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Concentrator of the Air Flow

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Abstract- One of the essential problems of the use of energy of wind is the fact that to wind generator the wind can blow from the different sides and its wind wheel must be turned in the direction opposite to wind direction. There is a whole series of constructions of wind generator, the operating principle of which is based on what the different parts of the wind wheel has different aerodynamic drag with respect to the wind direction. However, in practice it does not succeed to obtain a large difference aeroditamicheskikh in the resistances indicated, which decreases the effectiveness of such generators. Furthermore, such wind generator are fairly complicated from a design point of view. But since such generators have wide practical application, of urgent appears the problem of developing of highly effective simple of wind generator. The creation of this device, which dependently on the wind direction directs, is one of the ways of creating this generator the air flow in one assigned direction. To the creation of this device is dedicated the article.

Keywords: *wind generator, wind wheel, aerodynamic drag, airflow.*

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I. Problems of the Creation of wind Generator

One of the essential problems of the use of energy of wind is the fact that to wind generator the wind can blow from the different sides and its wind wheel must be turned in the direction opposite to wind direction.

There is a whole series of constructions of wind generator the operating principle of which it is based on what the different parts of the wind wheel has different aerodynamic drag with respect to the wind direction. Such wind generators are shown in the following photographs:

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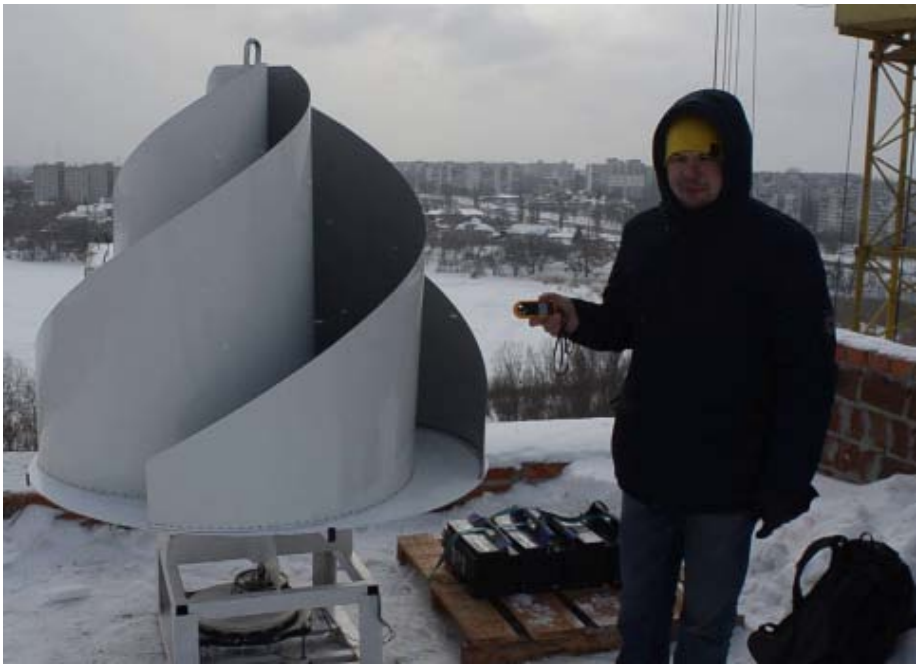

However, in practice it does not succeed to obtain a large difference aeroditamicheskikh in the resistances indicated, which decreases the effectiveness of such generators. Furthermore, such wind generator, as can be seen from photographs, are fairly complicated from a design point of view. But since wind generator have wide practical application, of urgent appears the problem of developing of highly effective simple wind generator.

The creation of device, which not dependences on the wind direction directs, is one of the ways of creating this generator the air flow in one assigned direction. After placing on the way of this flow wind wheel, it is possible to convert energy of flow into the mechanical or electrical energy. Since as yet there is no term, which determines this device, let us name its concentrator of the air flow.

II. Concentrator of the Air Flowand its Construction

Let us attempt to create the device, which is not dependent on the wind direction, it will direct the aircurrent in the vertical, or in other desired direction. The type of this device from above and from the side is shown in Fig. 1 and Fig. 2.

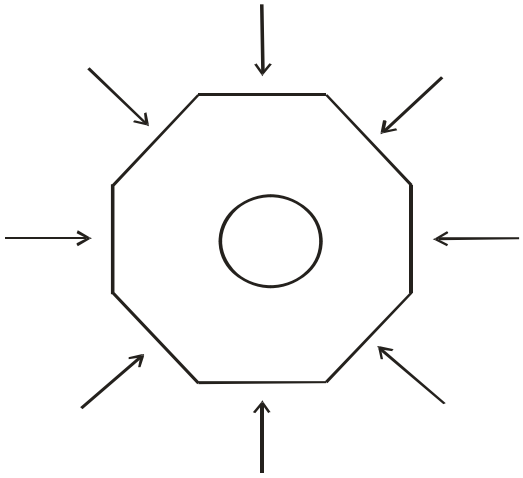

Fig. 1: Type of device on top. Pointers showed possible wind directions

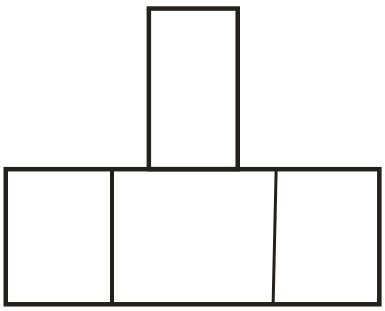

Fig. 2: Type of device on the side

Device works in such a way that it is not dependent on the wind direction, the air flow, by it created, it is sent for the stand pipe, which is located in the upper part of the device. If flow must be directed to other side, then this pipe can have a bend in the desired direction.

As is evident device presents the octahedron, whose development is shown in Fig. 3. The lower part of the octahedron has the flat bottom, not permeated for air, and flow, air, created is sent by wind for the stand pipe.

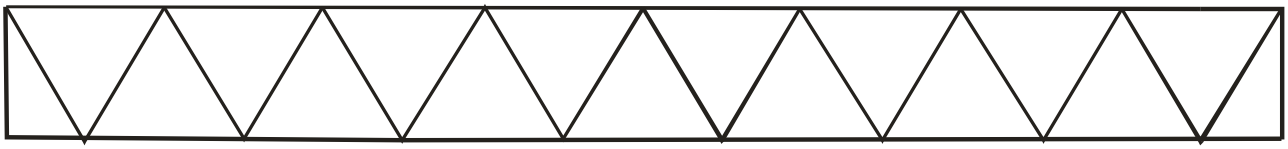

Fig. 3: Development of the side member of the device

The side member of the device consists of the triangles, the bases of half of which are located on the lower line, the basis of the remaining part of the triangles are located on the upper line. The triangles, whose basis being been located not of lower line, present those not penetrated for air by partitions. But the contour of the triangles, whose basis are found on the upper line, they are closed with the triangular shutters, which can be opened only inward under the wind pressure. Thus, from whatever side not of muzzles wind, the leeward part of the shutters will be opened, but the opposite part of the shutters will be closed and the flow, created by air, will be directed to the pipe, which is located in the upper part of the device.

Let us calculate the possible energy parameters of wind generator, with the use of a concentrator of the air flow.

Kinetic energy E_k, the air flow with the average speed $\overline{v}$, of passing through the cross section S, perpendicular $\overline{v}$, and it is calculated by the mass m, of air to the formula

$$E_k = \frac{m\overline{v}^2}{2}. \quad (1)$$

If in relation (1) as m to take the mass flow per second of air, kg/s, then we will obtain the value of the power, developed by airflow, i.e.

$$P = \frac{\rho \bar{v}^3 S}{2}, \qquad (2)$$

where ρ - the air density

If we place $S = 1m^2$, that we will obtain the specific power of the air flow
center

$$P_{spec} = \frac{\rho \bar{v}^3}{2}.$$

Usually in the calculations as ρ is taken its value, equal 1,226 to kG/m^3, which corresponds to the following normal climatic conditions: t = 15°S, r = 760 mm of mercury column (101,3 kPa).

We will consider that only 50% 0vetrovogo air flow are usefully used by a concentrator and only 50% ot of this power is converted into the mechanical or electrical energy. From (2) we obtain the useful nominal power, manufactured by the generator

$$P_{rated} = \frac{\rho \bar{v}^3 S}{8}.$$

Let us give concrete example, let us assume $\bar{v} = 10 \frac{m}{s}$ and $S = 10m^2$, then the generatable power is 1.5 kW. These are very good indices.

III. Conclusion

One of the essential problems of the use of energy of wind is the fact that to wind generator the wind can blow from the different sides and its wind wheel must be turned in the direction opposite to wind direction. There is a whole series of constructions of wind generator, the operating principle of which is based on what the different parts of the wind different aerodynamic drag with respect to the wind direction has wheels. However, in practice it does not succeed to obtain a large difference aeroditamicheskikh in the resistances indicated, which decreases the effectiveness of such wind generator. Furthermore, such generators, as can be seen from given photographs, are fairly complicated from a design point of view. But since wind generator have wide practical application, of urgent appears the problem of developing of highly effective simple wind generator.

The creation of this device, which dependently on the wind direction directs, is one of the ways of creating this generator the air flow in the assigned direction. The construction of this device is represented in the article.