April 15, 1924.

1,490,844

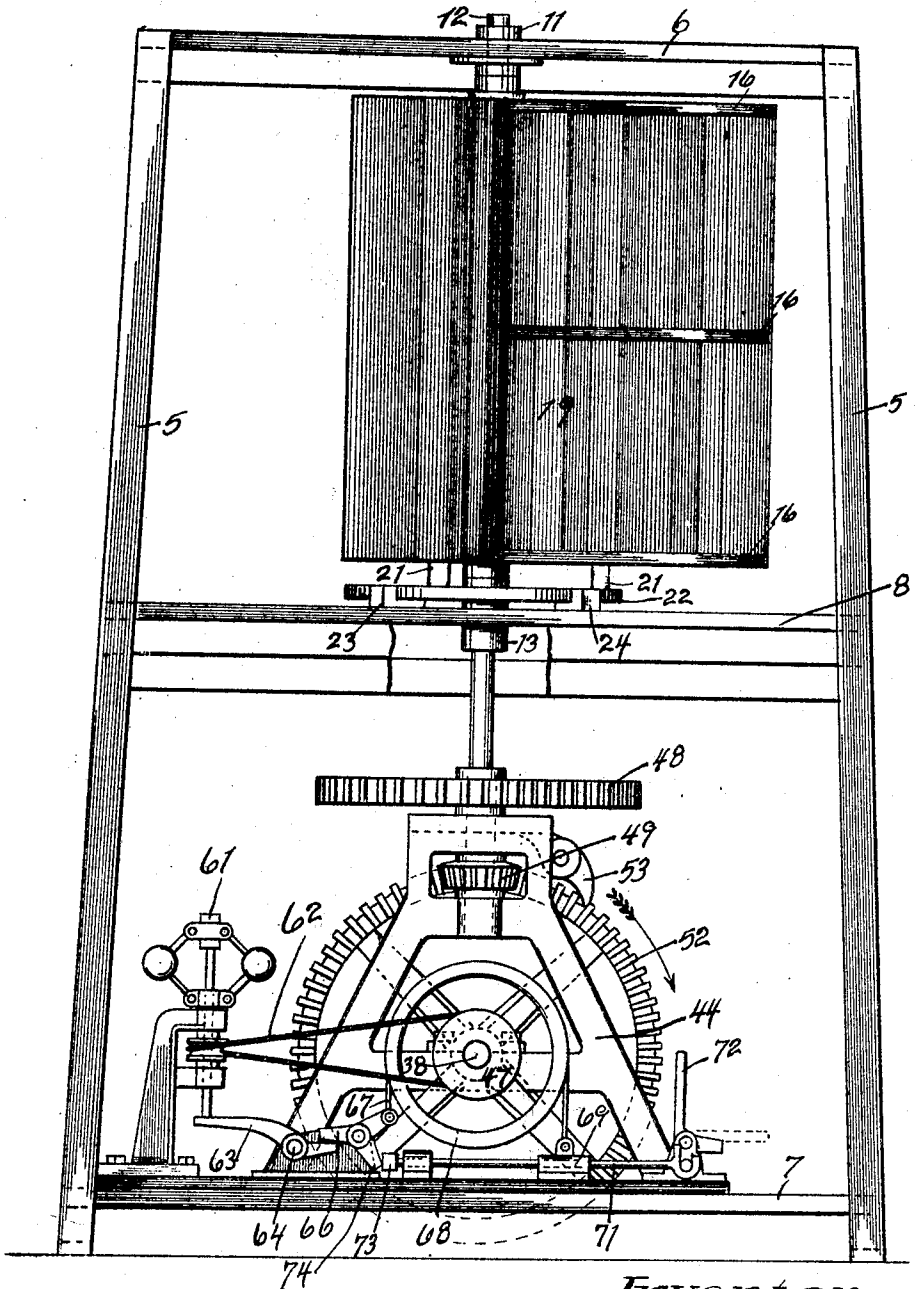
K. MUKAI

WINDMILL

Filed Feb. 12, 1923

3 Sheets-Sheet 1

Fig. 1.



Inventor.

KICHIMATSU MUKAI

By Victor J. Evans

Attorney.

April 15, 1924.

1,490,844

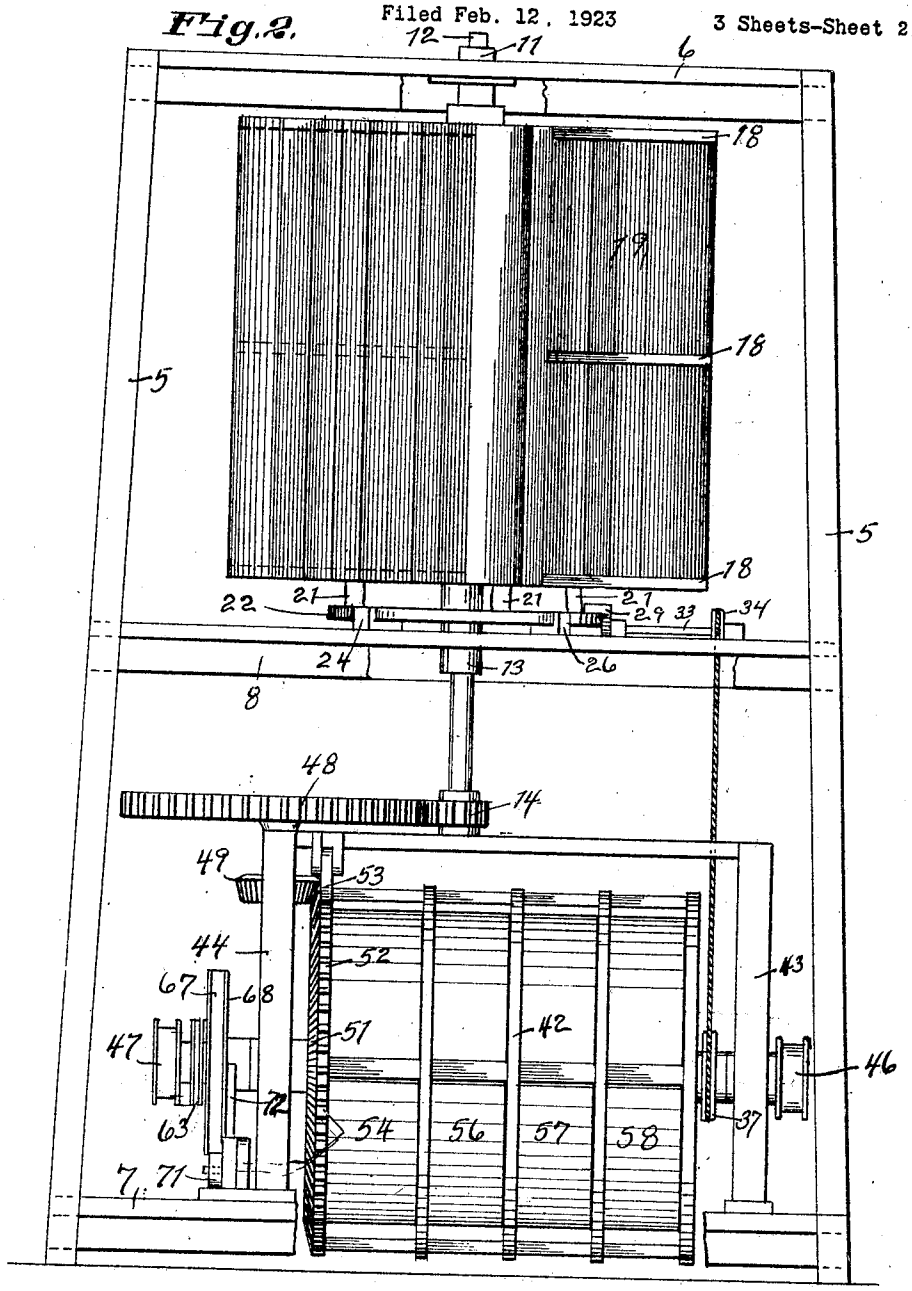
K. MUKAI

WINDMILL

Filed Feb. 12, 1923

3 Sheets-Sheet 2

Fig. 2.



Inventor,
KICHIMATSU MUKAI

By Victor J. Evans
Attorney

April 15, 1924. 1,490,844

K. MUKAI

WINDMILL

Filed Feb. 12, 1923 3 Sheets-Sheet 3

Fig. 3

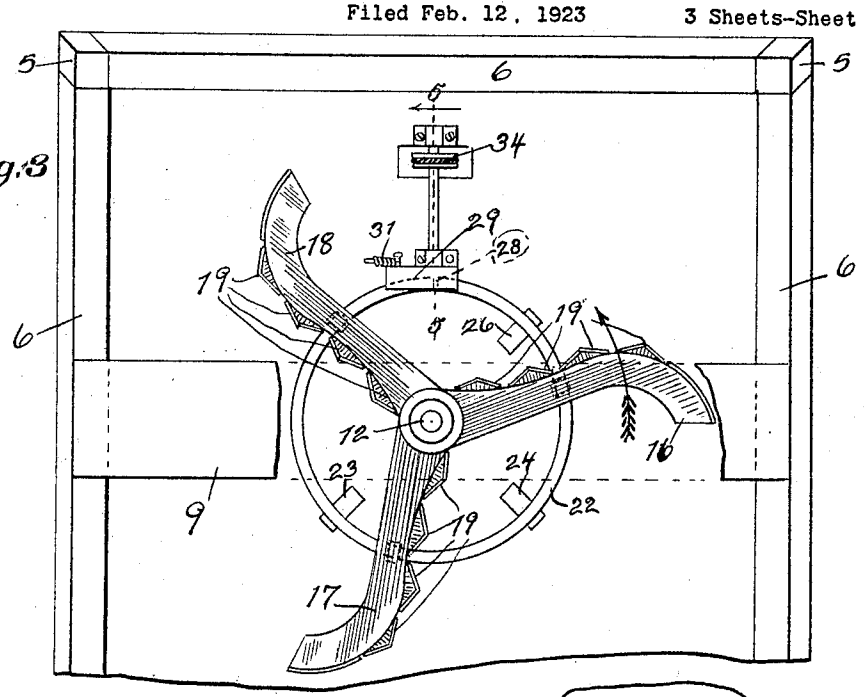


Fig. 5.

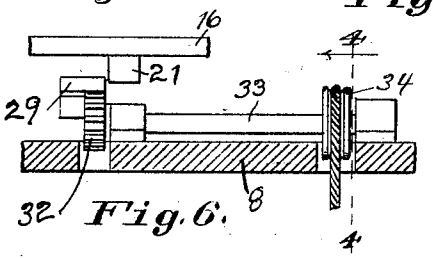


Fig. 6.

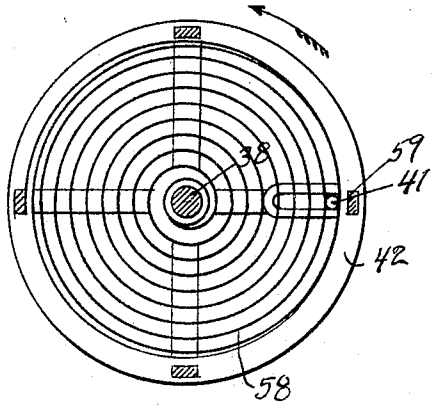
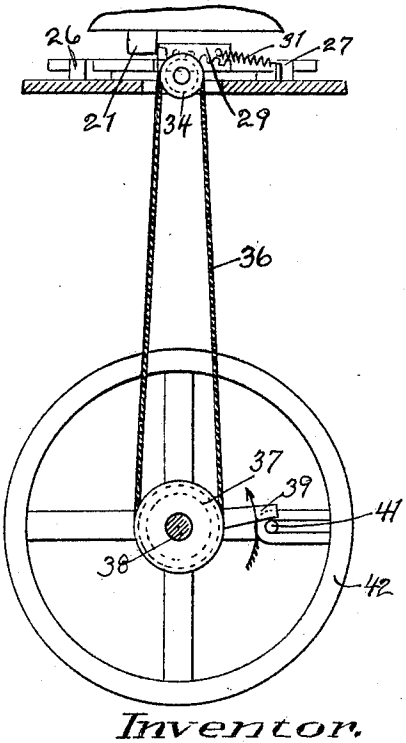


Fig. 4.



Inventor.
KICHIMATSU MUKAI
By Victor J. Evans
Attorney

Patented Apr. 15, 1924. 1,490,844

UNITED STATES PATENT OFFICE.

KICHIMATSU MUKAI, OF SAN FRANCISCO, CALIFORNIA.

WINDMILL.

Application filed February 12, 1923. Serial No. 618,594.

To all whom it may concern:

Be it known that I, KICHIMATSU MUKAI, a subject of the Emperor of Japan, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Windmills, of which the following is a specification.

This invention relates to improvements in windmills and has particular reference to a device wherein the wind is adapted to contact vanes for the purpose of delivering energy and at the same time for storing energy.

The principal object of this invention is to produce a windmill which will deliver a practically constant power under varying conditions.

A still further object is to provide means whereby power may be stored up when the same is being produced in excess of that required.

A still further object is to produce a device which is simple in construction, automatic in operation and one which is cheap to manufacture,

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a side elevation of my device,

Figure 2 is a side elevation of my device, taken at a right angle to that of Figure 1,

Figure 3 is a fragmentary detail top plan view,

Figure 4 is a cross section of the vane stopping mechanism taken on the line 4—4 of Figure 5,

Figure 5 is a cross section taken on the line 5—5 of Figure 4, and

Figure 6 is a cross sectional view of one of the spring members and its enclosing cage.

Applicant is aware of the fact that windmills have been employed for the purpose of delivering power. These windmills, however, have been directly connected to the device to be driven, with the result that as the wind varied in velocity, the result would be an uneven delivery of power.

I have overcome this difficulty by providing a series of springs interposed between the vanes and the power shaft, in such a way that they will automatically act as a balance so that a given amount of power will at all times be available, that is, providing sufficient wind is present to rotate the vanes.

In the accompanying drawings wherein for the purpose of illustration is shown a preferred embodiment of my invention, the numeral 5 designates four uprights to which are attached top braces 6.

A floor 7 is supported between the bottom of these uprights, while a platform 8 is positioned at any convenient point between the top and the bottom.

A cross piece 9 extending between two of the parallel top braces 6, serves to position a bearing 11 within which one end of a shaft 12 is positioned. This shaft extends downwardly through a bearing 13 positioned in the platform 8 and has a pinion 14 secured upon its lower end.

Positioned upon the shaft 12, at a point between the bearings 11 and 13 are three sets of arms, which arms are designated by the numerals 16, 17 and 18. These arms serve to support a series of vertically spaced vanes designated as a whole by the numeral 19.

Secured to the under surface of each of these arms is a lug 21, which lug extends downwardly and in close proximity to a ring 22 mounted above the platform 8 and supported by four chairs as shown at 23, 24, 26 and 27. This ring 22 is split as shown at 28 and has one end secured to the chair 26. The opposite end is attached to an inclined rack 29.

A spring 31 normally tends to hold the rack in a retracted position as shown in Figure 4.

A gear 32 mounted upon a shaft 33 is in constant mesh with the rack 29. A pulley 34 mounted upon the shaft 33 has a belt 36 passing thereover and over a pulley 37 loosely mounted upon the power shaft 38. This pulley 37 has an arm 39 which is adapted to be contacted by the end of a rod 41 radially slidable in one of the cross arms of a spring cage, designated as a whole by the numeral 42.

This spring cage is supported upon the power shaft 38, which shaft is journaled in brackets 43 and 44. Driving pulleys are mounted upon the opposite ends of this power shaft and are designated by the numerals 46 and 47.

In order to rotate this spring cage from

the vanes 19, I provide a master gear 48, which master gear is secured to a shaft above which is mounted a pinion 49.

This pinion in turn is adapted to engage a gear 51 formed upon the end of the cage 42. A ratchet 52 is formed upon the periphery of the cage 42 and is adapted to be engaged by a dog 53 for the purpose of preventing retrograde movement.

Mounted within the cage 42 are a series of springs as shown at 54, 56, 57 and 58. One end of each of these springs is secured to the power shaft 38 and the opposite end is secured to one of the rails of the cage as for instance, the rail 59. By viewing Figure 6, it will be seen that the rod 41 is mounted between the last convolution of the spring. In order to govern the speed of the power shaft, I provide a governor 61 of the centrifugal type. This governor is rotated through the medium of a belt 62 passing over a pulley 63. The lower end of the governor rod is adapted to contact the free end of a lever 63 pivoted as at 64 and having its opposite end beneath the arm 66 of a band actuating bell crank, which is pivoted to the brake band 67.

This brake band passes over a brake drum 68 and has its opposite end pivoted to a sliding member 69. This sliding member is connected to a rod 71 which is adapted to be moved laterally through the medium of a hand lever 72.

The rod 71 is provided with a block 73 adapted to engage the arm 74 of the bell crank lever.

The operation of my device is as follows:—

Assuming that the parts are arranged as shown in Figures 1 and 2 and that a wind of sufficient velocity is blowing, the vane 19 will revolve causing power to be transmitted through the shaft 12 to the gearing 14. This gear will in turn rotate the gear 48 and pinion 49, which movement will be converted into a rotary movement of the cage 42, causing the springs 54 to commence to tighten. As soon as the tension of the springs has become sufficient to drive the load attached to the pulleys 46 and 47, the power shaft will start to rotate. Should a gust of wind cause a sudden revolving, the governor will automatically apply the brake thereby holding the speed of the power shaft uniform, but at the same time allowing the surplus energy to be stored up by a further tightening of the springs. Should the springs become entirely tightened this action will cause the rod 41 to move into alignment with the end of the lever 39, which will result in turning the pulley 37 around which the belt 36 passes. This movement will in turn be transmitted to the pulley 34 which will cause the cam rack to tighten the ring 22, thus applying a friction brake to the ends of the lugs 21.

This will also bring the end of the rack into line with the lug thereby acting as a further and positive stop for the vanes. As soon as the stored up energy in the springs has become used, the parts will assume their normal position through the action of the spring 31, with the result that the vanes will again start to rotate. Should the wind die down the stored up energy in the springs will automatically be converted into power in a well known manner.

It will thus be seen that I have devised a windmill capable of transmitting a uniform amount of power under varying conditions.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:—

1. In a device of the character described a rectangular support, a platform mounted on said support, a wind propeller mounted above said platform, a shaft secured to said wind propeller and adapted to deliver power to a remote point, lugs extending downwardly therefrom, a split brake ring supported on said platform at a point below said propeller, means for raising one end of said ring so as to contact one of said lugs for the purpose described.

2. In a device of the character described a rectangular support, a platform mounted on said support, a shaft, a platform positioned in said support, a wind propeller mounted on said shaft, a plurality of lugs extending downwardly from said wind propeller, a split brake ring mounted on said platform, said ring having one end secured to said platform, means for contracting said ring so as to frictionally engage said lugs and means for raising one end of said ring so as to form an abutment against which one of said lugs is adapted to abut, for the purpose of forming a positive stop.

In testimony whereof I affix my signature.

KICHIMATSU MUKAI.