J. D. EBERT.

COMBINED WINDMILL AND AIR COMPRESSING MECHANISM.

APPLICATION FILED AUG. 14, 1917.

1,299,151.

Patented Apr. 1, 1919.

4 SHEETS—SHEET 1.

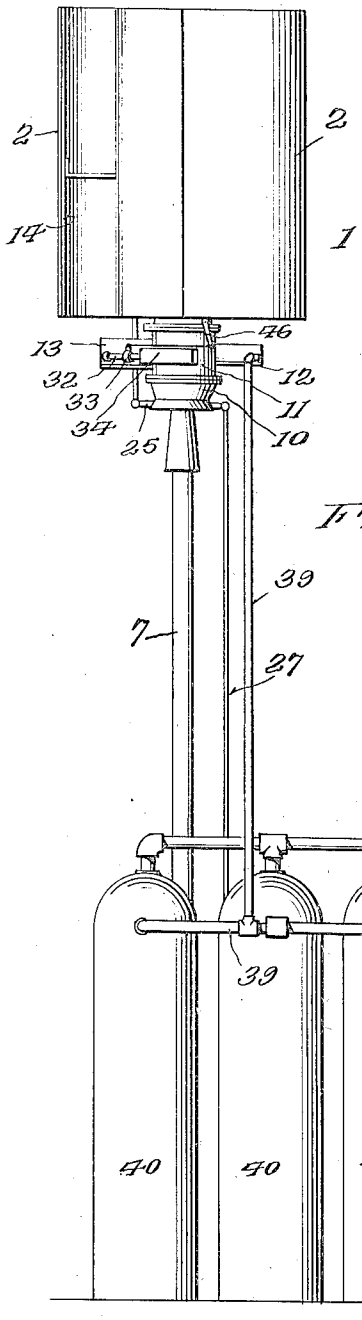


Fig. 1.

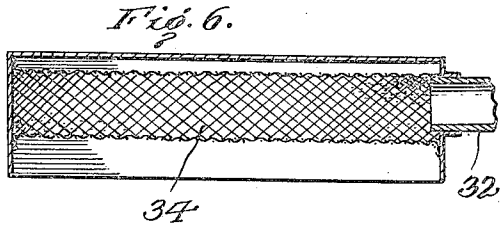


Fig. 6.

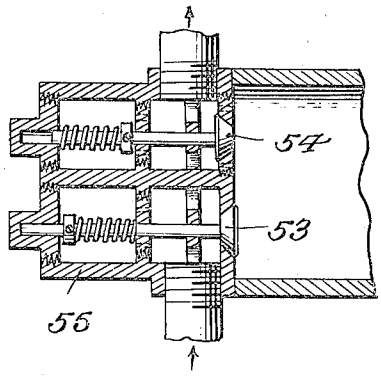
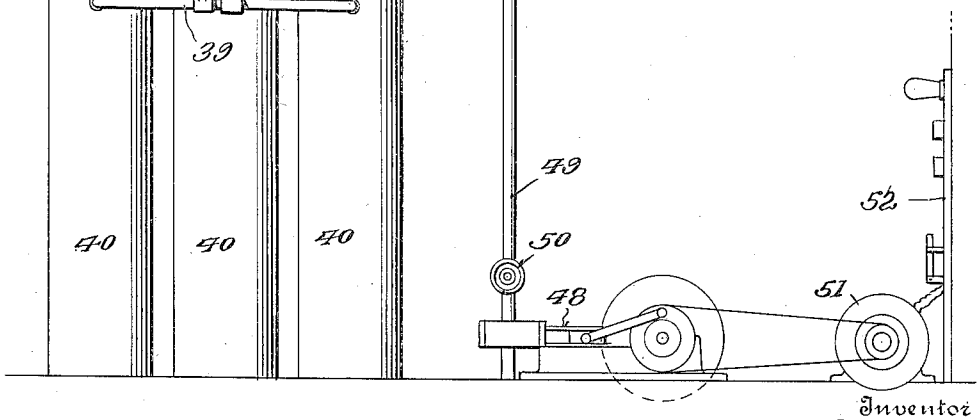


Fig. 7.



Witness

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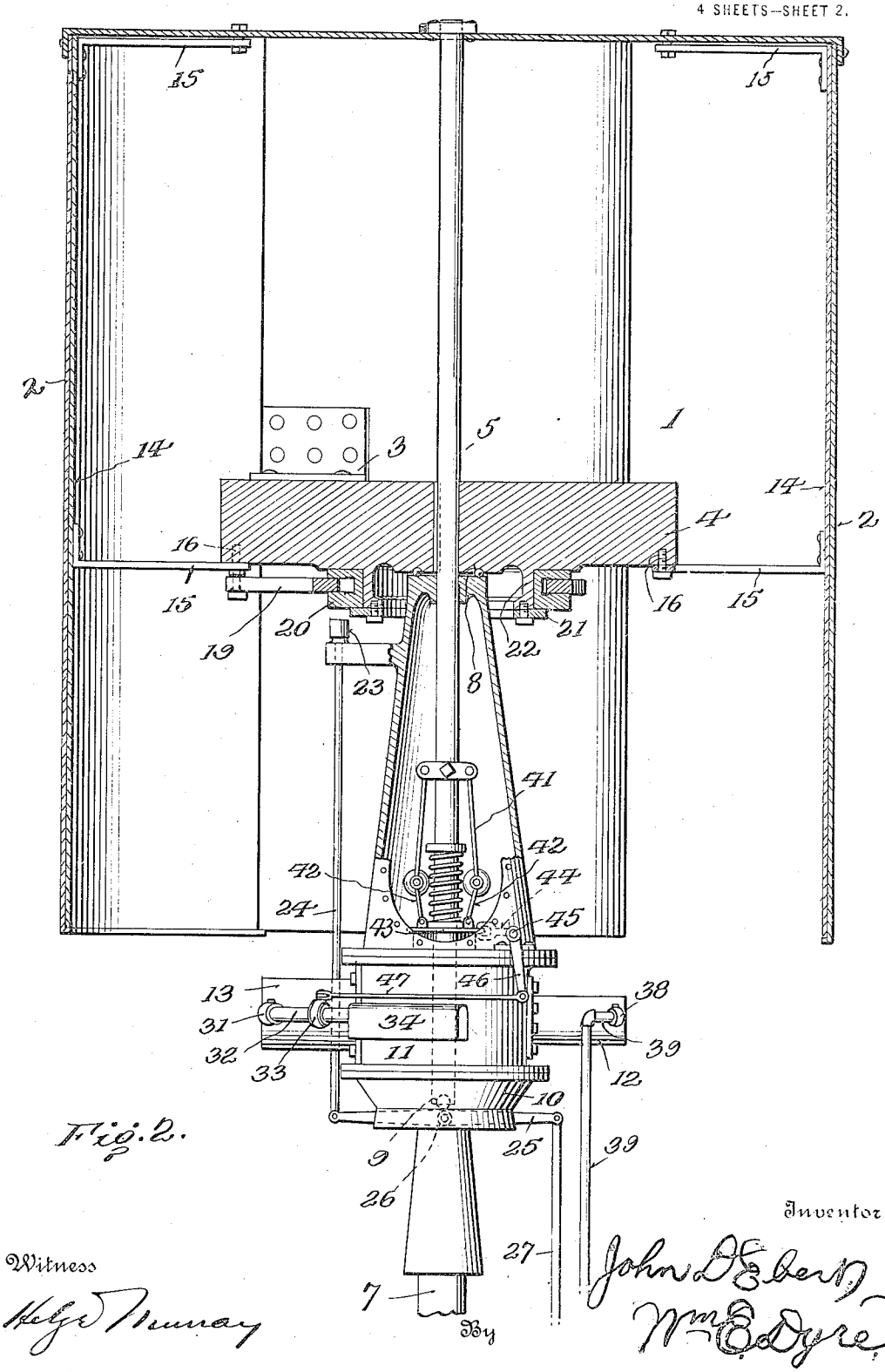

Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 3.

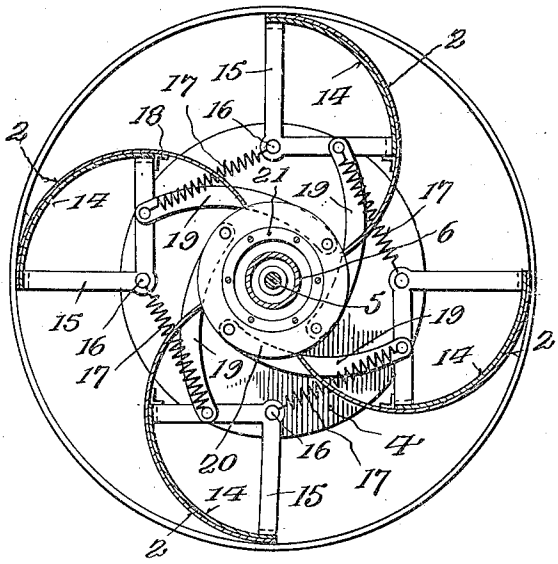
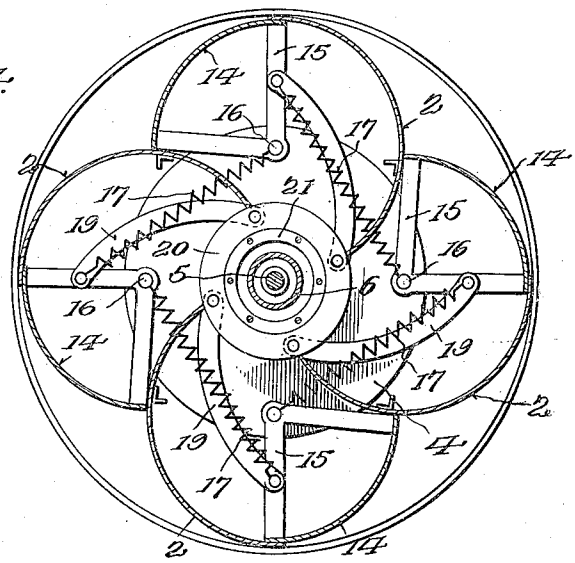


Fig. 4.



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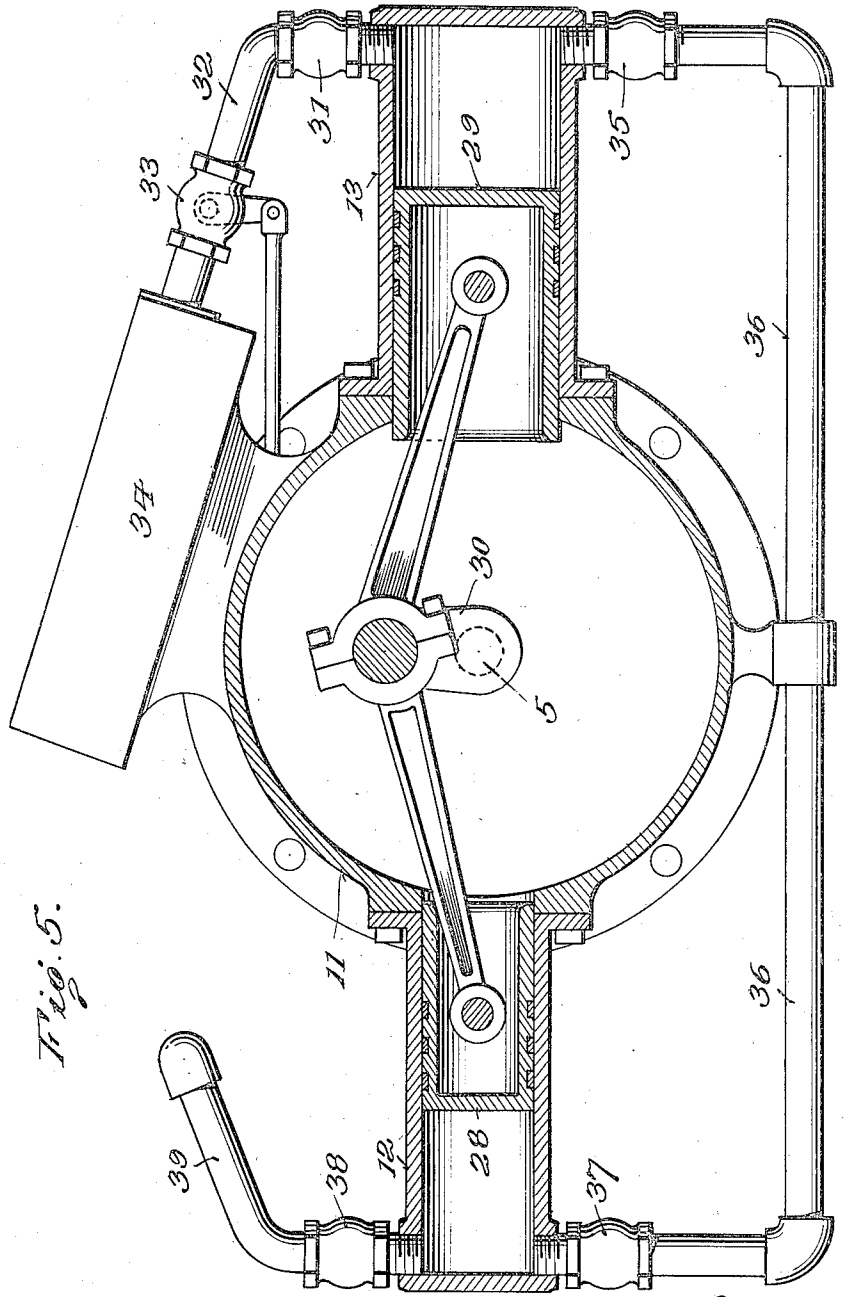

Fig. 5.

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UNITED STATES PATENT OFFICE.

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COMBINED WINDMILL AND AIR-COMPRESSING MECHANISM.

1,299,151. Specification of Letters Patent. Patented Apr. 1, 1919.

Application filed August 14, 1917. Serial No. 186,145.

To all whom it may concern:

Be it known that I, JOHN D. EBERT, a citizen of the United States, residing at Kinsley, in the county of Edwards and State of Kansas, have invented certain new and useful Improvements in Combined Windmill and Air-Compressing Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention contemplates certain new and useful improvements in motors, and relates more especially to a combined windmill and air compressing mechanism.

An object of the present invention is the production of a combined windmill and air compressing apparatus for use in connection with power storage reservoirs or tanks the contents of which may then be utilized to drive air engines, generators, dynamos, or other prime movers.

Another object of this invention is to produce a novel form of windmill having connected therewith an air compressing mechanism and a governing mechanism for regulating the capacity of the said air compressor relative to the speed of the windmill.

A further object of the present invention is the production of a combined windmill and air compressor including among other things a vane supporting flywheel directly connected to the power shaft and an air compressor relatively positioned beneath said fly wheel and connected directly to the said power shaft, whereby tendencies to strain are largely eliminated and the relative efficiency of the power producing device as a unit is increased.

A further object of the invention is the production of a combined windmill and air compressor including in combination vertically arranged vanes, means including movable shields for rendering the vanes ineffective, and means for automatically operating the said shields to again make the vanes operative.

The invention further consists in the combination and arrangement of the several parts including a novel form of compressor having an air filtering device and interconnected high and low pressure cylinders, as also in other details of construction hereinafter described and pointed out in the appended claims.

In the drawings which show an embodiment of my invention, and in which like reference characters designate corresponding parts in the several views:

Figure 1 is a side elevation of my improved windmill and air compressor shown connected to a series of suitable compressed air receiving tanks or reservoirs, from which power is taken to operate an engine which in turn can be so connected as to drive a dynamo or the like.

Fig. 2 is an enlarged sectional view through the vanes of the windmill, showing the compressor in side elevation.

Fig. 3 is a detail bottom plan view of the fly wheel and connected vanes showing the latter in operative position for receiving full force of the wind.

Fig. 4 is a similar view showing in operative position a series of shields for rendering the vanes ineffectual.

Fig. 5 is an enlarged horizontal sectional view through the air compressor, showing the oppositely located high and low pressure cylinders.

Fig. 6 is a detail section view through the air filter connected to the compressor, and

Fig. 7 is an enlarged detail sectional view of a form of intake and discharge valves for the high and low pressure cylinders which may be employed.

The present invention has been primarily designed for use in the storing of power for factory or home use, and contemplates a staple and effective combination of a wind motor and an air compressor, whereby a suitable power producing medium can be accumulated and then utilized to operate dynamos, engines, motors, or other prime movers.

Referring to the drawings, the windmill 1 is of the vertical vane type and comprises a plurality of arcuate wind vanes 2 secured by radial brackets 3 to a fly wheel 4. The fly wheel is keyed to the vertical shaft 5 which is rotatably mounted in a suitable casing 6 provided upon the upper end of a support or wind mill tower 7. Bearings 8 and 9 are provided for the said fly wheel 4 and shaft 5, respectively, and afford easy and free rotation for the mill proper. The casing 6 may be of any approved dust-proof construction, and as shown is of conical formation,

Between the casing 6 and a tower support 10 is positioned the compressor casing 11 upon opposite sides of which are bolted the high and low pressure cylinders 12 and 13, respectively, to be hereinafter described.

The windmill head consists principally of the vertically arranged arcuately shaped vanes 2 supported upon the brackets 3 extending from the fly-wheel. Coöperating with the vanes 2 are relatively movable shields or air breaking members 14 carried by angular brackets 15 which are pivotally positioned upon the under side of the fly-wheel at 16 near the outer edge thereof, and a cover or cap plate, the flange of which is secured to the vanes 2 as shown in Fig. 2 of the drawings.

These shields or air breaking members 14 are concentric with the arcuate vanes 2, as shown. When the mill is in normal operating position the shields 14 are held by springs 17 against stops 18 carried on the inner surfaces of the said vanes 2, as shown in Fig. 3. When the shields are operated so that they move across the air pocket formed between the vanes 2, the windmill is rendered ineffective (see Fig. 4).

Connected to each angular bracket 15 which carries a shield 14 is a link 19. The opposite end of each link 19 is pivotally connected to a collar 20, movable with relation to the fly-wheel. The collar 20 is positioned upon the under side of the fly-wheel and rotatably held in place by a ring 21 secured to a depending flange 22 of the fly-wheel. The under side of the collar 20 near its periphery is left free to receive the retarding or stopping member of an engaging brake 23 supported from the conical casing 6, as shown in Fig. 2. The lower end of the brake rod 24 is connected to one end of a lever 25 pivoted at 26 to the lower support 10. To the opposite end of the lever 25 is connected an operating rod or cable 27 which extends downwardly within reach of an attendant for operating the brake. Any suitable means for securing the rod or cable 27 may be employed when the windmill is to be rendered ineffective for some time.

In operation it will be noted that as the brake member 23 contacts with the under side of the collar 20, which normally revolves at the same speed as the fly-wheel, the said collar will be retarded or stopped according to the degree of the braking force, thereby causing the pivotal connections of the links 19 to shift about the shaft 5 and throw the shield or air breaking members 14 across the air pockets against the tension of the springs 17, as shown by Fig. 4. When the braking member is released the springs 17 retract the shields 14 from across the air pockets between the vanes 2 and the mill is again rendered effective in the wind.

The air compressor is preferably arranged beneath the fly-wheel and just clear of the lower edge of the vanes 2. This positioning of the compressor together with its direct connection to the vertical or driving shaft 5 has been found to be highly advantageous in the production of an evenly balanced and readily controlled air motor apparatus of the herein-described type.

The air compressor includes high and low pressure cylinders 12 and 13, extending radially from the compressor casing 11, and coöperating pistons 28 and 29, respectively, connected to a crank 30 formed integral with the driving shaft 5, as shown in Fig. 5. Upon each inward stroke of the piston 29 air is drawn in through the check valve 31 from an air conduit 32 leading from a controlling valve 33 and air filter 34 secured in any suitable manner to compressor casing 11. The outward movement of the piston 29 compresses and forces the air which has been drawn out of the low pressure cylinder 13 past the check valve 35 into an air conduit 36 leading to the high pressure cylinder 12. The timed relation shown of the two pistons 28 and 29 is such that as the piston 29 moves outwardly the piston 28 of the high pressure cylinder draws in the partially compressed air from the conduit 36 through the check valve 37. The outward movement of the high pressure piston 28 further compresses the air and forces it through the check valve 38 into the pipe or conduit connection 39 leading to the air storage tanks or reservoirs 40. There may be several of these tanks connected in series and provided with the usual drain cocks, gages, and other mechanisms incidental to their effective operation.

In operation it will be seen that the air is first filtered and then drawn through a controlling valve into the low and high pressure cylinders for successive compression, after which it is stored for operating purposes. The governing mechanism for regulating the amount of air drawn in for compression, which is commensurate with the speed of the mill, is located within the conical casing 6 and comprises ball governors 41 centrifugally mounted upon the shaft 5 keyed to the fly-wheel, and a lever connection extending to the controlling air intake valve 33 in the air conduit 32.

Referring to Fig. 2, the balls of the governor are connected by links 42 to a sliding collar 43 movable upon the shaft 5. Connected to the sliding collar 43 is an arm 44 extending from a rock shaft 45 mounted in the casing 6. An arm 46 depends from the rock shaft 45 and is connected to one end of a link 47 the other end of which is connected to the stem of the controlling valve 33.

By this construction it will be seen that as the balls of the governor are thrown outwardly by an excessive speed of the mill the

sliding collar 43 will be raised, thereby elevating the arm 44, rocking the shaft 45 and moving the arm 46 which, through the link connection 47, acts to open the controlling valve 33 and increase the amount of air drawn in by the compressor. The controlling valve is preferably adjusted so as to admit the proper amount of air under normal working conditions and is movable by the governor and its connections to reduce or increase the amount of air dependent upon the speed of the mill and the velocity of the wind.

Referring to Fig. 1, I have shown an engine 48 driven by power taken from the tanks or reservoirs 40 through the pipe connection 49. A throttle valve 50 controls the admission of air to the engine 48.

The engine is designed to drive a generator or dynamo 51 from which electricity may be taken from a distributing board 52 provided with the usual electrical connections.

In the form of air intake and discharge valve for the compressor, shown in Fig. 7, the air intake valve 53 is spring-actuated and is modeled after the usual type of puppet valve used in explosive engines. Likewise, the discharge valve 54 for allowing the compressed air to be forced out of the cylinder is of the same design. These valves are mounted in a suitable valve casing or head 55 which may be secured to the end of each compressor cylinder.

The operation of the combined wind motor and compressor follows:

Under normal wind velocity conditions the speed of the mill is regulated with that of the compressor so as to produce sufficient power for storing the required amount of air for operating purposes. The vanes 2 of the mill are normally set as shown in Fig. 3 and the air currents act within the air pockets between the said vanes to revolve the fly-wheel to which is keyed the shaft 5. As the shaft 5 is rotated the crank 30 is revolved, thereby causing the compressing pistons 28 and 29 to operate within the high and low pressure cylinders to compress the air. The speed of rotation of the shaft 5 determines the action of the ball governor 41, which in turn regulates the amount of air drawn in through the controlling valve 33. In rendering the mill ineffective the braking member is operated as hereinbefore described, and the air breaking members or shields 14 are allowed to swing across the entrance of the air pockets between the vanes 2. The springs 17 return the shields 14 to their normal working position against the inner surface of the arcuate vanes 2 when the brake is released.

From the foregoing it will be obvious that I have produced a novel and readily controlled combined wind motor and air compressor, capable of producing power which is readily accessible for any and all uses to which it may be applied.

Various changes in the form, arrangement and construction of the several parts may be resorted to without departing from the spirit of the invention, and I do not limit myself to the exact construction herein set forth.

What I claim is:

1. A wind motor of the class described including in combination vertically arranged revoluble vanes, a fly-wheel to which the vanes are connected, means including movable vanes for rendering the first mentioned vanes ineffective in the wind, a relatively movable collar connected to said movable vanes, and means for controlling the relative movement of the fly-wheel and the movable collar.

2. A wind motor of the class described including in combination vertically arranged revoluble vanes, a fly-wheel to which the vanes are connected, means for rendering the first mentioned vanes ineffective in the wind, said means comprising pivoted vanes, a collar movable with relation to the fly-wheel, links connecting said pivoted vanes and said collar, and means for shifting the links carried by the collar with relation to the fly-wheel.

3. A wind motor of the class described including in combination arcuately arranged revoluble vanes having air receiving pockets therebetween, and relatively movable arcuately and concentrically arranged air breaking members for closing the air receiving pockets.

4. A wind motor of the class described including in combination arcuately arranged revoluble vanes, having air receiving pockets therebetween, relatively movable arcuately and concentrically arranged air breaking members for closing the air receiving pockets, means for operating the said air breaking members, and means for returning said air breaking members clear of the air receiving pockets.

5. A wind motor of the class described including in combination arcuately arranged revoluble vanes, having air receiving pockets therebetween, relatively movable arcuately and concentrically arranged air breaking members for closing the air receiving pockets, means including a braking device for operating said air breaking members, and means including springs for returning said air breaking members clear of the air receiving pockets.

6. A wind motor of the class described including in combination vertically arranged revoluble vanes, a fly-wheel connected to said vanes, relatively movable air shielding vanes normally positioned against the revoluble vanes, a movable mem-

ber connected to said air shielding vanes and frictionally movable with the fly-wheel, and means for interrupting the frictional movement of the fly-wheel and movable member for shifting the position of the air shielding vanes.

7. A wind motor of the class described including in combination vertically arranged revoluble vanes, a fly-wheel connected to said vanes, relatively movable air shielding vanes normally positioned against the revoluble vanes, a movable member connected to said air shielding vanes and frictionally movable with the fly-wheel, means for interrupting the frictional movement of the fly-wheel and movable member for shifting the positions thereof relatively to each other for changing the position of the air shielding vanes, and means for returning said air shielding vanes to their normal position.

In testimony whereof I affix my signature, in presence of two subscribing witnesses.

JOHN D. EBERT.

Witnesses:
EDWARD C. GORDLEY,
M. A. MERTEN.