April 3, 1934. S. A. ESKILSON ET AL 1,953,159

MEANS FOR INDICATING THE DIRECTION AND VELOCITY OF THE WIND NEAR THE GROUND

Filed Feb. 9, 1931 2 Sheets-Sheet 1

Fig. 1.

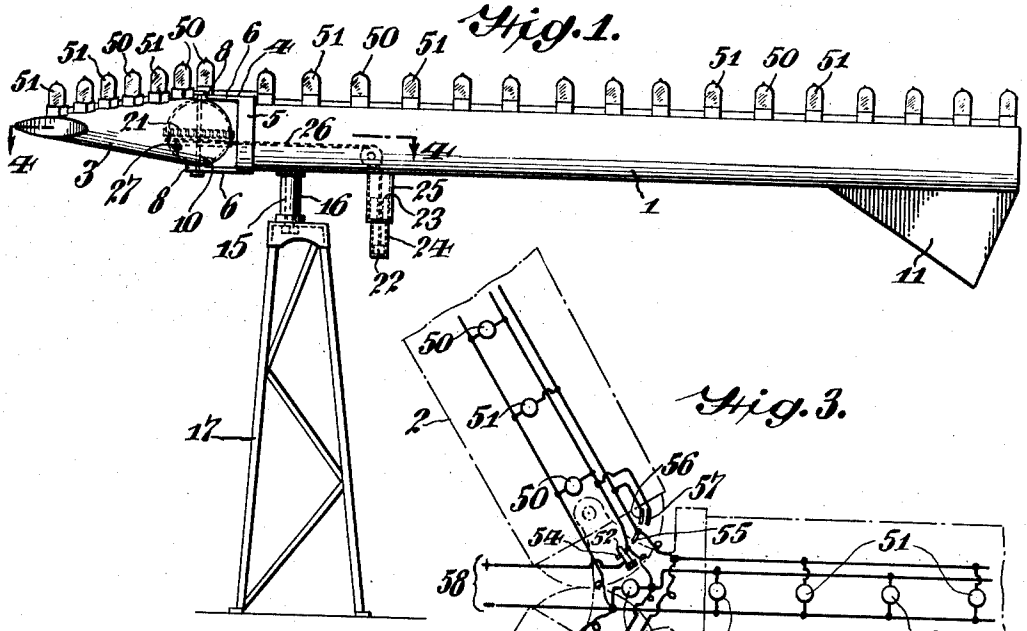
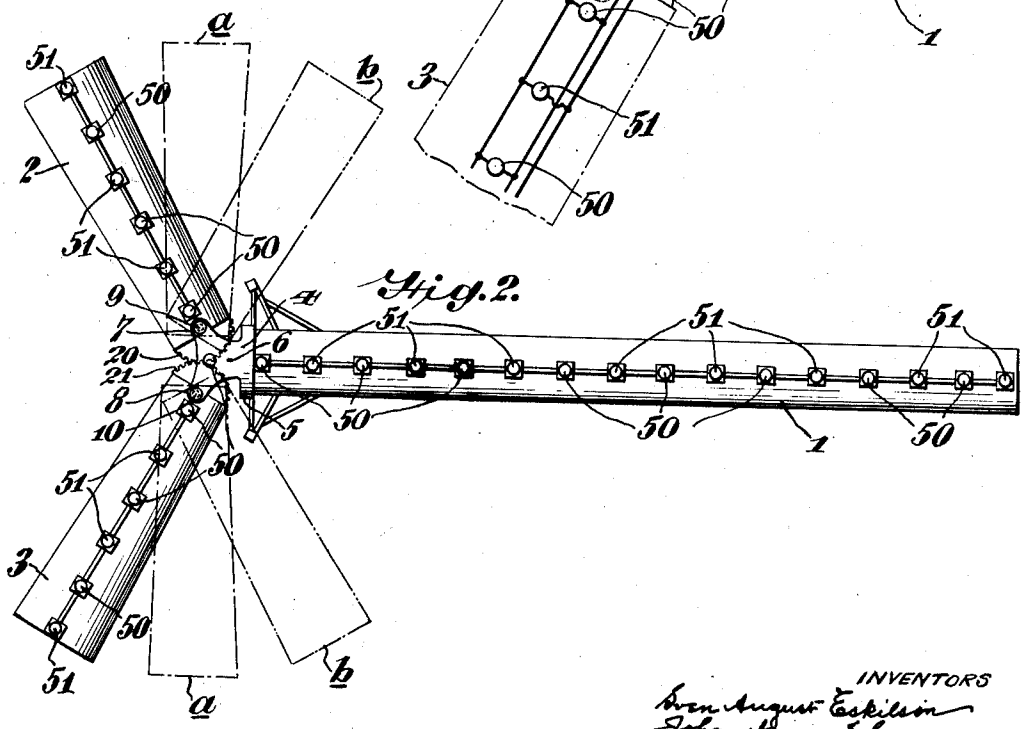


Fig. 3.

Fig. 2.



INVENTORS

Sven August Eskilson

BY Johan Georg Scheer

Cyrus A. Anderson

Attorney

April 3, 1934. S. A. ESKILSON ET AL 1,953,159

MEANS FOR INDICATING THE DIRECTION AND VELOCITY OF THE WIND NEAR THE GROUND

Filed Feb. 9, 1931 2 Sheets-Sheet 2

Fig. 4.

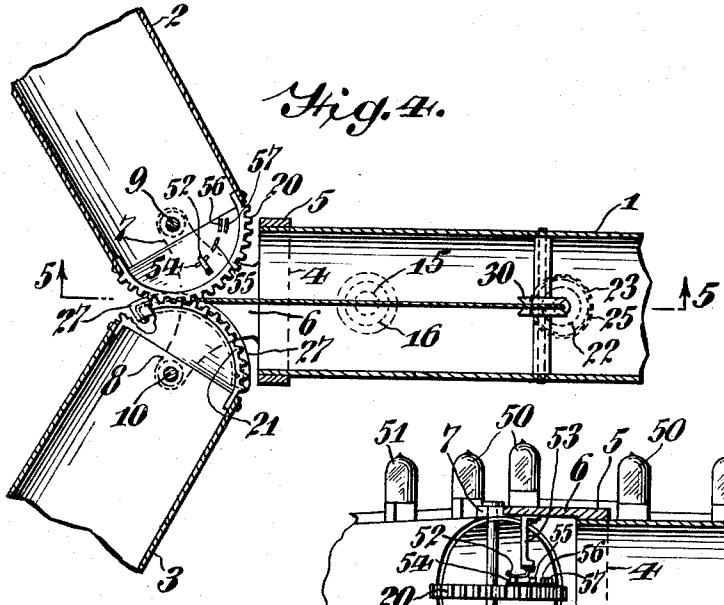


Fig. 5.

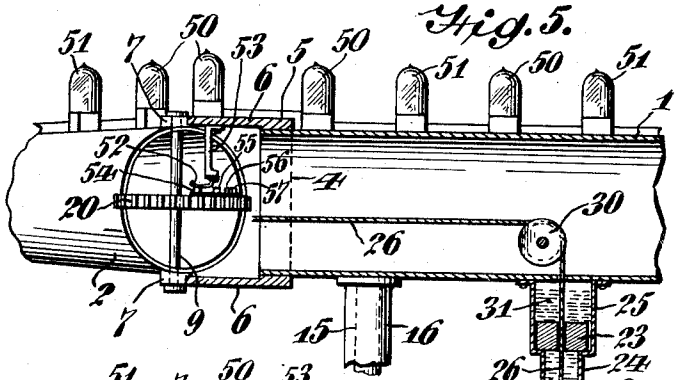


Fig. 7.

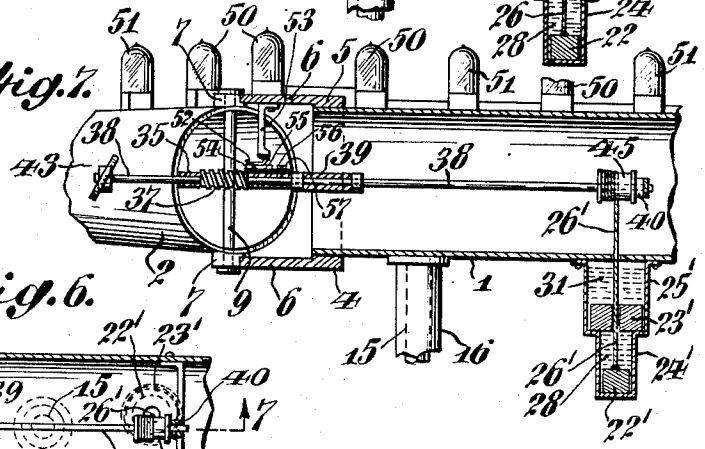
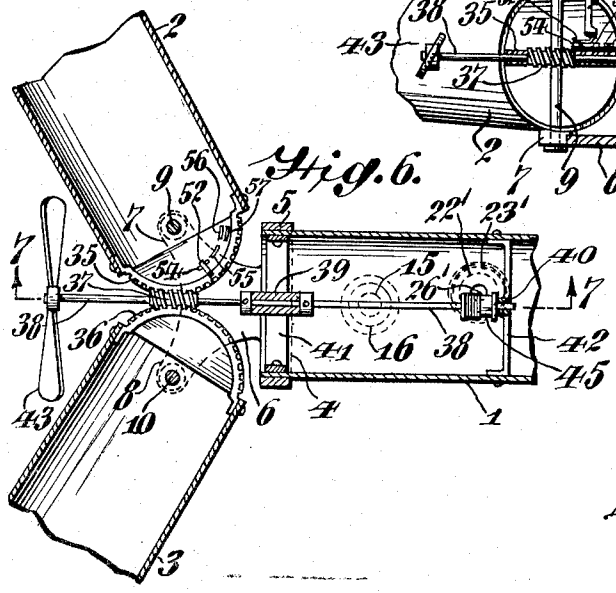


Fig. 6.



INVENTORS

Sven August Eskilson

Johan Georg Scheer

BY

Cyrus N. Anderson

Attorney

Patented Apr. 3, 1934 1,953,159

UNITED STATES PATENT OFFICE

1,953,159

MEANS FOR INDICATING THE DIRECTION AND VELOCITY OF THE WIND NEAR THE GROUND

Sven August Eskilson and Johan Georg Scheer, Stockholm, Sweden, assignors to American Gasaccumulator Company, Elizabeth, N. J., a corporation of New Jersey

Application February 9, 1931, Serial No. 514,388
In Sweden October 25, 1930

6 Claims. (Cl. 73—55)

It is important to aviators that in the landing of aeroplanes or airships of other character they have knowledge of both the direction and the velocity of the wind near the ground where the landing is to be made. If the conditions of velocity and wind direction are not known to those landing aeroplanes or airships of other character there is liability of accident which may result seriously.

Various attempts heretofore have been made to provide means for imparting that information to aviators but thus far the means suggested and provided, for one reason or another, have not been altogether satisfactory.

The general object of our invention is to provide novel means of the character indicated which shall be practical and which at the same time is simple in construction and of a character such that it may be manufactured at a minimum of cost.

It also is an object of the invention to provide means of the character indicated which automatically assumes a position depending upon the direction of the wind current within which the said means may be located and the shape of which also is automatically changed, the extent of the change depending upon the velocity of the wind to which the means is subjected.

Without attempting to point out preliminarily the various and further objects of our invention we shall proceed at once with a detailed description thereof wherein other objects and advantages will be pointed out or else will become apparent therefrom.

In order that the invention may be readily understood and its practical advantages fully appreciated reference should be had to the accompanying drawings wherein we have illustrated certain embodiments of our invention in forms which at present are preferred by us. However, it will be understood that the invention is susceptible of embodiment in other forms of construction than are shown and that changes in the details of construction may be made within the scope of the claims without departing from the invention or the principle thereof.

In the drawings:

Fig. 1 is a view in side elevation of means embodying our invention, the support therefor likewise being shown in elevation;

Fig. 2 is a top plan view of the means shown in Fig. 1;

Fig. 3 is a diagrammatic or schematic view showing the wiring diagram for the electric lights shown in Figs. 1 and 2;

Fig. 4 is a horizontal sectional view taken in the plane of the line 4—4 of Fig. 1;

Fig. 5 is a vertical sectional view taken on the line 5—5 of Fig. 4;

Fig. 6 is a horizontal sectional view similar to that of Fig. 4 but showing a modification of the construction; and

Fig. 7 is a view in vertical section taken on the line 7—7 of Fig. 6.

The device or means of our invention includes a vane by which the direction of the wind at the point where the means or device is located may be indicated. In the construction of our invention as illustrated we have shown a vane 1 with which are associated arms 2 and 3 which are pivotally supported at their inner ends. These arms are adapted to and do assume different angular positions relatively to the length of the vane 1, their different positions depending upon the velocity of the wind. The construction of the parts 1, 2 and 3 may be of any character desired but as illustrated they are tubular. However, they may be of "built-up" construction.

The forward end of the vane 1 is provided with a head 4 comprising a band portion 5, which encircles and is secured to the front end of the vane 1, and forwardly projecting or extending arms 6 located at the top and bottom portions of the band. The forward ends of each of these arms 6 are provided with projections 7 and 8, the upper arm and its projections being parallel with the lower arm and its projections. The outer ends of the projections 7 and 8 are provided with holes or openings through which pivot pins 9 and 10 extend. These pins also extend through openings provided near the inner ends of the arms 2 and 3 and pivotally support the latter in horizontal positions as shown in the drawings.

For causing the vane to take a position extending in a direction parallel with the direction of the wind we have provided a rudder 11 upon the under side of the rear end portion thereof as shown in Fig. 1 of the drawings.

If desired, the arms 2 and 3 may be slightly flattened vertically and tapered from their inner to their outer ends as indicated in Fig. 1 of the drawings. However, it is to be understood that our invention is not dependent upon the particular shape of these arms nor of the vane 1.

The vane 1 is provided with a pivot rod or projection 15 near its front end which extends downwardly through a bearing sleeve 16 provided upon the upper end of a support 17. The pivot pin or projection 15 turns readily in the sleeve 16 so that the vane may assume any position in a horizontal

plane under the influence of the wind currents which may impinge thereon. The arms 2 and 3 in the several forms of construction assume different angular positions with respect to the vane 1 depending upon the wind velocity. The arms 2 and 3 are shown in the drawings in the positions they occupy when the wind is moving or blowing at a rate of four meters per second or less. When the velocity of the wind increases so that it is blowing or moving at a rate of speed ranging from four meters to ten meters per second the arms 2 and 3 assume the positions indicated by the dash and dot lines at *a* in Fig. 2. However, if the wind should be blowing at a rate of ten meters and upwards per second the arms 2 and 3 will assume the positions indicated by the dash and dot lines at *b* in Fig. 2.

In the several forms of construction means is provided for controlling the movements and positions assumed by the arms 2 and 3.

In Figs. 1, 2, 4 and 5 of the drawings we have shown a construction in which gear segments 20 and 21 are provided upon the inner ends of the arms 2 and 3. As illustrated these gear segments are semi-circular in shape and the teeth thereof are in mesh as shown in the drawings. Being thus meshed it follows that the arms move either backward or forward in unison.

For the purpose of controlling the positions assumed and occupied by the arms 2 and 3 under the speed conditions of the air currents previously referred to we have provided weights 22 and 23 which are located in cylinders 24 and 25 located in alinement one above the other as shown in Figs. 1 and 5. When the arms occupy the positions shown in full lines in Figs. 2 and 4 the weight 22 occupies a position upon the bottom of the cylinder 24. A cord 26 is connected at its rear end to the weight 22 and at its front end to the front edge or end of a grooved semi-circular disc 27 which is mounted upon one side, the lower side in the construction shown, of the gear segment 21. Upward movement of the weight 22 in the cylinder 24 is resisted by the fluid 28 in the said piston and the amount of resistance is dependent upon the viscosity of the said fluid and also upon the space between the sides of the weight 22 and the side walls of the cylinder 24. The cord 26 is supported and guided by an idler roll 30 mounted interiorly of the vane 1. It will be noted that the cord extends upwardly through an opening provided in the weight 23.

When the velocity of the wind current is at a rate of less than four meters per second the force exerted by the weight 22 is sufficient to retain the arms 2 and 3 in their forward positions as indicated in the drawings. However, if the velocity of the wind increases so that it is greater than four meters per second but less than ten meters per second then the weight 22 is lifted into contact with the weight 23 in the cylinder 25. The combined weight of the two weights 22 and 23 and of the resistance offered by the fluid 31 in the cylinder 25 creates a force sufficient to stop the rearward movements of the arms 2 and 3 at the dash and dot line positions indicated at *a* in Fig. 2. However, if the velocity of the wind should be greater than ten meters per second then both the weights 22 and 23 are lifted, the latter being lifted by the contact of the former therewith. The movement of the said weights is limited by the contact of the upper side of the weight 23 with the under side of the vane 1 at the upper end of the cylinder 25. The rate of upward movement of the weights 22 and 23 may be varied by varying the viscosity of the liquids 28 and 31 in the cylinders 24 and 25.

In the construction as illustrated in Figs. 6 and 7 we have provided worm gear segments 35 and 36. These segments, as are the segments 20 and 21, are of semi-circular shape and are mounted upon the inner ends of the said arms 2 and 3. These segments 35 and 36 do not engage with each other but are engaged by an intermediate worm 37 provided upon shaft 38 mounted in bearings 39 and 40 supported upon cross members 41 and 42 which extend transversely of and are in turn mounted upon the vane 1. The forward end of the shaft 38 is provided with a fan 43 upon the wings of which the wind impinges. Such impingement causes rotation of the shaft 38 and the worm 37 thereon to effect pivotal movements of the arms 2 and 3 upon their pivots 9 and 10. The weights 22′ and 23′ and the cylinders 24′ and 25′ are identical in construction and operation with the corresponding weights and cylinders shown in Figs. 1 and 5 of the drawings and need not be further described. The cord 26′ is connected at its outer end to the weight 22′ and extends upwardly through the weight 23′ and is connected at its upper end to a drum 45 mounted upon the rear end portion of the shaft 38. It follows that when the shaft is rotated by the action of the wind upon the fan 43 the cord 26′ is wound upon the drum 45.

When the velocity of the wind is at a rate of four meters or less per second the weight 22′ operates to hold the arms 2 and 3 in the positions shown in Fig. 6. However, if the velocity is at a rate of more than four meters per second and less than ten meters per second the weight 22′ is raised until it contacts with the weight 23′. The force exerted by the combined weights 22′ and 23′ is sufficient to cause the arms to assume positions corresponding to the dash and dot lines indicated by the letter *a* in Fig. 2. However, if the velocity is at a rate above ten meters per second then the action of the wind upon the fan 43 causes the lifting of both of the weights 22′ and 23′, the upward movements thereof being limited by the contact of the upper side of the weight 23′ with the under side of the vane 1 at the top of the cylinder 25′.

In the several forms of construction the arms 2 and 3 are caused to move forward as the velocity of the wind decreases by the action of the weights 22 and 23, or 22′ and 23′, acting through the cord 26, or 26′ as the case may be.

The liquid in the cylinders 24′ and 25′ is identical with and performs the same function as the liquid 28 and 31 shown in the cylinders 24 and 25. These liquids perform a braking function cooperating with the weights previously referred to in their tendency to retain the arms 2 and 3 in their forward or intermediate positions, as the case may be.

Any other braking means which may be suggested by the ingenuity of the builder of a device embodying the invention may be employed. In other words, our invention is not limited to any particular construction of means for controlling the forward and backward movements of the arms 2 and 3. By proportioning the pitch of the threads of the worm 37 the speed of back and forth movement of the arms 2 and 3 may be controlled. This control is supplemental to that of the weights.

As has been indicated already, the positions of the arms 2 and 3 with respect to the vane 1 indicates to a person such as an aviator the ve-

locity of the wind at the point where the device is located.

In the daytime when these arms are readily visible it is not necessary that they be illuminated or lighted but at night-time when they are invisible unless illuminated it is desirable that means be provided for illuminating not only the vane 1 but also the arms 2 and 3. Such illumination as would enable an aviator to determine the angular positions of the arms 2 and 3 with respect to the vane 1 probably would be sufficient to enable the aviator to make a proper landing but as additional means for indicating the relative positions of the arms 2 and 3 with respect to the vane 1 we have provided lights of different colors, as for example white or clear, and red. These lights are located upon the top sides of the vane 1 and the arms 2 and 3 and it will be assumed that the first or inner of the lights of each series is white and that the white and the red lights alternate throughout each series. The white lights in the several series will be designated by the number 50 while the red lights are designated by the number 51.

For the purpose of controlling the lights we have provided a relatively stationary contact 52 which is supported upon but insulated from a bar 53 mounted upon the upper of the arms 6. The contact 52 is adapted to engage with contacts 54, 55, 56 and 57 upon one of the gear segments mounted upon the arms 2 and 3. In the construction shown these contacts 54 to 57 inclusive are mounted upon the gear segment 20. When the arms 2 and 3 occupy their forward positions as shown in full lines in Fig. 2 the contact 52 engages the contact 54 which is connected in circuit with the white or clear lights 50 of the several series of lights. That will be apparent from an inspection of Fig. 3 of the drawings. However, if the wind velocity is such as to cause movements of the arms 2 and 3 into the dash and dot line position indicated at *a* the contact 55 will be moved into engagement with the contact 52 whereupon the red lights 51 of the several series will be placed in circuit while the white or clear lights will be cut out of circuit. However, if the wind velocity is sufficient to cause movement of the arms into the dash and dot line position indicated at *b* the contact 52 engages the contacts 56 and 57 so that both the white or clear and the red lights are placed in circuit and are lighted. The electric current for the lights is supplied by the main supply lines 58.

It will be seen, therefore, that not only do the angular positions of the arms 2 and 3 with respect to the vane 1 indicate to a person desiring to land upon an aviation landing field the velocity of the wind near the ground but that also the character of the lights serves a like purpose. The device or means of our invention operates to indicate at one and the same time to an observer both the velocity of the wind near the ground and its direction. These are the two things which should and must be known to an aviator desiring to land an aeroplane in order that he may do so with assurance of safety.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. A device for indicating the direction and velocity of the wind at a selected point, comprising a vane for indicating the wind direction, arms pivotally connected to said vane at one end of it, said arms being arranged to be actuated directly by the wind pressure, a gravity actuated device operating on said arms to constitute a resistance to movement thereof under wind pressure, and means to intermittently increase or decrease the effective action of said gravity actuated device.

2. A device for indicating the direction and velocity of the wind at a selected point, comprising a vane for indicating the wind direction, wind velocity indicating arms pivotally connected to said vane and arranged to be set in different positions in relation to the wind direction indicating vane, a wind motor operatively connected to said arms to retard the movement thereof, and means to arrest the wind motor at different predetermined velocities of the wind.

3. A device for indicating the direction and velocity of the wind at a selected point, comprising a vane for indicating the wind direction, arms pivotally connected to one end of said vane and arranged to be set in different positions in relation to the wind direction indicating vane in accordance with different determined velocities of the wind and means associated with said arms to arrest their motion at different predetermined velocities of the wind, said arresting means comprising a member operable in a fluid to obtain braking effects by means of a cataract action.

4. A device for indicating the direction and velocity of the wind at a selected point, comprising a vane for indicating the wind direction, arms pivotally connected to one end of said vane, said arms being arranged to be actuated directly by the wind pressure, a gravity actuated device operating on said arms to constitute a resistance against the wind pressure on said arms, and means to successively increase or decrease the effective action of said gravity actuated device, said device being operated in a fluid to obtain retarding effects on the arms by means of a cataract action.

5. A device for indicating the direction and velocity of the wind at a selected point, comprising a vane for indicating the wind direction, wind velocity indicating arms pivotally connected to one end of said vane and arranged to be set in different positions in relation to the wind direction indicating vane, a wind motor operatively connected to said arms to retard the movement thereof, and means to arrest the wind motor at different predetermined velocities of the wind.

6. A device for indicating the direction and velocity of the wind at a selected point, comprising a vane for indicating the wind direction, arms pivotally connected to said vane to indicate wind velocity, a gravity actuated device, means for connecting said gravity actuated device in operating relation to said arms to constitute a resistance against the wind pressure on said arms, and means to successively increase or decrease the effective action of said gravity actuated device.

SVEN AUGUST ESKILSON.
JOHAN GEORG SCHEER.