Nov. 14, 1933. L. O. NELSON 1,935,097

AIR TURBINE

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Fig. 1.

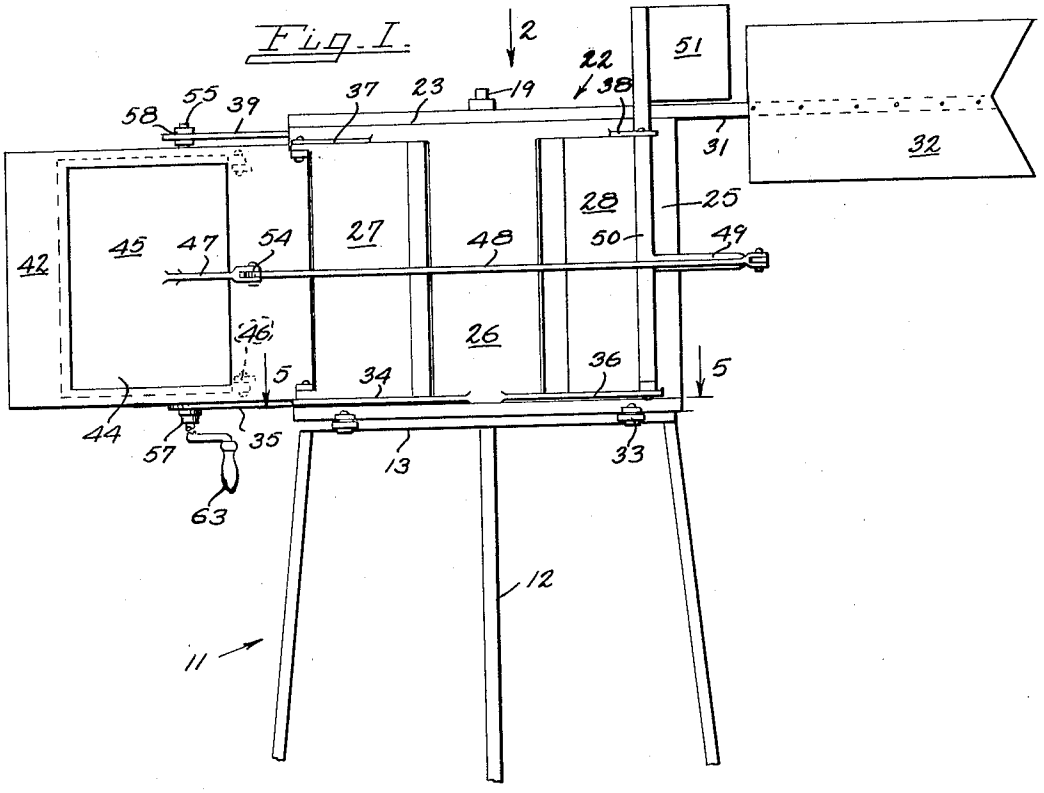
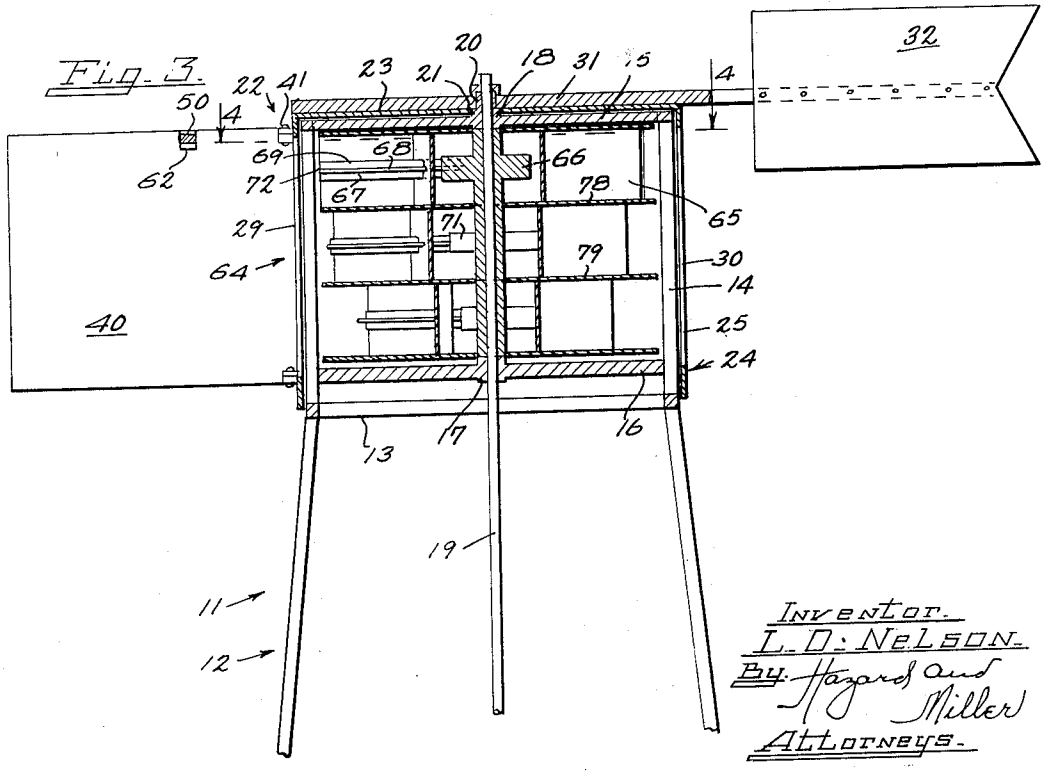


Fig. 3.



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Fig. 2.

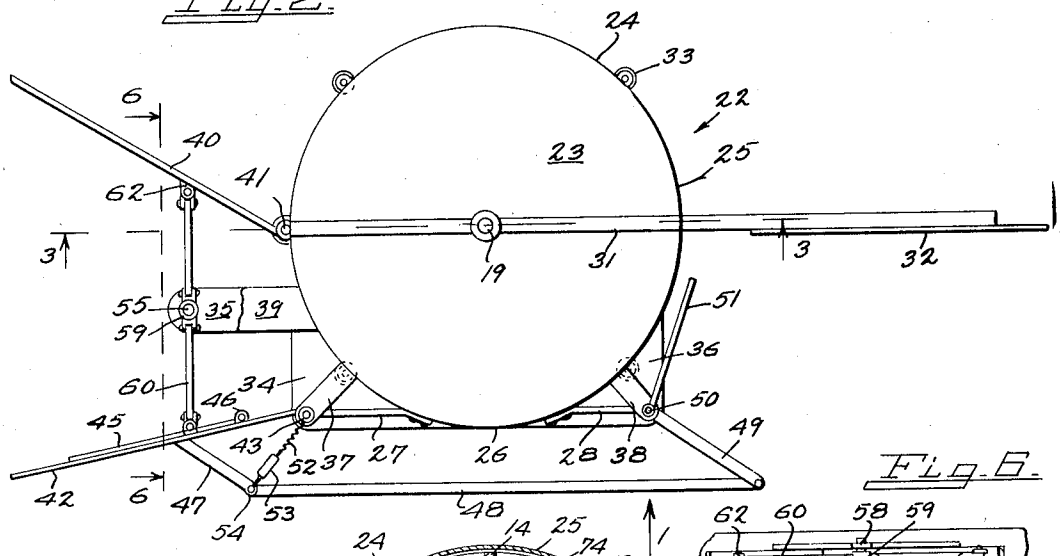


Fig. 6.

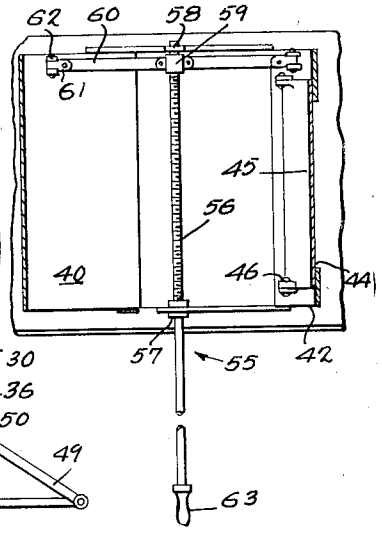


Fig. 4.

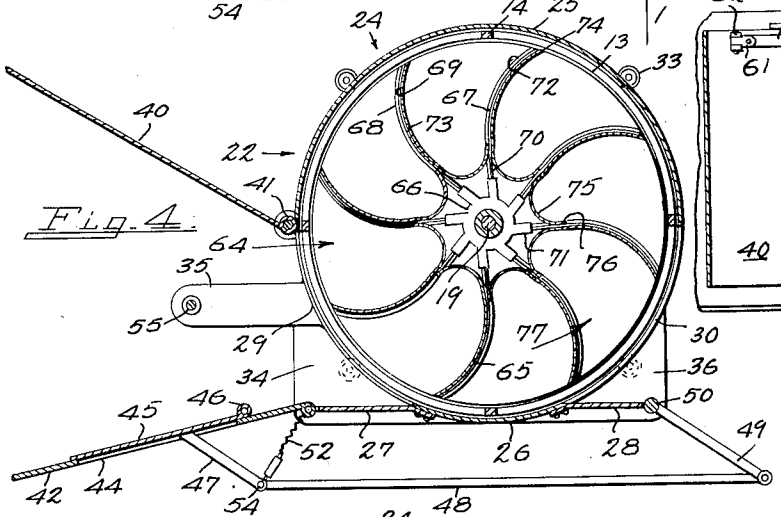


Fig. 7.

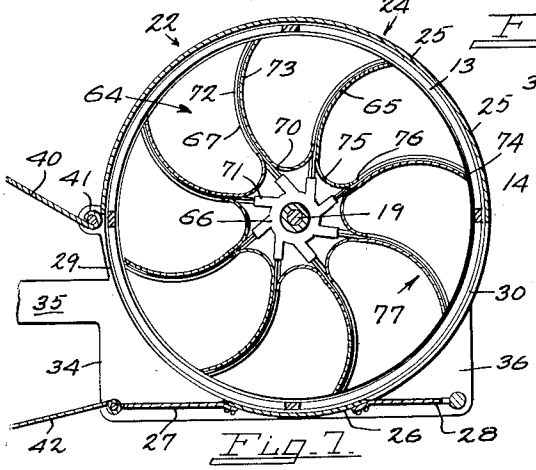
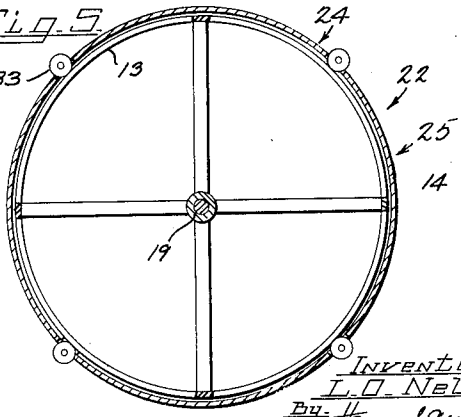


Fig. 5.



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UNITED STATES PATENT OFFICE

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AIR TURBINE

Lee O. Nelson, Bay City, Oreg.

Application February 17, 1932. Serial No. 593,525

4 Claims. (Cl. 170—15)

My invention relates to an air turbine of a type in which a wind wheel rotates a vertical shaft and has blades or vanes which may be acted upon by the wind, which shaft may be utilized for the take-off of power.

In the above type of air turbine an object and feature of my invention relates in part to the construction of the blades or vanes of a turbine and other features to the manner of admitting air and discharging the air from the rotating blades. In regard to this latter feature a further detailed object relates to the employment of gates which may be utilized to form a funnel to drive the air into the turbine. These gates may be controlled by a remote control device to bring the free ends relatively close together or spaced apart to change the area admitting the air.

Another detailed feature of my invention comprises an automatic regulator or governor depending on the velocity of the wind which will automatically restrict the amount of air supplied to the turbine when the wind pressure increases to a great extent and will open up the air admission when the wind pressure decreases.

Another feature of my invention relates to the manner of mounting the air turbine on the top of a tower construction and in the manner of swinging the device to be head on to the wind whereby the wind may be admitted to the vanes or blades of the turbine in the proper direction to utilize the driving force to best advantage.

My invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a side elevation taken in the direction of the arrow 1 of Fig. 2;

Fig. 2 is a plan taken in the direction of the arrow 2 of Fig. 1;

Fig. 3 is a vertical section substantially on the line 3—3 of Fig. 2 in the direction of the arrows;

Fig. 4 is a horizontal section on the line 4—4 of Fig. 3 in the direction of the arrows;

Fig. 5 is a horizontal section taken on the line 5—5 of Fig. 1 in the direction of the arrows;

Fig. 6 is a vertical section on the line 6—6 of Fig. 2 in the direction of the arrows;

Fig. 7 is a partial section similar to Fig. 4 with the blades in a different position.

In my invention I employ a tower structure 11 which is indicated as having a series of legs 12, a circular ring frame 13 at the top forming a track, an upper set of short posts 14, with an upper set of cross arms 15, there being a lower set of cross arms 16 connecting the lower portion of these posts, these cross arms effecting a brace from the top of the tower, and at the center of these cross arms there are enlarged lower and upper journals 17 and 18 through which extends a vertical shaft 19.

The upper journal 18 has an upper extension 20 with a shoulder 21, on which shoulder is supported a casing 22, this casing having a horizontal top plate 23 and depending sides 24, such sides having a semi-cylindrical portion 25 and a partially cylindrical section 26 from which there extends forwardly a vertical side plate 27 and rearwardly another vertical side plate 28, leaving a large intake opening 29 and a discharge opening 30. Secured to the top of the casing there is an arm 31 to which is attached a wind fan 32 to turn the casing in the direction of the prevailing wind. This casing has a series of guide rollers 33 at the bottom which roll on the outside of the circular track 13 and thus with the centering bearing at the top hold the casing properly centered on the top of the tower. At the bottom of the casing there is a horizontal plate 34 with a forward extension 35 and a rear plate 36, and at the top there is a forward laterally extending bracket 37 and a rearwardly extending bracket 38 and a forwardly extending arm 39, this being vertically above the extension plate 35.

The control gates for the turbine utilize a first gate 40 pivoted on a vertical pivot 41 which is secured to the casing. A second gate 42 has a vertical pivot 43, this being mounted on the forward extension plate 34 and the upper radial arm 37. The gate 42 has a large opening 44 in which is fitted a door 45, this having a hinge 46 secured thereto to regulate the air inlet by connection through an arm 47. Rigidly connected to this door there is a link 48 which is attached to a radial arm 49, which latter arm is connected to a vertical pivot shaft 50, such shaft being journaled in the bottom plate 36 and the radial arm 39. The shaft 50 has a wind fan 51 at the top, this being above the top plate 23 of the casing and positioned to be acted upon by the free flowing wind, there being no obstruction to the flow of the wind. Hence, this fan is subject to the full air velocity and air pressure.

A retraction spring 52 with an adjusting connection 53 is secured between the pivot joint 54 of the arm 47 and the link 48 and the hinge or pivot 43. This construction exerts a pull on the arm 47 tending to close the door 45 and the gate 42.

The means to vary the opening for entrance of air utilizes a vertical shaft 55, this having a screw threaded section 56, this shaft having journals

57 in the extension plate 35 and journals 58 in the forwardly extending arm 39. A nut 59 is threaded on the threaded screw 56 and to this nut there are pivotally connected a pair of links 60, each link being attached by a universal joint connection 61 to brackets 62 which are secured to the gates 40 and 42. The shaft 55 has a crank 63 at the bottom. Therefore, by rotating this crank the gates may be brought together or moved apart the full limit of the links 60, and when spread apart to the fullest extent they form a funnel-shaped opening as illustrated in Figs. 2 and 4 for the inflow of air. The movement of these gates or their adjustment does not interfere with the action of the wind fan 51 in regulating the opening of the door 45 but, manifestly, if the gates are substantially closed the opening of the door 45 would have substantially no effect.

The type of turbine 64 used comprises a plurality of turbine units 65, each having a hub 66 secured to the drive shaft 19, and from this hub extend a plurality of ribs 67, which ribs are illustrated as being formed of T-shaped bars with a web 68 extending horizontally and flanges 69 extending vertically. These ribs have a straight section 70 extending outwardly from a socket 71, these sockets being arranged substantially tangential to the hub. The ribs have a forward curved section 72 and secured to the front of each of the ribs there is a metal plate 73 extending from the outer end 74 to a position adjacent the holders, the plates then having a curved section 75 and being attached at the point 76 to the back of the blade behind, considering the direction of rotation to be in that of the arrow 77.

In this type of blade, as illustrated in Figs. 4 and 7, the wind blowing in the pockets between the blades exerts a force on the ribs, and the rib for each blade is positioned offset from the center of rotation. Therefore, there is no direct thrust in any position of the blades on the rotating shaft.

In order to build the turbine in units the hubs are made separate and the blades of each set are separated by upper and lower separating plates or disks 78 and 79.

From this construction it will be seen that the turbine is driven by the air entering through the air intake 29, which rotates the turbine and is discharged through the outlet 30. The outlet is always open for free discharge but the intake, as above described, may be manually controlled by opening and closing the gates 40 and 42 or may be automatically controlled through the medium of the wind vane 51 regulating the opening of the door 45.

Various changes may be made in the details of construction without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. In a turbine construction, a tower having a casing with an intake and discharge opening and a turbine operating within the casing, the intake opening having a pair of pivoted gates, forwardly extending arms from the casing, a shaft journaled in said arms, said shaft having a screw with a nut threaded thereon, a pair of links connected to the nut and each having a universal pivoted connection to a gate whereby on rotating the shaft the gates may regulate the opening of the intake, one of the gates having an opening with a door pivoted adjacent thereto, a vertical rock shaft adjacent the casing and having a vane exposed above the casing, and a lever and link connection from the rock shaft to the door to regulate the position of the door in reference to the intake in accordance with the flow of air operating the vane.

2. In an air turbine construction, a casing having an intake and a discharge opening, a turbine rotatably mounted in the casing, a gate pivotally mounted adjacent the intake opening, means to actuate said gate to regulate such intake opening, said gate having an opening therethrough with a door pivotally mounted adjacent the opening, a vertical rock shaft having a vane extending above the casing, and a connection from the rock shaft to the door to regulate the position of the door in reference to the intake opening.

3. In an air turbine construction as claimed in claim 2, a connection from the rock shaft to the door comprising a radial arm connected to the rock shaft, a link connected to said radial arm, and an arm rigidly connected to the door, the link being connected to said rigid arm.

4. In an air turbine having a casing with an intake opening, a gate pivoted at the side of said opening, manual means to pivot the gate to regulate the said opening, the gate having an opening with a pivotally mounted door, and a wind controlled vane with an operative connection to the said door to regulate the position of said door in reference to the said gate.

LEE O. NELSON.