

NEW ZEALAND

PATENT SPECIFICATION

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C O M P L E T E S P E C I F I C A T I O N.

"Improvements in windmills"

I, James Barton Graham, of Gore, in the Dominion of New Zealand, Farmer, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement,-

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This invention has been devised with the object of providing improvements in the construction of windmills, or aermotors, by means of which, (1) improved driving or power transmission gear is obtained, and (2) whereby the windmill is governed automatically by variations in the force of the wind pressure in order that excessive driving of the gear may be prevented.

To attain these objects special means have been devised, the construction and working of which will be hereinafter more fully explained with relation to the accompanying sheet of drawings, in which,-

Figure 1 is a front elevation, and

Figure 2 a side elevation of the motor portion of the windmill constructed in accordance with this invention.

Figure 3 is a front elevation on an enlarged scale of the driving gear shown in position within its casing which casing is drawn in section.

Figure 4 is a cross section elevation of the motor taken on the line 4-4 of Figure 3.

Figure 5 is a similar view but taken on the line 5-5 of Figure 3.

Figure 6 is a plan of the motor.

Figure 7 is a detail view of the governing mechanism that will be afterwards more particularly described.

In carrying out the invention a gear casing A of suitable material, is provided, such casing having an open top (which, when in use, will be covered in to prptect the gearing from the weather) and being constructed to hold a quantity of lubricating oil.

The casing is provided with a tubular pillar B on its back which pillar forms a guide for the upper end of a power transmission rod C, for connection with the pump or other mechanism to be operated by the windmill, and also forms, at its lower end, the pivot for the mounting of the casing in the head of the windmill frame in any of the approved ways to allow of the casing swinging round in all directions. For this purpose the pillar is made to extend below the bottom of the casing.

The sails D of the windmill are secured upon the front end of the shaft E, which passes through bearings formed in the sides of the casing and projects beyond the back of the casing for a suitable distance. A pinion F is mounted on the shaft and positioned within the casing. This pinion is locked to rotate with the shaft and also to allow of the shaft moving longitudinally to and fro, by any of the well known methods, as for instance, by the feather key and groove shown in Figure 4. The pinion is kept from transverse movement in any suitable manner, as by forming it with an elongated boss on each side which engages the inside of the respective sides of the casing.

A countershaft G is mounted in the front side of the casing and extends inwards and has the gear wheel G' fixed upon its inner end. This gear wheel gears with the pinion F and rotates with the rotation of the sails D, the ratio of the gear wheel and pinion being adjusted to suit requirements. If desired, also, the power from the shaft E may be transmitted to the countershaft G by any other means, or by indirect gearing such as to obtain any desired ratio of rotation, or of power, for the countershaft.

The inside back of the casing is formed with a

slide guide H extending vertically up it and forming the inside portion of the pillar B. Mounted upon this guide is a cross head J that is formed to envelope the front and sides of the guide and is provided with the groove J' extending transversely across it. Fitted within the groove is a small block K that is adapted to slide to and fro therein and is formed with a pin K' projecting from its front that passes loosely through the gear wheel G' at a suitable distance from the centre thereof, and thereby forms a crank pin. If desired this crank pin may be made fast to the gear wheel and to fit loosely into the block K.

The rotation of the gear wheel will thus, through the crank action of the pin K', cause the cross head J to be moved up and down the guide H, the block K sliding to and fro in the transverse groove of such cross head. This up and down movement of the cross head may then be conveyed through any suitable mechanism to the apparatus to be operated by the windmill. Its motion may be conveyed to the power rod C by attaching such power rod to a collar M (Figure 5) projecting rearwards from the top of the cross head and situated within the pillar B, the front of the guide H being formed with the slot m (Figures 3 and 5) to permit of the up and down movement of the collar.

The second object of the invention is obtained by mounting the sail shaft E so that it may have an amount of longitudinal movement and in carrying its back end through a cylinder N fixed to the back of the casing. Within the cylinder a helical spring O is arranged to surround the shaft and to bear in compression between the outer end of the cylinder and a pin or other fixture e on the shaft so that the shaft is normally

pressed forward through the front of the casing. The spring O is made of such a strength that it will keep the shaft and the windmill sails pressed forward against the normal pressure of the wind, but will give back when such pressure exceeds the normal, to a greater or less extent, according to the force of the wind pressure. This longitudinal movement of the shaft is employed to turn the tail or vane of the windmill to a more or less extent corresponding to the movement of the shaft and to turn it to a right angled position with the maximum movement of the shaft. Consequently the casing A will be turned on its pivot correspondingly, and cause the sails of the windmill to assume varying angles to the direction of the wind, between that of the normal position facing the wind, and the 'rest' position edge on to the wind, according to the force of the wind and the movement of the shaft. When the wind pressure decreases the spring O will re-assert itself and turn the tail, to force the sails up to the wind. Thus the rotation of the windmill gearing will be automatically governed in accordance with the strength of the wind above the normal.

To obt=ain these movements of the tail from the movements of the shaft E, the means shewn in the drawings may be employed. These means consist in attaching the tail P to a frame R that is pivoted to bearings R' on the back of the casing. The upper member of this frame is formed with a right angled extension S beyond its pivot (see Figure 7, which shows the frame in plan) and this extension is connected by means of the rigid link T with the outer end of the shaft E. The forward and backward movements of the shaft will thus, through the agency of the link connection, cause the frame R to be

positioned in the normal position or to be turned at an angle thereto. To provide for the variations in angle assumed by the link as it turns the frame to different positions, its connection to the shaft E is made as a swivel connection, or loosely, as shown in the drawings.

The gearing is oiled by filling the casing A with oil to any desired level so that the gear wheel G' in its rotation, will carry up a portion of the oil on to the pinion F, from whence it will be distributed to the bearings of the said shaft. It will also be spread generally over the working faces of the motor by the cross head dipping into the oil as it travels through the lower portion of its movement.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is,-

1. In windmills, a pivotally mounted casing having the sail-shaft passing horizontally through it and journalled in its sides, a slide-guide extending up one side of the casing, a cross-head mounted to slide up and down on such guide and formed with a horizontal groove in its face, a crank-pin engaging in such groove, a countershaft journalled in the casing-side, upon which such crank-pin is mounted, and gearing contained within the casing and connecting the sail-shaft with the countershaft, substantially as and for the purposes specified.

2. In windmills, a pivotally mounted casing, a sail shaft passing horizontally through the casing and journalled in its sides, a pinion mounted on such shaft, within the casing, a countershaft journalled in the casing and geared with the pinion upon the sail shaft, a slide guide extending vertically up the inside of the casing, a cross head mounted to slide up and down such

guide and formed with a horizontal groove in its face, a crank pin mounted upon the countershaft and fitting the groove in the cross head, a power transmitting rod, and a connection between such rod and the cross head, substantially as specified.

3. In windmills, a pivotally mounted casing, formed as an oil tank in its lower portion, a sail shaft passing horizontally through the casing and journalled in its sides, a slide guide extending up the inside of the casing, a cross head mounted to slide up and down on such guide, a power transmission rod, a connection between such rod and the cross head, and means within the casing for imparting an up and down movement to the cross head by the rotation of the sail shaft, substantially as specified.

4. In windmills, a pivotally mounted casing, a wind tail hinged to the back of the casing, a sail shaft extending horizontally through the casing and mounted to slide longitudinally to and fro, a spring keeping the sail shaft normally pressed forward, and connections between the back end of the sail shaft and the said tail by which the longitudinal movements of such shaft will convey turning movements to the tail, substantially as and for the purposes herein specified.

5. In windmills, a pivotally mounted casing, a wind tail hinged to the back of the casing, a sail shaft extending horizontally through the casing and projecting beyond the back thereof, a cylinder upon the casing surrounding the back end of the said sail shaft, a spring within the cylinder and surrounding the shaft and bearing in pompression between the outer end of the cylinder and the shaft, a lever extension from the sail shaft at its pivot point, and connections between such lever and the back end of the sail shaft,

substantially as and for the purposes herein specified.

6. In windmills, a casing having a vertical pivot, a sail shaft extending horizontally through the casing and journalled in the sides thereof so as to be capable of to and fro longitudinal movement, a slide guide extending up one side of the casing, a cross head mounted to slide up and down on such guide and formed with a horizontal groove in its face, a countershaft journalled in the side of the casing, a crank pin on such shaft engaging in the groove of the cross head, gearing arranged within the casing connecting the sail shaft with the countershaft, a power transmission rod, a connection between such rod and the cross head, a wind tail hinged upon the back of the casing, a spring bearing upon the sail shaft and normally pressing it forward, and connections between the back end of the sail shaft and the wind tail whereby the longitudinal movements of such shaft will convey turning movements to the wind tail, substantially as specified.

Dated at Wellington this 24th day of March, 1917.

HENRY HUGHES, LTD.
per B Alexander
AGENT FOR THE APPLICANT.

True copy
HENRY HUGHES, LTD.
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FIG.1

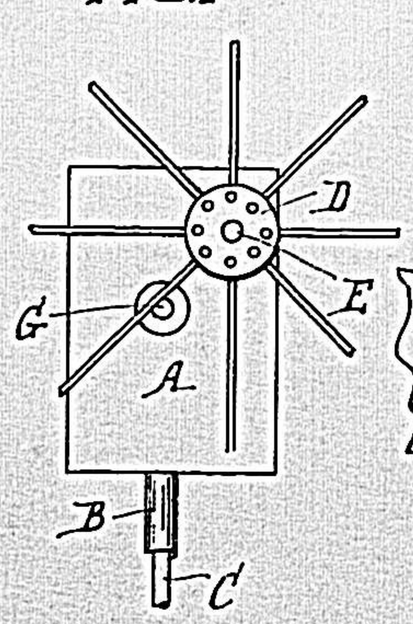


FIG.2

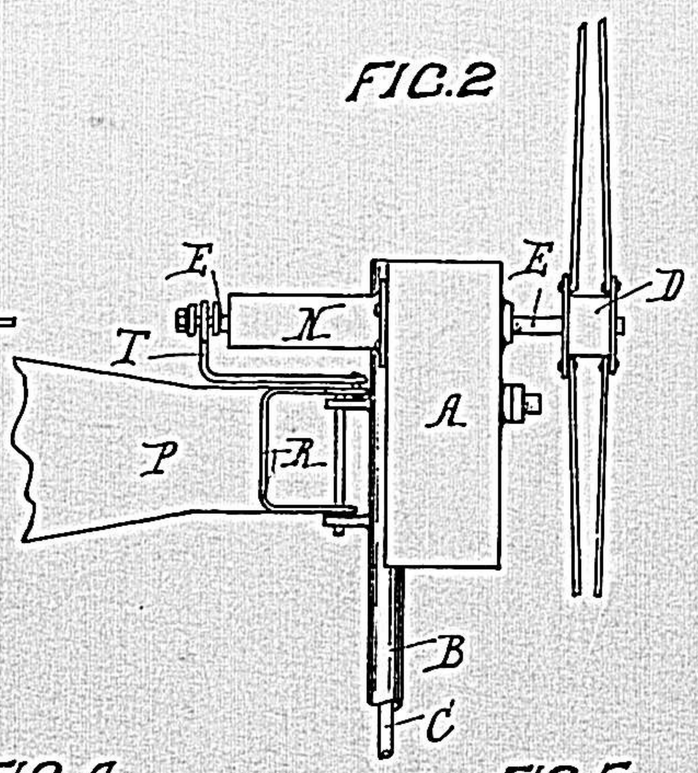


FIG.3

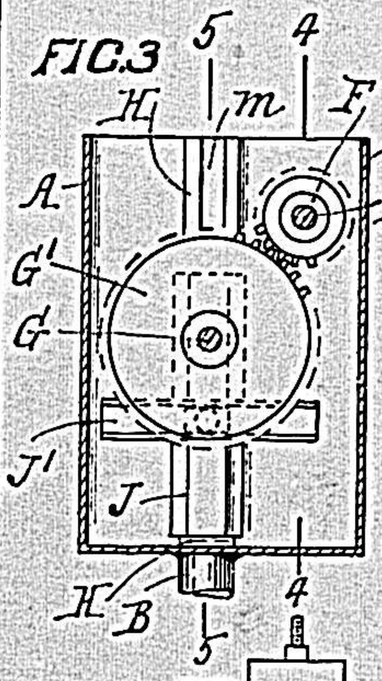


FIG.4

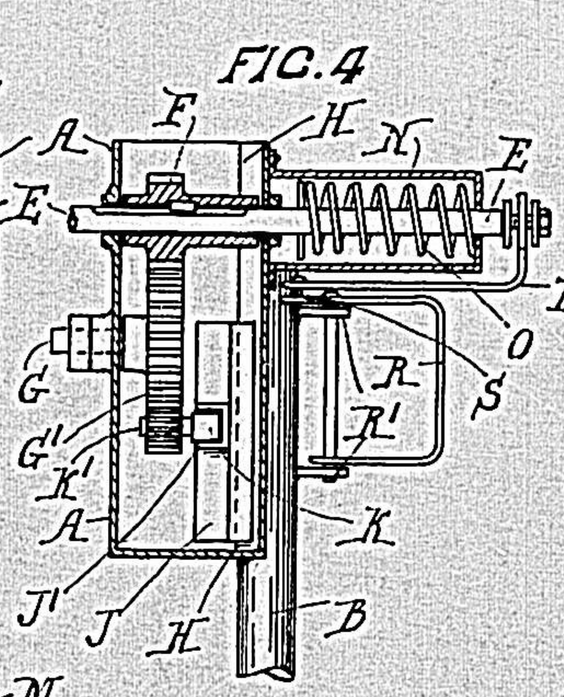


FIG.5

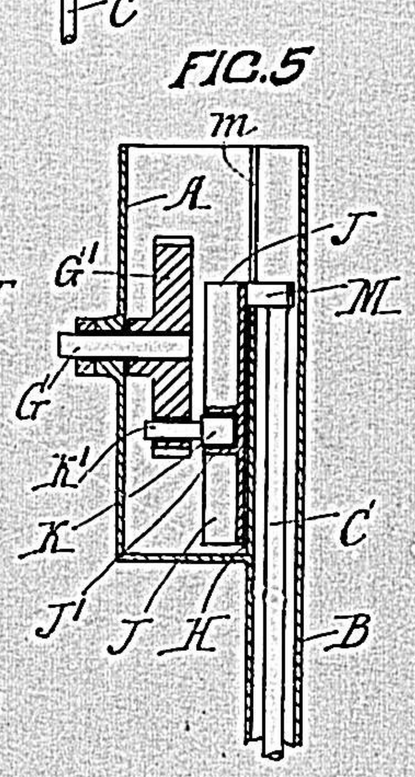


FIG.6

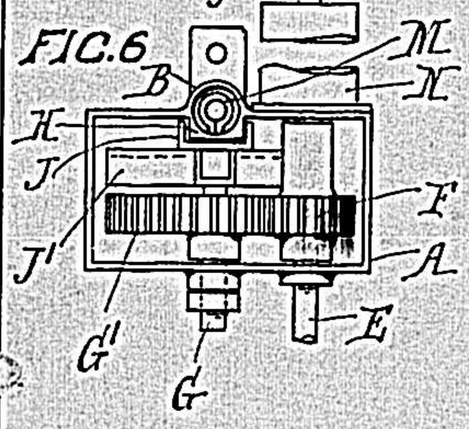
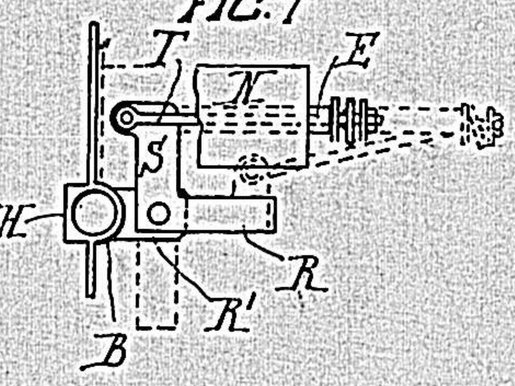


FIG.7



M. Alexander

Graham N. J.

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