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PATENT SPECIFICATION.

489,139



Application Date : July 27, 1937. No. 20813/37.

Complete Specification Accepted : July 20, 1938.

COMPLETE SPECIFICATION

Improvements in or relating to Wind-driven Power Apparatus

ERRATUM

SPECIFICATION No. 489,139

In the Statutory Reference at the end of the Specification for "No. 3003/10," read "No. 3303/10,"

THE PATENT OFFICE,
31st August, 1938.

power is restricted and is limited by the weight of the machines and of the guy-rope.

20 The principal object of this invention is to overcome these disadvantages and to this end, according to the invention, I provide a wind-driven power apparatus
25 for utilising high winds, the wind-driven machines of which are held by captive kites, characterised by the use of a system of interconnected kites. By this means, the lifting power can be increased
30 to a practically unlimited extent as any desired number of kites can be coupled together and because each kite has to carry only that part of the guy-rope which connects it to the next lower kite. The
35 result is that the strength of the guy-rope, particularly towards the upper end, can be small whilst, with a single kite, on account of its large dead weight, it must be as strong as possible at the upper
40 end.

It further follows that each kite of the system, as its lifting power exceeds the weight of the pertaining guy-rope, increases the total lifting power. In this
45 way, it is possible with the wind-driven machine, to bring large weights (windwheel and dynamos) to great heights and thus to utilise the stronger and more uniform high winds.

50 In order that the invention may be fully understood, I shall now describe two embodiments thereof, by way of example by reference to the accompanying diagrammatic drawings, in which:—

cable is not necessary. The energy generated by the windwheel may also be led or transmitted positively mechanically directly to the ground by means of the
75 guy-rope.

As will be seen from Fig. 2, it is not necessary to arrange the windwheel on the lowermost kite. If, for the purpose of reaching the most favourable air currents,
80 the windwheel is to be raised to a greater height, then one or more kites 10, 11 can also be arranged underneath the kite 9 carrying the windwheel 7, which have the purpose of taking the weight of the lower
85 guy-rope.

Fig. 2 shows, moreover, that two kite-systems 12, 13, or a plurality thereof, can be used in combination. By this means the possibility is offered, on the one hand,
90 of increasing the lifting power, without the topmost kite attaining an excessive height. On the other hand, a greater security is attained if kite systems, which are built so as to be able to rise to great
95 heights, are used together with kite systems built to give great lifting power, as the whole arrangement can thus be easily adapted to the changing wind conditions.

It is important that the number of kites
100 united to form a kite system shall be greater than the number of wind-driven machines. Nevertheless, the latter need not, as shown in figures 1 and 2, be necessarily limited to a single machine.
105

In order to maintain the pull in the rope 6 as nearly uniform as possible, when the wind strength shows considerable



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I, DR. ING. A. VAN GRIES, of 72, Nussbaumerstrasse, Köln, Germany, a German citizen, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to improvements in and relating to wind-driven power apparatus.

It has already been proposed to arrange wind-driven machines, together with dynamos, driven thereby, on captive balloons or kites, for the purpose of making use of the high winds. The suitability and capacity of such an arrangement is, however, small as the lifting power is restricted and is limited by the weight of the machines and of the guy-rope.

The principal object of this invention is to overcome these disadvantages and to this end, according to the invention, I provide a wind-driven power apparatus for utilising high winds, the wind-driven machines of which are held by captive kites, characterised by the use of a system of interconnected kites. By this means, the lifting power can be increased to a practically unlimited extent as any desired number of kites can be coupled together and because each kite has to carry only that part of the guy-rope which connects it to the next lower kite. The result is that the strength of the guy-rope, particularly towards the upper end, can be small whilst, with a single kite, on account of its large dead weight, it must be as strong as possible at the upper end.

It further follows that each kite of the system, as its lifting power exceeds the weight of the pertaining guy-rope, increases the total lifting power. In this way, it is possible with the wind-driven machine, to bring large weights (windwheel and dynamos) to great heights and thus to utilise the stronger and more uniform high winds.

In order that the invention may be fully understood, I shall now describe two embodiments thereof, by way of example by reference to the accompanying diagrammatic drawings, in which:—

Fig. 1 is a view of the arrangement according to the invention. 55

Fig. 2 is a similar view of a modification,

Fig. 3 is a view of a height control device in one position, and 60

Fig. 4 is a similar view to Fig. 3 but showing the parts in another position.

Referring first to Fig. 1, the system consists of the kites 1, 2, 3, 4 and 5, which are connected to the ground by a guy-rope 6. On the kite 1 is arranged a windwheel 7, which drives a dynamo 8. The guy-rope 6 is preferably formed, at the same time, as a cable for conducting the electricity produced by the dynamo to the required point, so that a separate cable is not necessary. The energy generated by the windwheel may also be led or transmitted positively mechanically directly to the ground by means of the guy-rope. 75

As will be seen from Fig. 2, it is not necessary to arrange the windwheel on the lowermost kite. If, for the purpose of reaching the most favourable air currents, the windwheel is to be raised to a greater height, then one or more kites 10, 11 can also be arranged underneath the kite 9 carrying the windwheel 7, which have the purpose of taking the weight of the lower guy-rope. 85

Fig. 2 shows, moreover, that two kite-systems 12, 13, or a plurality thereof, can be used in combination. By this means the possibility is offered, on the one hand, of increasing the lifting power, without the topmost kite attaining an excessive height. On the other hand, a greater security is attained if kite systems, which are built so as to be able to rise to great heights, are used together with kite systems built to give great lifting power, as the whole arrangement can thus be easily adapted to the changing wind conditions. 95

It is important that the number of kites united to form a kite system shall be greater than the number of wind-driven machines. Nevertheless, the latter need not, as shown in figures 1 and 2, be necessarily limited to a single machine. 105

In order to maintain the pull in the rope 6 as nearly uniform as possible, when the wind strength shows considerable

variations and to prevent the tearing of the rope, on the occurrence of violent gusts of wind, an automatic control is provided which causes the air current, during a storm, to pass underneath each kite.

The control can, for example, consist of an elastic intermediate member 14 inserted in the guy-rope 6 (figure 3). To the rear end of the kite is connected a damping surface 15, to which is pivoted an altitude control 16. To the latter is connected a double-armed lever 17, which is coupled by draw-wires 18 to a second double-armed lever 19 carried by the kite. This lever 19 is provided with an arm 20 with which engages a rod 21 secured to the rope 6 below the elastic intermediate member 14. On the setting up of powerful gusts of wind, the rope-tension increases, the member 14 being thereby stretched. The rods 20, 21 thus moves, as shown in figure 4, the levers 19 and 17 and thus also the control 16, so that the position angle thereof is reduced. This causes a reduction of the angle of inclination of the kite-supporting surface, whereby the rope tension is at once diminished.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A wind-driven power apparatus for

utilising high winds, the wind-driven machines of which are held by captive kites, characterised by the use of a system of interconnected kites.

2. A wind-driven power apparatus as claimed in Claim 1, wherein a guy-rope, such as (6), is utilized directly for the power transmission or, if the change of wind energy into electricity is to be effected on the kite system itself, is formed as a cable for conducting the electric current developed.

3. A wind-driven power apparatus as claimed in Claim 1, wherein the kites are provided on their rear ends with a rigid damping surface, such as 15, to which is coupled an adjustable altitude control.

4. The improved wind-driven power apparatus, constructed and arranged substantially as hereinbefore described and illustrated diagrammatically in the accompanying drawings.

Dated the 5th day of July, 1937.

S. SOKAL,
1, Great James Street,
Bedford Row, London, W.C.1,
Chartered Patent Agent.

Reference has been directed, in pursuance of Section 7, sub-section (4), of the Patents and Designs Acts, 1907 to 1932, to Specifications Nos. 3003/10, 23566/01, 12146/97, 12320/89.

[This Drawing is a reproduction of the Original on a reduced scale.]

