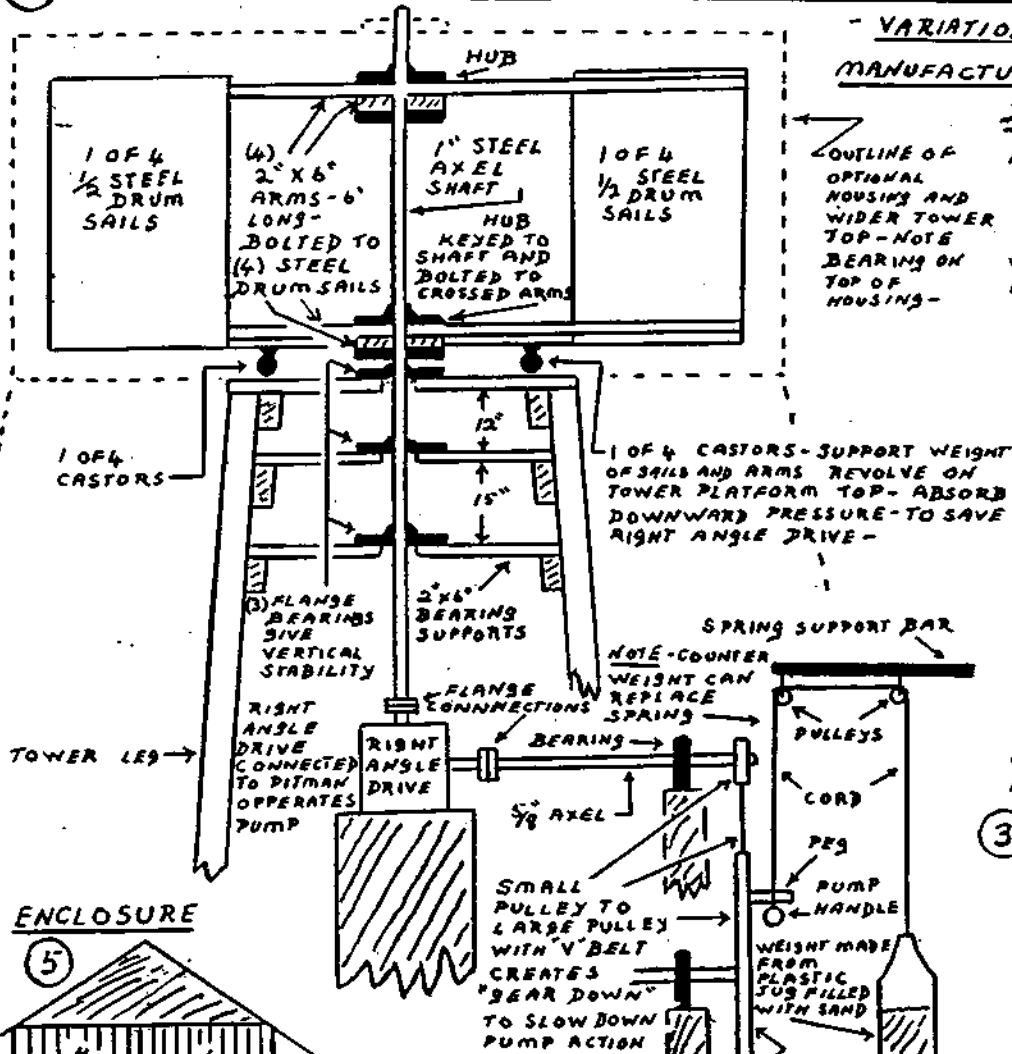
By increasing the length of the arms, and by adding quarter sections of steel drums to the half drums on the ends of the arms, you will increase the torque.

The set up for adapting the auto rear end (fig. 4), is described in plate no. 29 and its accompanying verbal text.

The pitman (fig. 5, 6 and 7), is a wooden or metal peg on a wooden or metal wheel, which is bolted to a metal disc, which is bolted to the auto rear end axle flange.

The 1", (or 2"), gas pipe sail axle is welded to a 1/4" thick steel plate disc, which bolts to the auto rear end drive shaft flange, (see fig. 3, 4 and 8).

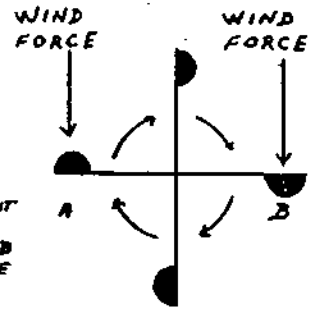
1 BEARINGS ETC - SIDE VIEW



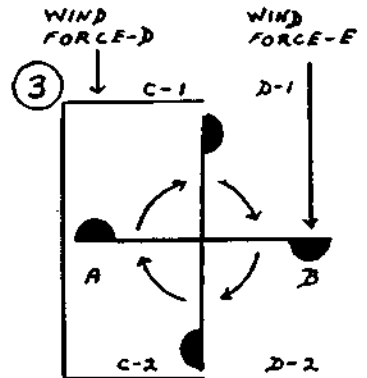
VARIATION - USING MANUFACTURED RIGHT ANGLE

DRIVE AND ENCLOSURE

THEORY - I

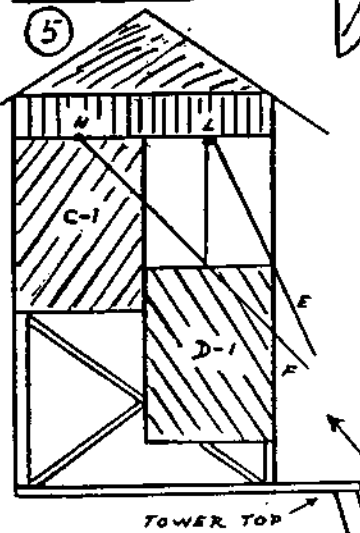


NOTE - WITHOUT ENCLOSURE - WIND STRIKES SAIL - A WITH SAME FORCE AS SAIL - B - SLOWS ROTATION AS - A - ACTS AS A BREAK ON - B -



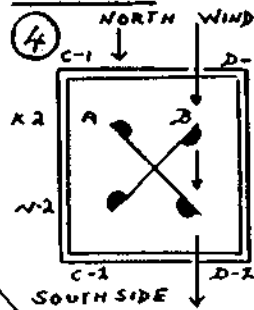
NOTE - ENCLOSURE - C - PREVENTS WIND FORCE - D FROM STRIKING SAIL - A AND IMPEDING THE SPEED OF ROTATION WIND FORCE - E - STRIKES SAIL B - ONLY - ENCLOSURE - C - MUST BE ADJUSTABLE ACCORDING TO DIRECTION OF WIND -

ENCLOSURE



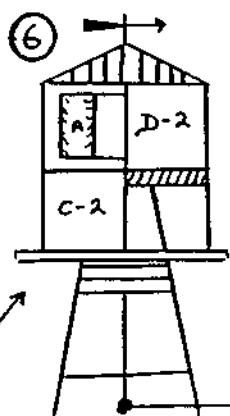
SLIDING DOOR - C - IS PULLED UP BY ROPE - F - ON PULLEY - H - TO SHIELD SAILS IN POSITION - A - (SEE THEORY) - WHEN WIND DIRECTION CHANGES - LOWER - C - AND RAISE - D - WITH ROPE - E -

THEORY - II

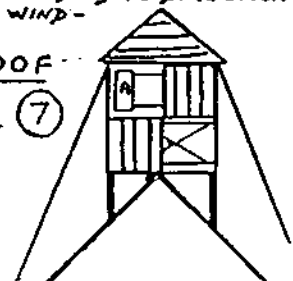


NOTE - FOR NORTH WIND OPEN DOORS D-1, D-2, K-1, N-1 - CLOSE DOORS C-1, C-2, K-2 N-2; FOR SOUTH WIND DO THE REVERSE -

ON TOWER



ON ROOF TOP



## PLATE NO. 58

Note the counter weight replacing the spring in fig. 1. The counter weight is simply a plastic tub filled with the proper amount of sand. A counter weight will not wear as a spring will. A spring, however, will last a long time if it is not extended beyond its proper stretching limit.

Note the important concept, illustrated in fig. 2, 3, 4, 5, 6 and 7.

Left alone, the wind blows at the same time on both sides of the machine, the open sail going as well as on the back side of the returning sail coming back.

If the returning sail side is blocked off, the speed and power of the machine will increase dramatically. This can be done in a number of ways as illustrated. A good alternative is the replacement of the doors (fig. 5), with venetian blind type louvre boards which can be opened or closed at will.

A more simple solution is to erect canvas or wooden barriers which can be easily raised or taken down.

## **PLATE NO. 59**

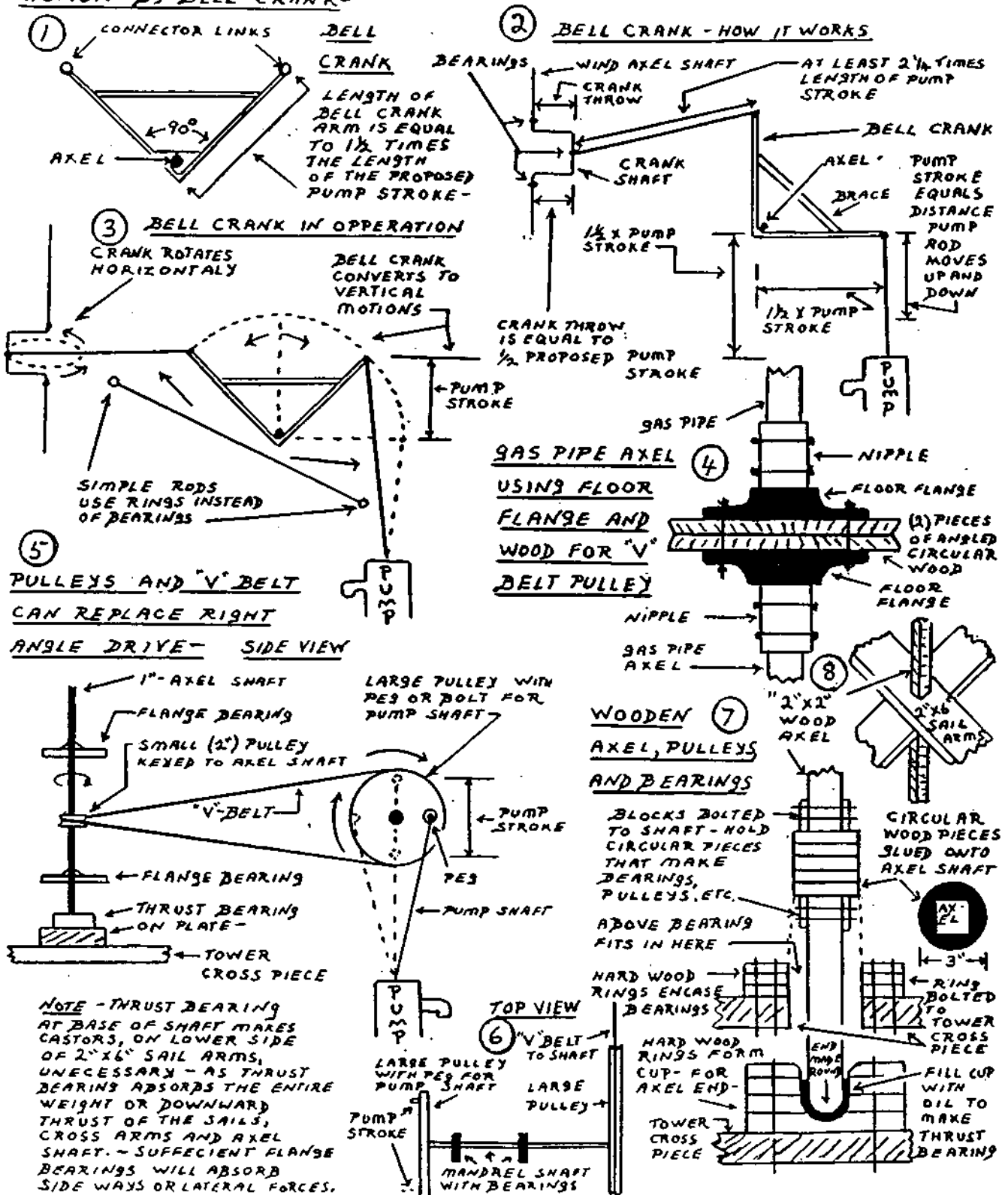
**The methods of power direction change, illustrated here, can be applied to all designs, (see the section on “Design Relationships”).**



PLATE No. 59

HORIZONTAL MOTION  
CONVERTED TO VERTICAL  
MOTION BY BELL CRANK-

DESIGN ALTERNATIVE - V  
THE POLISH WINDMILL - III  
POWER CONNECTIONS



NOTE - THRUST BEARING AT BASE OF SHAFT MAKES CASTORS, ON LOWER SIDE OF 2" X 6" SAIL ARMS, UNNECESSARY - AS THRUST BEARING ABSORBS THE ENTIRE WEIGHT OR DOWNWARD THRUST OF THE SAILS, CROSS ARMS AND AXEL SHAFT. - SUFFICIENT FLANGE BEARINGS WILL ABSORB SIDE WAYS OR LATERAL FORCES.

## **PLATE NO. 60**

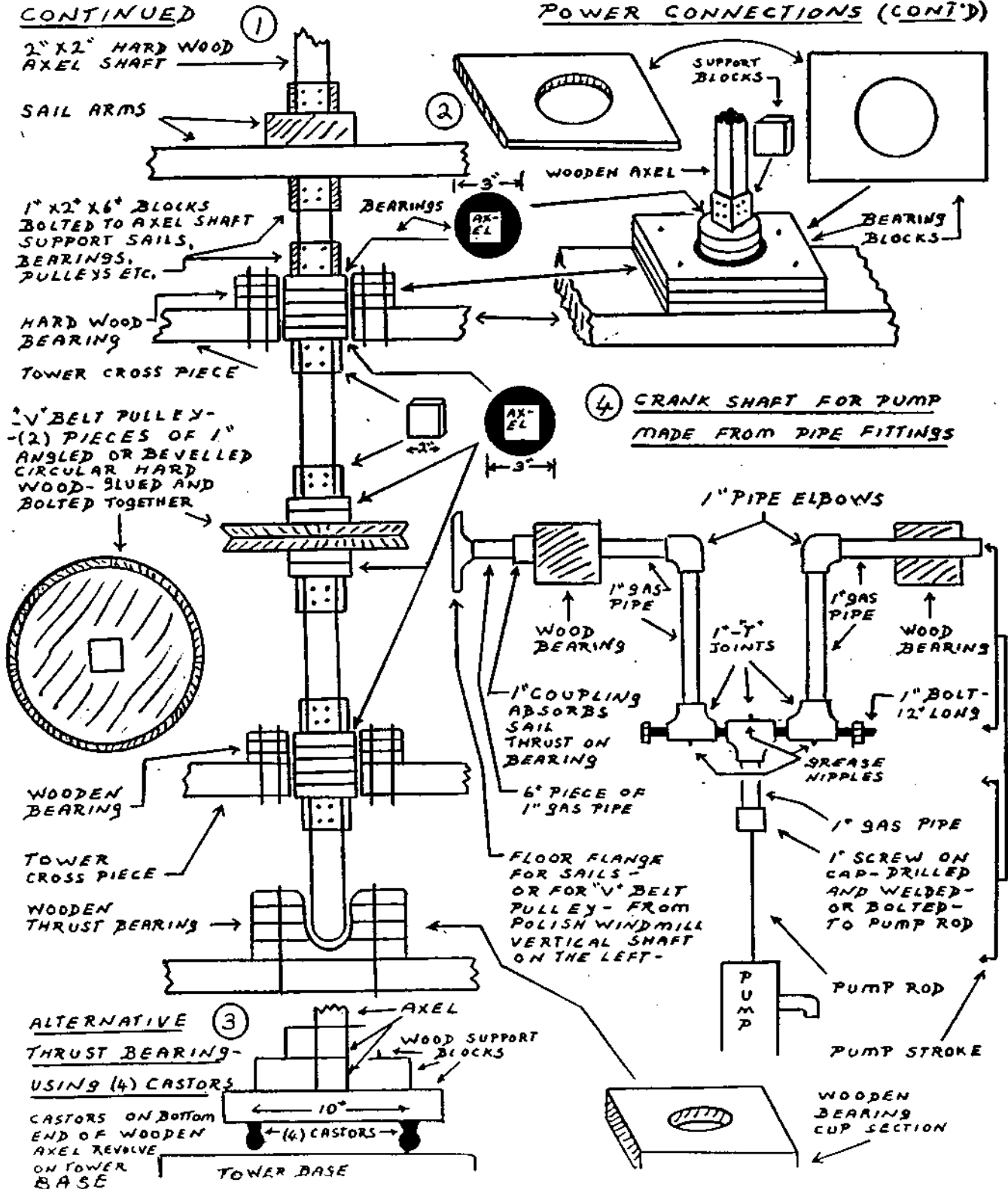
**The wooden bearings here illustrate all work in the same way as those shown in plate No. 15. Vertical bearings should have cups, (widening of the hole), at the top, so that used crank case oil can be poured in from time to time for lubrication.**

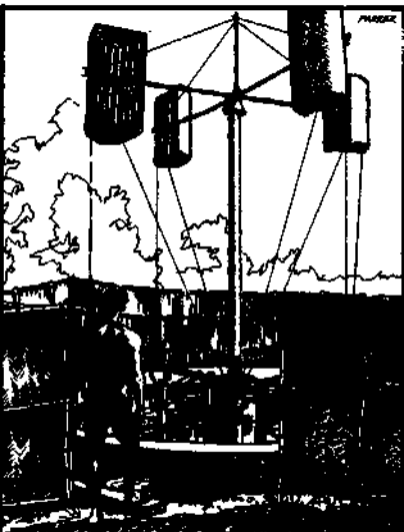
**Bearings and pulleys must be of hardwood, while the vertical shaft can be of either hard or soft wood.**

# PLATE No. 60

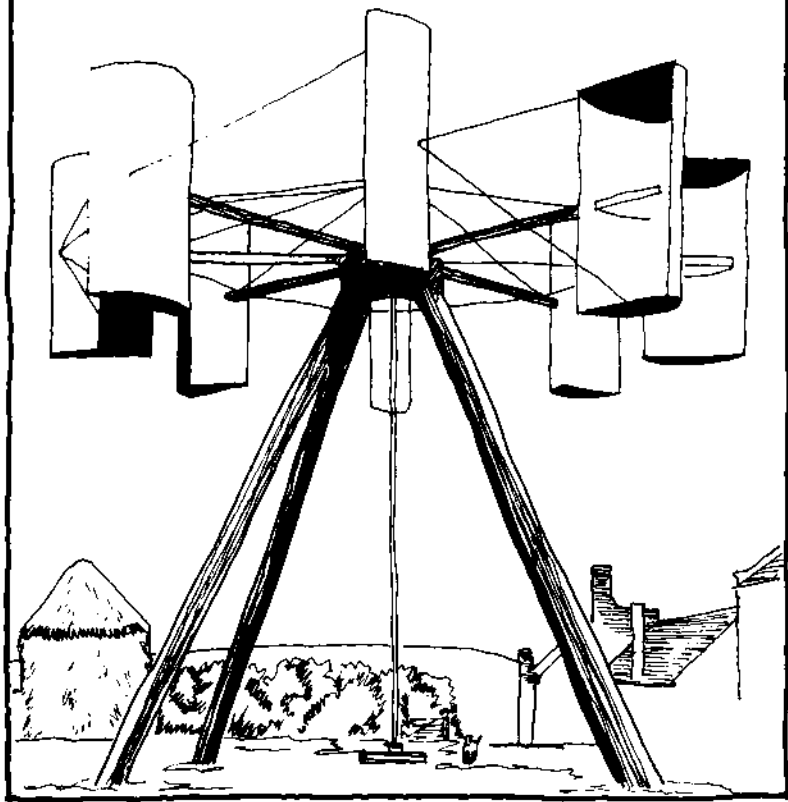
## WOODEN SHAFT, BEARINGS, POWER CONNECTIONS CONTINUED

## DESIGN ALTERNATIVE - VI THE POLISH WINDMILL - IV POWER CONNECTIONS (CONT'D)





**Algae culture in India**



35 A very large vertical-axis wind-powered generator built in Scotland at the beginning of this century.