July 3, 1934. H. R. BOYER 1,965,171

VENTILATOR

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Fig. 2.

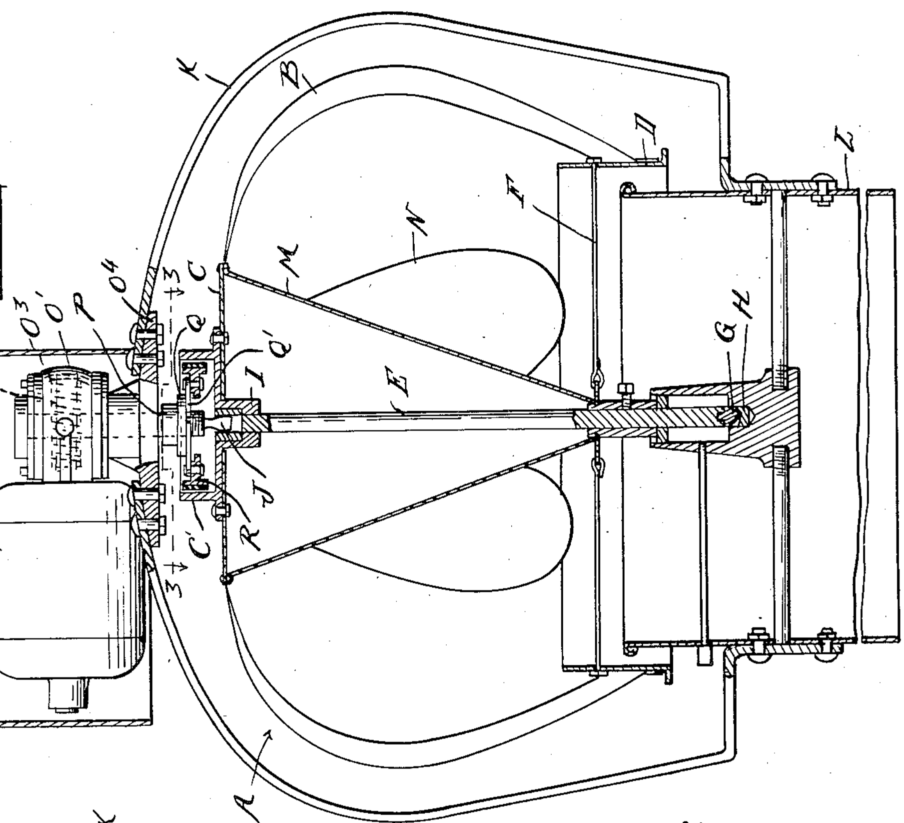

Fig. 1.

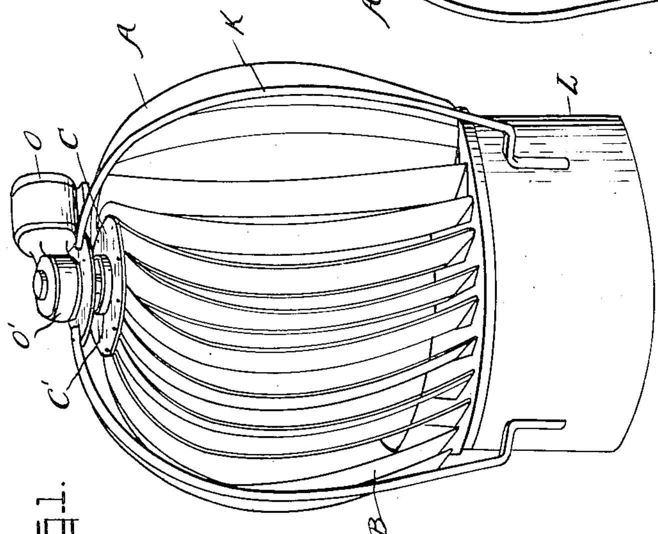

Fig. 3.

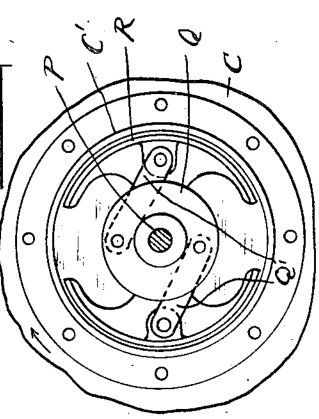

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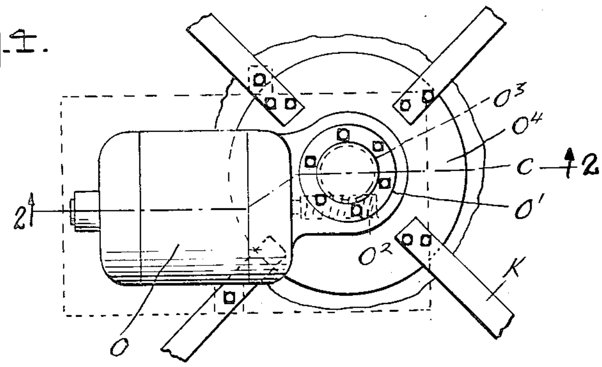
Fig. 4.



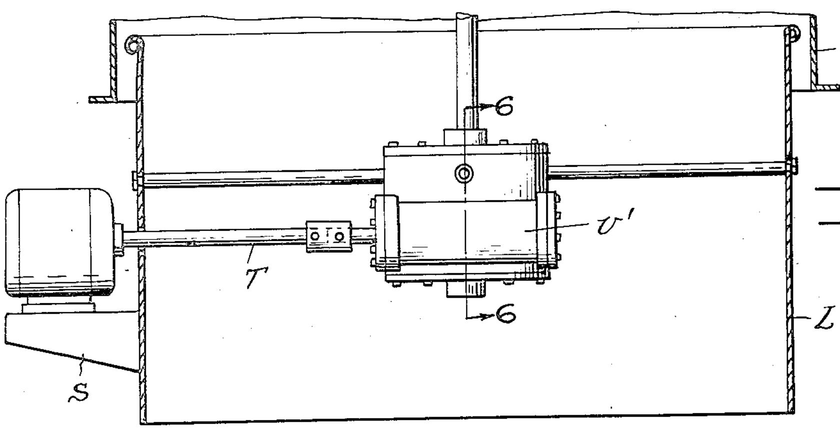


Fig. 5.

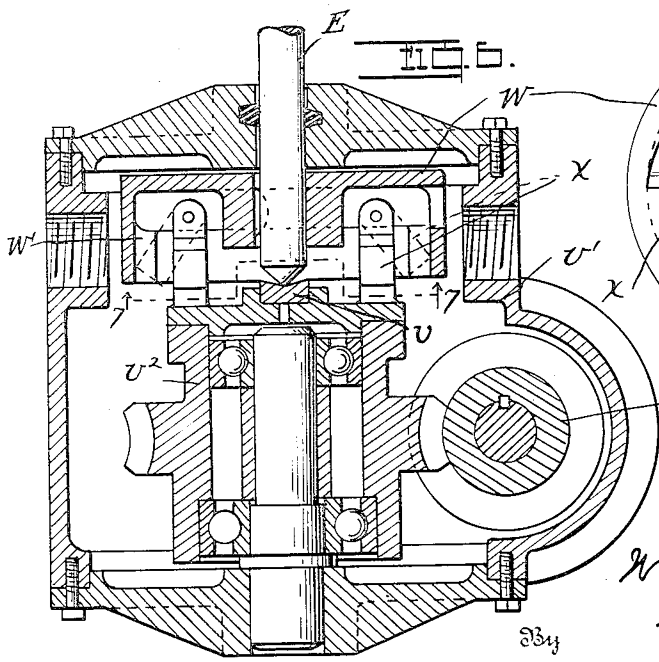


Fig. 6.

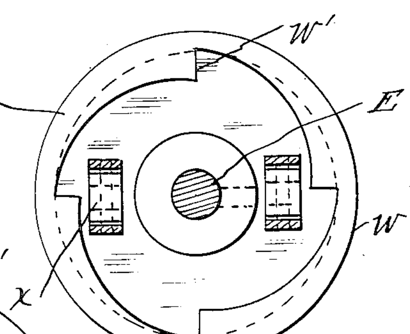


Fig. 7.

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Patented July 3, 1934 1,965,171

UNITED STATES PATENT OFFICE

1,965,171

VENTILATOR

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Application February 6, 1933, Serial No. 655,518

2 Claims. (Cl. 98—72)

The invention relates to ventilators of that type commercially known as turbine ventilators and which function to exhaust air or fumes from an enclosure to the external atmosphere. Ventilators of this type are normally revolved by the wind when blowing in any direction and when no wind is blowing will still permit unimpeded discharge of air or fumes by the natural draft of the flue to which the ventilator is attached. Nevertheless the efficiency of the device as an exhausting means is largely dependent on wind velocities.

It is the object of the present invention to obtain a construction, the efficiency of which is independent of external atmospheric conditions. This I have accomplished by the provision of an independent motor for driving the turbine whenever wind velocity is low or where it is desired for any reason to augment the discharge. I have also devised a construction which in no way interferes with the efficiency of the turbine when operated by the wind. The invention therefore consists in the construction of power driven turbine ventilator as hereinafter set forth.

In the drawings:

Fig. 1 is a perspective view of my improved ventilator;

Fig. 2 is a vertical central section therethrough on line 2—2 of Fig. 4;

Fig. 3 is a horizontal section on line 3—3 of Fig. 2 illustrating the centrifugal clutch;

Fig. 4 is a plan view;

Fig. 5 is a vertical section partly in elevation showing a modified construction;

Fig. 6 is a transverse section of Fig. 5 on line 6—6 thereof; and

Fig. 7 is a horizontal section on line 7—7 of Fig. 6.

The ventilator to which my improvements are applied comprises essentially a substantially spherical hood A formed of a series of segmental blades B attached at their upper ends to a cap C and at their lower ends to an annulus D. The hood is supported by a central shaft E connected with the cap at its upper end and also connected by radial braces F with the annulus D. The lower end of the shaft is preferably provided with a bearing point G engaging a cupped bearing H while the upper end of the shaft is provided with a cup I for engaging a guide pin J. This pin in turn is supported by a skeleton frame K which surrounds the hood and is connected at its lower end with a cylindrical casing L mounted on the flue or other support. Within the interior of the hood is an inverted cone M provided with a plurality of spiral blades N. The construction is such that the blades B which are arranged obliquely in the plane of rotation will extend transversely to the direction of the wind on one side of the axis of the turbine and will be substantially parallel to the direction of the wind on the opposite side of said axis, thereby causing a rotation of the turbine. The effect of this rotation is to propel the air outward from all sides of the turbine and this is assisted by the spiral blades N and inverted cone M so that the entire structure is very efficient in augmenting the draft.

The construction as above described has heretofore been used but as previously stated its efficiency is dependent largely upon wind velocities. Furthermore, the construction has been designed to operate solely by air currents and its purpose has been to avoid interference or down drafts, whatever the direction of the wind. I have discovered that the rotation of the turbine by independent means will greatly augment the maximum efficiency that can be obtained when wind driven, and will accomplish this with an exceedingly low consumption of power.

As shown in Figs. 1 to 4, the independent driving means employed is an electric motor O which is mounted at the top of the skeleton frame K in a position where it will not interfere with air currents either internal or external which impinge on the turbine. The motor casing is connected with the casing O′ which contains a step-down transmission, preferably a worm gearing O^2, O^3. The lower part of the casing O′ has a flange O^4 that is connected with the arms K of the skeleton frame and so as to arrange the driven shaft P of the step-down transmission in axial alignment with the shaft E, the guide pin J may be mounted on the lower end of the shaft P so as to revolubly engage the socket I.

To couple the driven shaft P with the turbine I provide an overrunning clutch so constructed that when the motor is de-energized rotation of the turbine will be unimpeded. On the other hand, when the motor is energized the clutch will instantaneously couple the shaft P with the turbine to drive the latter. As specifically shown in Figs. 2 and 3, the cap C is provided with an upwardly extending annular flange C′ and the shaft P has mounted thereon a collar Q connected by pivotal links Q′ with segmental clutch shoes R. The links Q′ are oblique to the radius of the drum C′ so that when the shaft P is rotated in the direction of the arrow, the initial torque together with the inertia of the shoes will cause the straightening of the oblique links Q′ and the forcing of the shoes into frictional engagement with the flange C′. This will positively couple the shaft P with the turbine as long as the motor is in operation, but when it is de-energized the shoes will be withdrawn from frictional contact with the annular flange so that the turbine can be revolved without resistance.

In the modified construction shown in Figs. 5 to 7, instead of mounting the motor on the top of the skeleton frame K it is placed upon a shelf S on the cylindrical casing L and has its shaft T extending radially inward into engagement with a step-down worm gearing U. This is mounted in a casing U′ which also forms a guide bearing for the lower end of the shaft E. The pointed lower end of this shaft is supported in a cupped bearing V similar to the bearing H and which is mounted on the upper end of the worm gear U^2. W is a drum attached to the shaft E within the casing U′ and having a series of ratchet teeth W′ on its inner face. X are dogs pivotally attached to the worm gear U^2 and adapted to be thrown outward by centrifugal action into coupling engagement with the ratchet teeth W′ when the motor is energized but which are dropped out of engagement when the motor is stationary to prevent interference with the independent rotation of the turbine.

With each of the constructions above described, the turbine is free to be operated by wind pressure or the force of the ascending air current in the chimney, but whenever it is desired to increase the draft, the motor may be used for this purpose.

Practical tests of my improved construction have demonstrated that the exhausting efficiency of the turbine can be more than doubled when it is power driven and with a relatively small consumption of power.

What I claim as my invention is:

1. The combination with a rotary turbine ventilator of the type revolvable by external air currents in any lateral direction to discharge air from the interior thereof, of a skeleton frame surrounding said turbine, an electric motor mounted on top of said skeleton frame, a step-down transmission connected to said motor and having its driven shaft in alignment with the axis of the turbine, a cupped bearing at the upper end of the turbine engaging the lower end of said shaft, an annular flange on said turbine concentric with said shaft, and shoes connected to said shaft within said annular flange normally out of contact therewith but actuated centrifugally when said motor is energized to engage said flange and to form a driving coupling between said shaft and turbine.

2. The combination with a rotary turbine ventilator of the type revolvable by external air currents in any lateral direction to discharge air from the interior thereof, of a skeleton frame surrounding said turbine and comprising a plurality of vertically extending bowed rods, an electric motor, a step-down transmission therefor and a housing forming a weatherproof casing for both motor and transmission, the driven shaft of the transmission being in alignment with the axis of the turbine and said housing having a disk portion connected to the bowed rods of said skeleton frame to support the motor and transmission thereabove, a cupped bearing at the upper end of the turbine revolvably engaging the lower end of the transmission driven shaft, an annular flange on said turbine surrounding and concentric with said shaft, shoes within said annular flange and pivotal links connecting said shoes with said shaft adapted to be thrown out centrifugally when the motor is energized and to effect a driving coupling between the driven shaft of the transmission and said turbine.

HAROLD R. BOYER.