H. G. McCULLOCH.

WINDMILL.

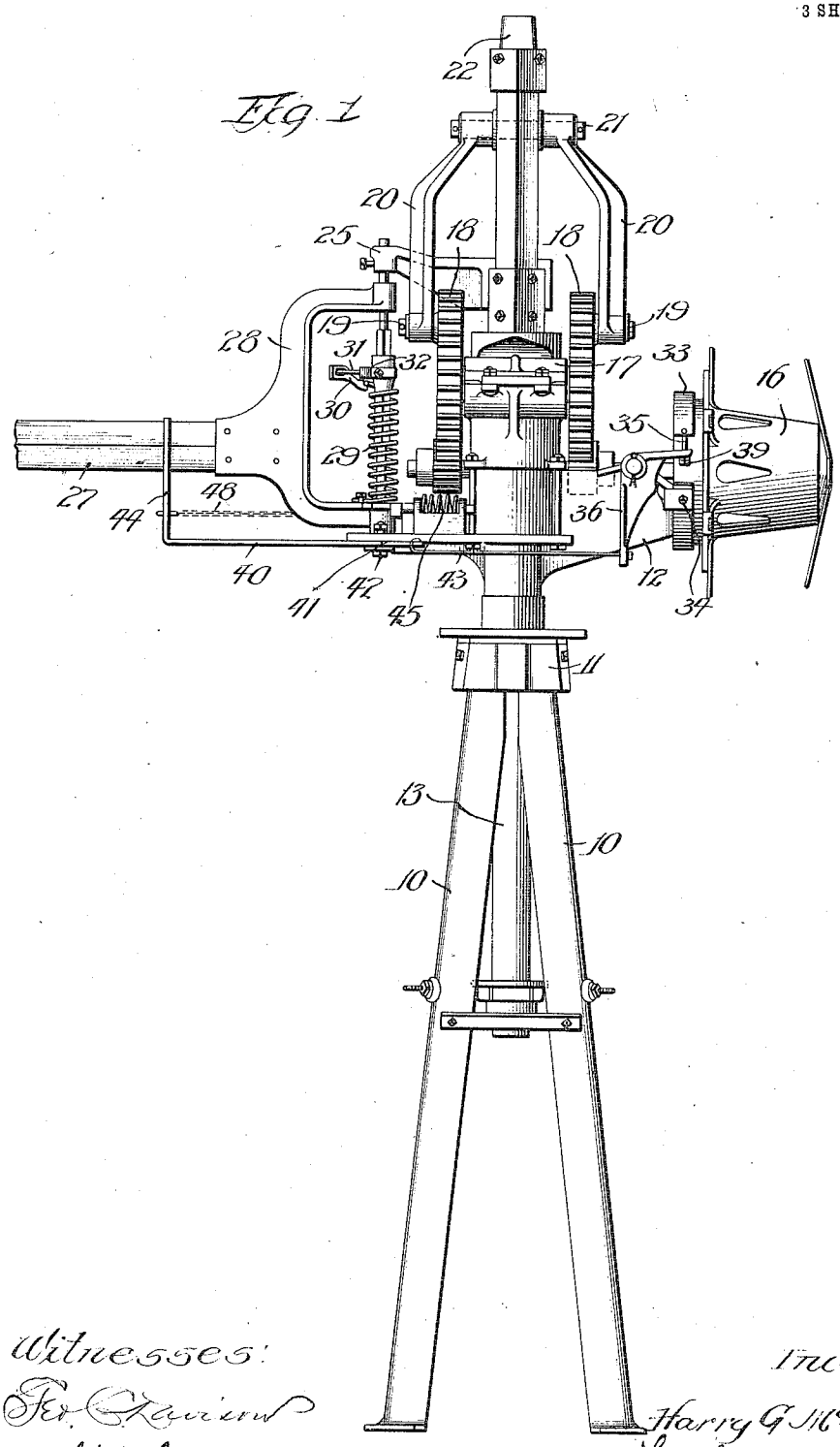
APPLICATION FILED DEC. 5, 1910.

1,006,113.

Patented Oct. 17, 1911.

3 SHEETS—SHEET 1.

Fig. 1



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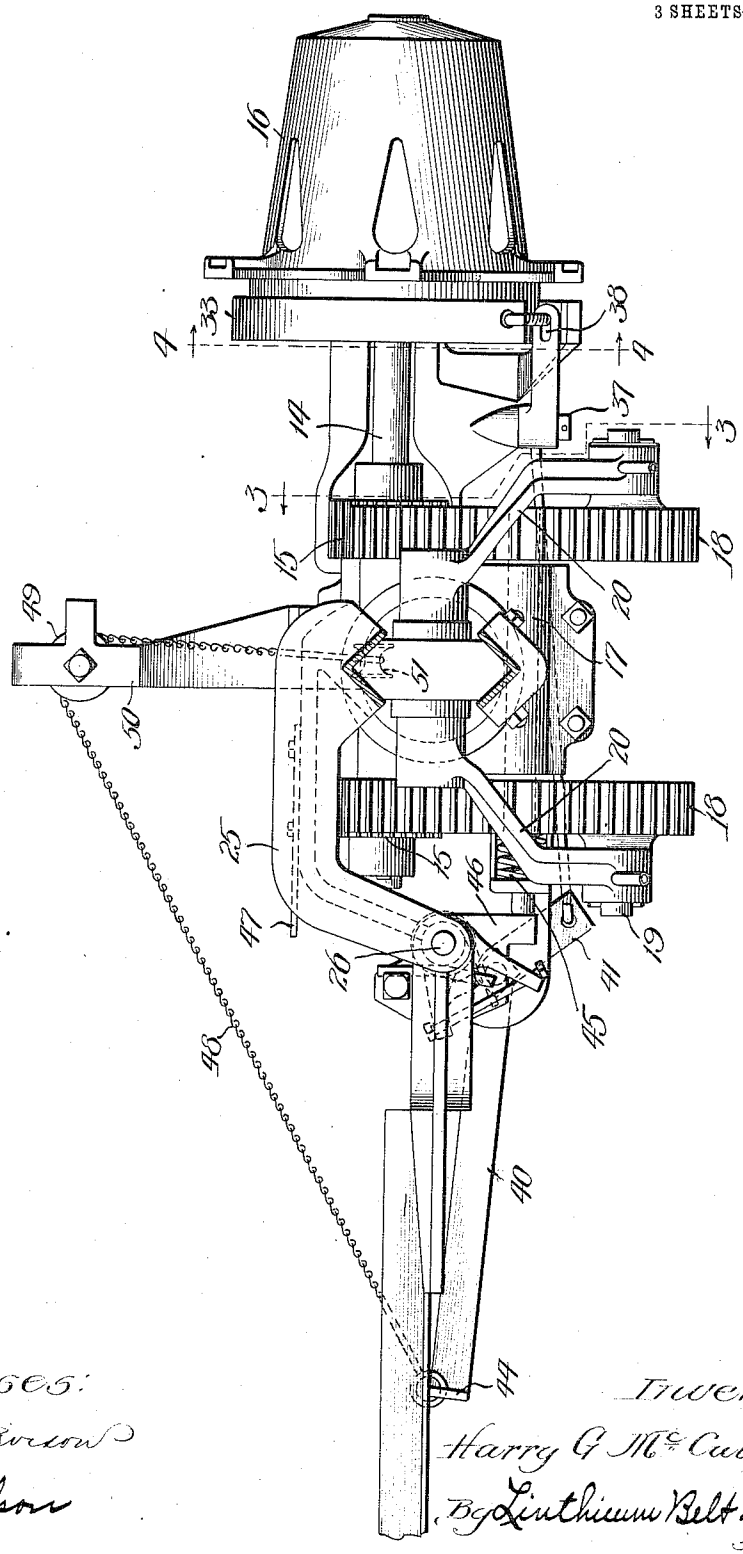
3 SHEETS—SHEET 2.

Fig 2.



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3 SHEETS—SHEET 3.

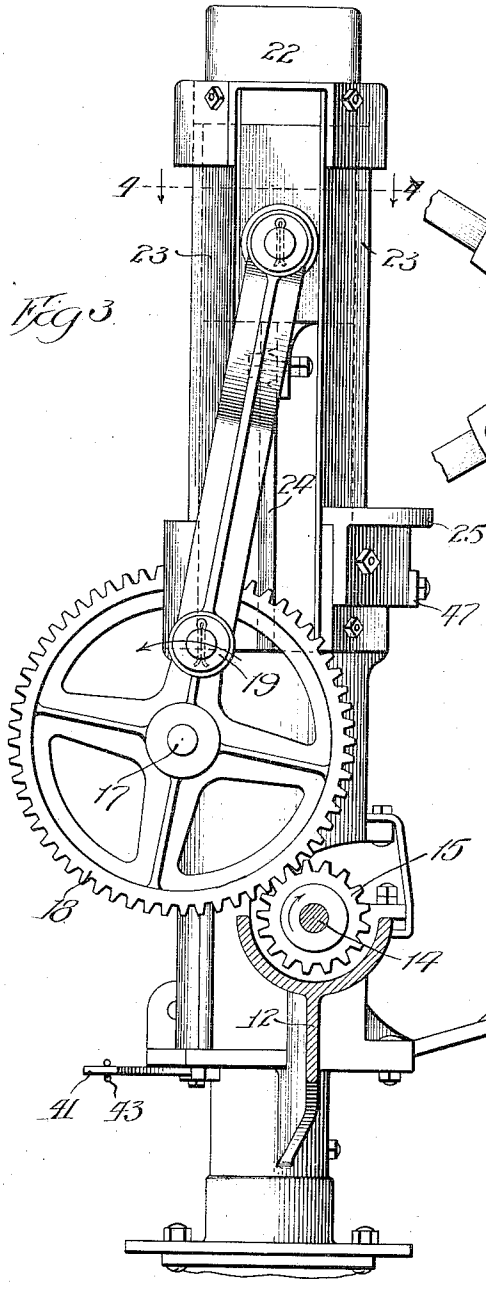

Fig 3.

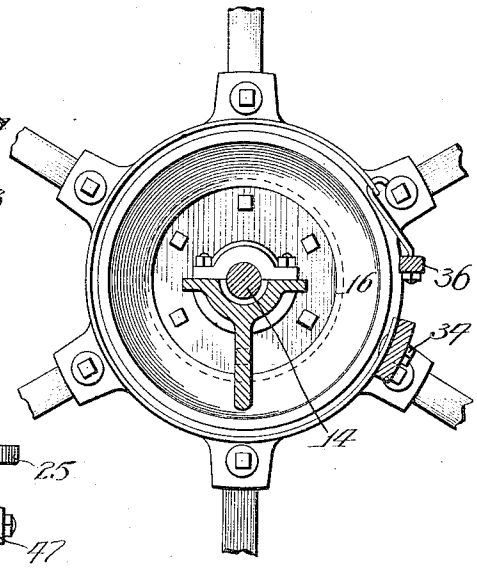

Fig 4.

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UNITED STATES PATENT OFFICE.

HARRY G. McCULLOCH, OF FREEPORT, ILLINOIS, ASSIGNOR TO THE STOVER MANUFACTURING COMPANY, OF FREEPORT, ILLINOIS, A CORPORATION OF ILLINOIS.

WINDMILL.

1,006,113. Specification of Letters Patent. Patented Oct. 17, 1911.

Application filed December 5, 1910. Serial No. 595,644.

To all whom it may concern:

Be it known that I, HARRY G. McCULLOCH, a citizen of the United States, residing at Freeport, in the county of Stephenson and State of Illinois, have invented certain new and useful Improvements in Windmills, of which the following is a specification.

This invention relates to improvements in windmills and consists in certain novel features of construction and arrangement of parts which result in advantageous and efficient operation of the assembled structure and which will be described at length in the following specification.

Some of the advantages and objects of the present invention will be apparent as the invention is better understood by reference to the illustrations of one particular embodiment thereof which is shown in the accompanying drawings.

One of the objects of the invention is to increase the efficiency and promote the utility of a device of this character by applying the lifting force to the pump rod approximately in its plane of reciprocation.

Another object is to provide mechanism unconnected with the mill-vane for applying the brake to the windmill only when the vane is swung into closed position by the attendant.

Still another object is to permit freedom of movement of the vane for governing the mill without applying the brake, thereby obviating the danger of applying the brake when the wind-wheel is partially facing into the wind.

A further object is to reduce the number of bearings and shafts to a minimum and to simplify the general structure of the device without sacrificing its strength and efficiency.

Other objects and advantages will become apparent from the following description and accompanying drawings illustrating one preferred embodiment thereof.

Referring to the drawings—Figure 1 is an elevation of a mill embodying my invention. Fig. 2 is a top plan view thereof. Fig. 3 is a partial elevation taken on the line 3—3 of Fig. 2; and Fig. 4 is a sectional elevation on the line 4—4 of Fig. 2.

On the drawings 10 designates the apex portion of a windmill tower provided with the usual cap 11. A cast frame or bed-piece 12 forming the frame or support for the operating parts of the mill is provided with a tubular portion 13 which projects downwardly through the cap 11 and forms with the cap a swivel-support for the mill.

The main shaft 14 is suitably journaled in bearings provided in the bed 12 and has fixedly secured thereon in spaced relation a pair of driving pinions 15. The outer end of the shaft has fixed thereon a head 16 forming a hub for the wind-wheel (not shown) which may be of any well known or preferred type.

A driven shaft 17 is suitably supported in parallel relation with the driving shaft 14 in a bearing 17 upon the bed 12. To either end of the shaft 17 there is fixedly secured a gear 18; said gears being positioned to mesh with and be driven by the driving pinions 15. To the outer face of each of the gears 18 there is journaled at 19 a pitman or connecting rod 20. The upper ends of said pitmen are secured by a pin 21 to a head 22 which is vertically reciprocable in suitable guideways 23 and has secured to its lower end the ordinary pump rod 24. The guideways 23 which rise from the main bed of the mill are so positioned that the pump rod is guided in a vertical plane which intersects the gears 18 tangentially to the orbits of the journals 19 by which the connecting rods 20 are secured to the gears.

It is well known that the greatest force must be exerted upon the pump rod when it is moved upwardly and it is obvious that by eliminating the lateral thrust which prior to my invention has been exerted upon the cross-head by the pitman, I am able to materially reduce the friction of the cross-head in its guides and thereby increase the efficiency of the mill. By disposing the guides so that the pump rod is positioned in a plane tangential to the orbits of the journals 19 the connecting rods 20 are in a position to exert a direct upward thrust upon the cross-head when the maximum speed of the pump rod in the upward direction is effected. In other words the speed of the journals 19 in an upward direction is greatest when they cross a horizontal plane coincident with the axis of the shaft 17, and if at this time the lifting force of the gears 18 is applied to the cross-head in a vertical

direction without any lateral thrust against the guide members 23 the maximum efficiency of the apparatus will be attained.

An arm 25 projects beyond the gears for the purpose of supporting the upper end of a rod 26 upon which the vane rail 27 is mounted by means of a bifurcated casting 28. The vane of the mill (not shown) is attached to the vane rail in the usual manner. A governor consisting of a torsion spring 29 coiled around the rod 26 and secured at its upper end to a rod by an arm 30 loosely journaled on the rod and suitably retained in position by a bolt 31 passing through an arm 32 fixed on the rod, the lower end of the spring being secured to the casting 28, tends to maintain the vane in the open position shown in Figs. 1 and 2. In this position of the parts, as is well understood, the wind-wheel is held with its face to the wind. If the velocity of the wind rises above a predetermined point the vane will swing backwardly, viewing Fig. 1, against the force of the governor spring to throw the wheel partially out of the wind for purposes of protection.

A brake consisting of a flexible steel band 33 having one end fixed at 34, encircles the hub 16 and is provided at its other end with a bolt 35. A bell-crank lever 36 is pivotally mounted upon a stud 37 projecting from the bed of the device and has its horizontal arm slotted at 38 for the reception of the bolt 35 which is secured therein by nuts 39. A second bell-crank lever comprising a long arm 40 and a short arm 41 is pivotally mounted upon the bolt 42; the short arm 41 being connected to the depending arm of the bell-crank lever 36 by a link or rod 43. The long arm 40 is bent upwardly at its upper end to provide a vertical extending portion 44 which, when the mill is in operative position, is disposed adjacent the vane rail 27. Since the spring-buffer 45 which is interposed in the path of an arm 46 projecting laterally from the casting 28 limits the opening movement of the vane to the position shown in Fig. 2, and since the bell-crank lever 40, 41 is not connected with the vane it will be evident that the governing movements of the vane may take place without affecting the brake. The vane may even swing to closed position against the stop 47 without setting the brake for the reason that the brake is in no way associated with the governing movement of the mill. For the purpose, however, of simultaneously swinging the vane to closed position and applying the brake 33 there is provided a chain 48 connected at one end with the arm 40, which is trained over a pulley 49 carried by a laterally extending arm 50, and over the guide-pulley 51 from whence it extends to the bottom of the tower where it may be manipulated by the attendant in the usual manner to throw the mill out of the wind. When the chain 48 is drawn down by the attendant the arm 40 is swung rearwardly, viewing Fig. 1, carrying with it the vane rail which is engaged by the vertical portion of the arm 44. It will be evident that this movement of the bell-crank lever 40, 41 will pull upon the link 43 and swing the bell-crank lever 36 to depress its horizontal arm and apply the brake arm to the hub of the wind-wheel. When the chain is released the governor spring 29 will swing the vane into the position shown in Fig. 2, which will carry with it the bell-crank lever 40, 41 and release the brake.

It will be evident from the above description that the brake is entirely independent from and is not affected by the normal governing movements of the mill vane, and that it is impossible to apply the brake until the wheel has been thrown nearly or completely out of the wind. This feature obviates the danger of breakage to the mill which has heretofore frequently occurred where the brake has been connected directly with the vane so that closing movement of the vane applied the brake automatically. In this construction the application of the brake is absolutely under the control of the attendant while the releasing of the brake will be automatically accomplished when the vane swings into open position under the influence of the governor spring.

From the foregoing it is thought that the construction, operation and many advantages of the herein-described invention will be apparent to those skilled in the art without further description, and it will be understood that various changes in the size, shape, proportion and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

What I desire to claim is:

1. In a windmill, the combination of a driving shaft, pump operating mechanism connected therewith, a wind-wheel head secured on said shaft, a brake adapted to hold said shaft against rotation, a vane, a governor therefor, and means for swinging said vane against the force of the governor and simultaneously applying said brake, said vane acting on said means to positively release the brake upon opening movement of the vane.

2. In a windmill, the combination of a driving shaft, pump operating mechanism connected therewith, a wind-wheel head secured on said shaft, a brake adapted to be applied to said head, a bell-crank lever connected with said brake and having an upwardly projecting end, and a swingingly mounted vane normally disposed adjacent the upturned end of said bell-crank lever but disconnected therefrom whereby when

said lever is operated to set the brake the vane is closed thereby, but when the brake is released the vane may close without affecting the brake.

3. In a windmill, the combination of a driving shaft, pump operating mechanism connected therewith, a wind-wheel head secured on said shaft, a brake for said head, a swingingly mounted vane, and a lever connected with said brake and having one end disposed in the path of said vane, whereby opening movement of the vane will release the brake but closing movement of the vane will not affect the brake.

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