Aug. 2, 1938. F. WALLER 2,125,365

ANEMOMETER

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Fig. 1.

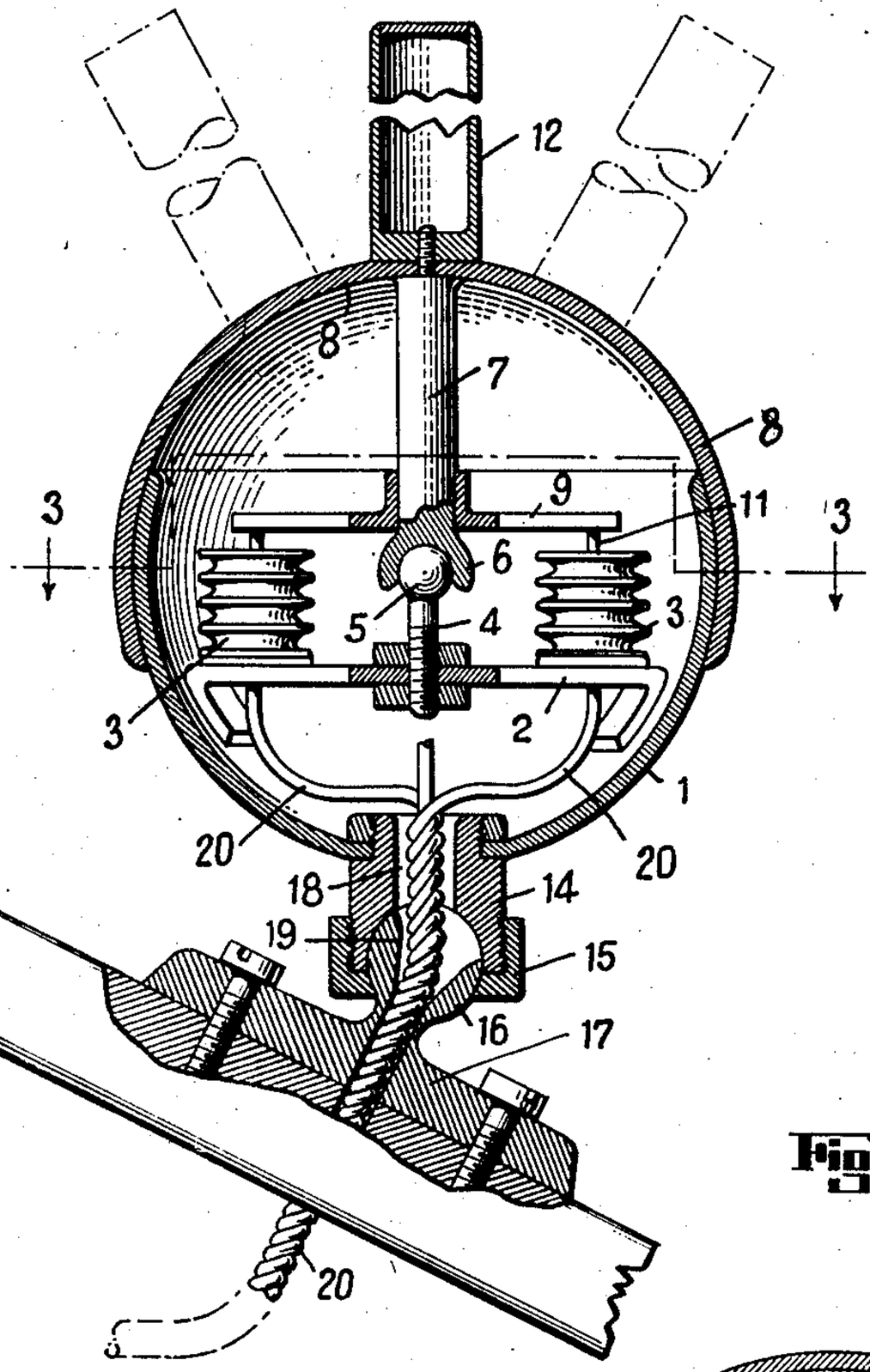


Fig. 2.

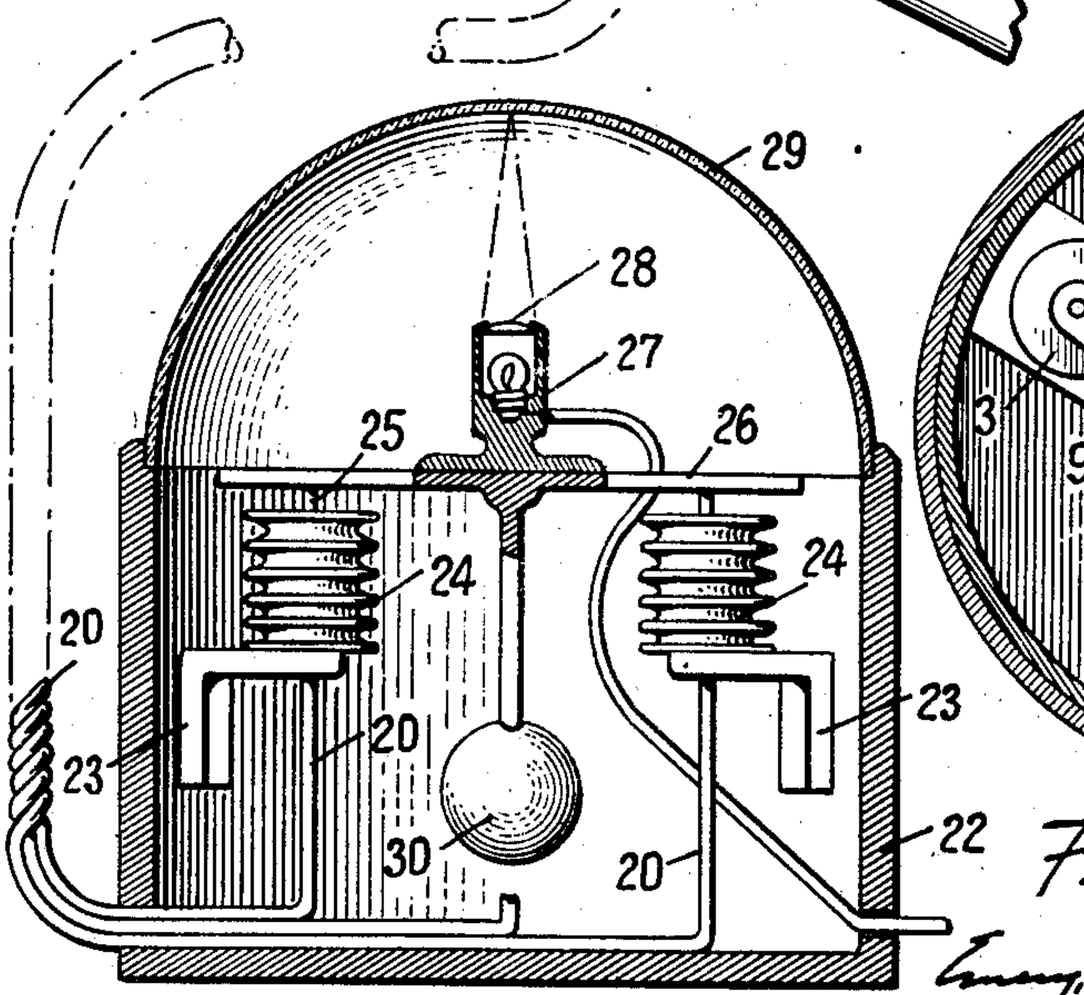
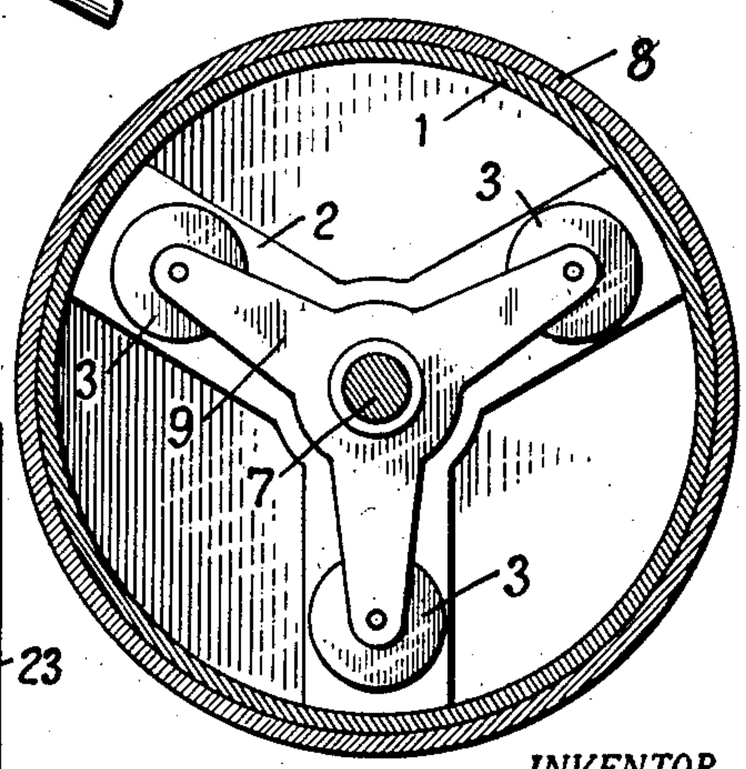


Fig. 3.



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Aug. 2, 1938. F. WALLER 2,125,365

ANEMOMETER

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Fig. 4.

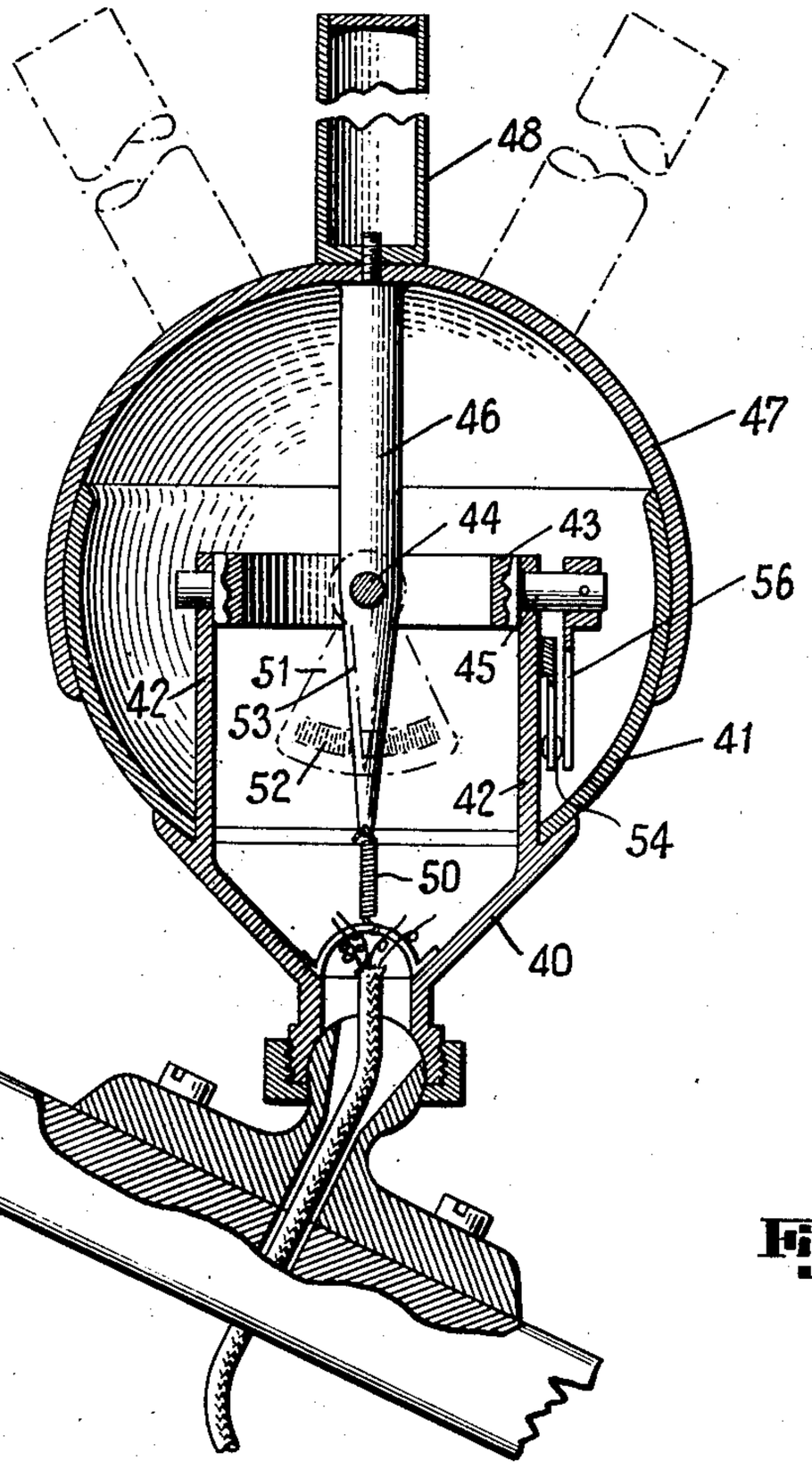


Fig. 5.

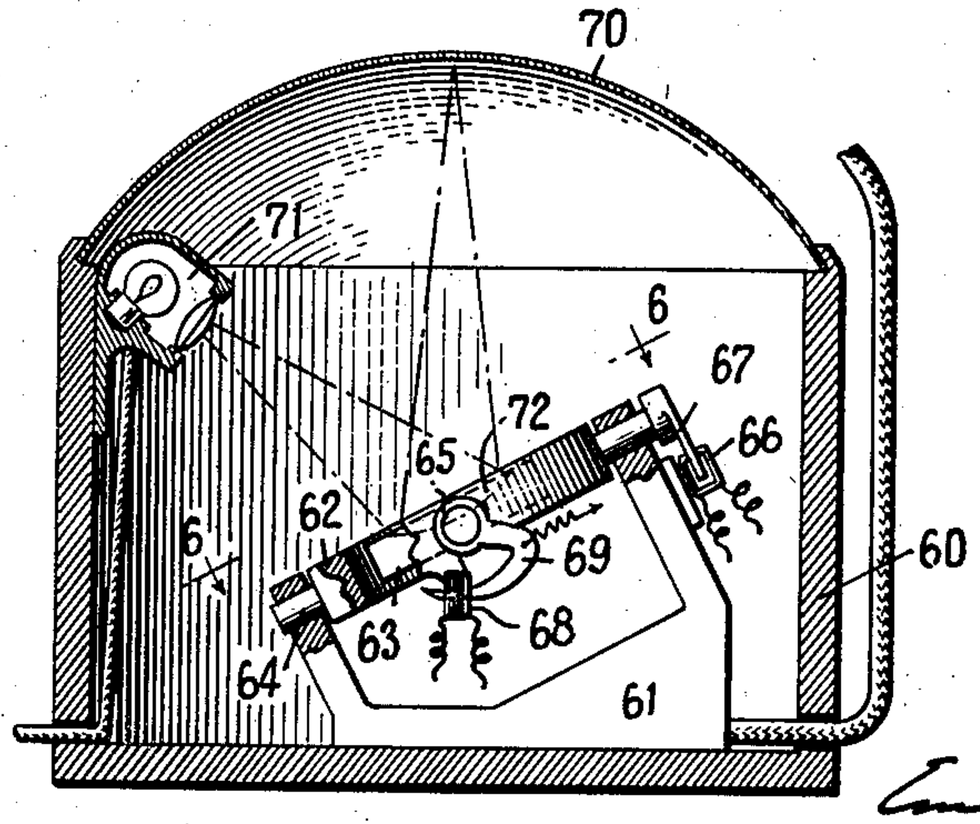
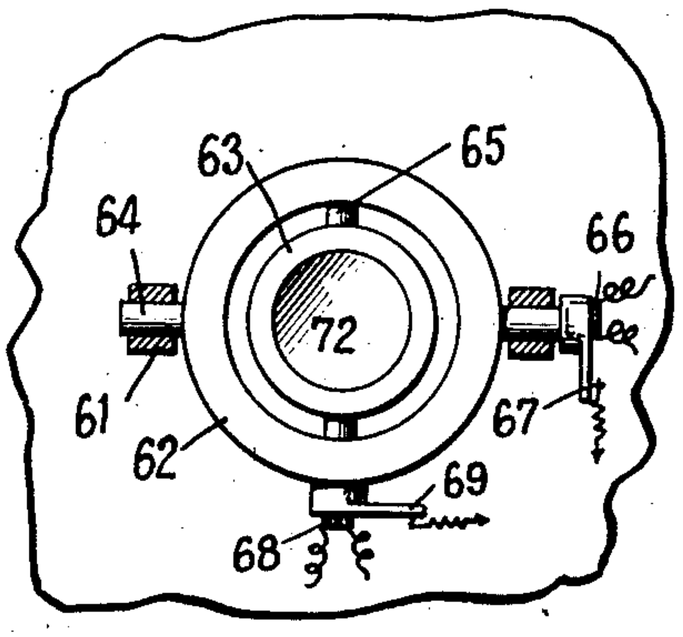


Fig. 6.



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Aug. 2, 1938. F. WALLER 2,125,365

ANEMOMETER

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Fig. 7.

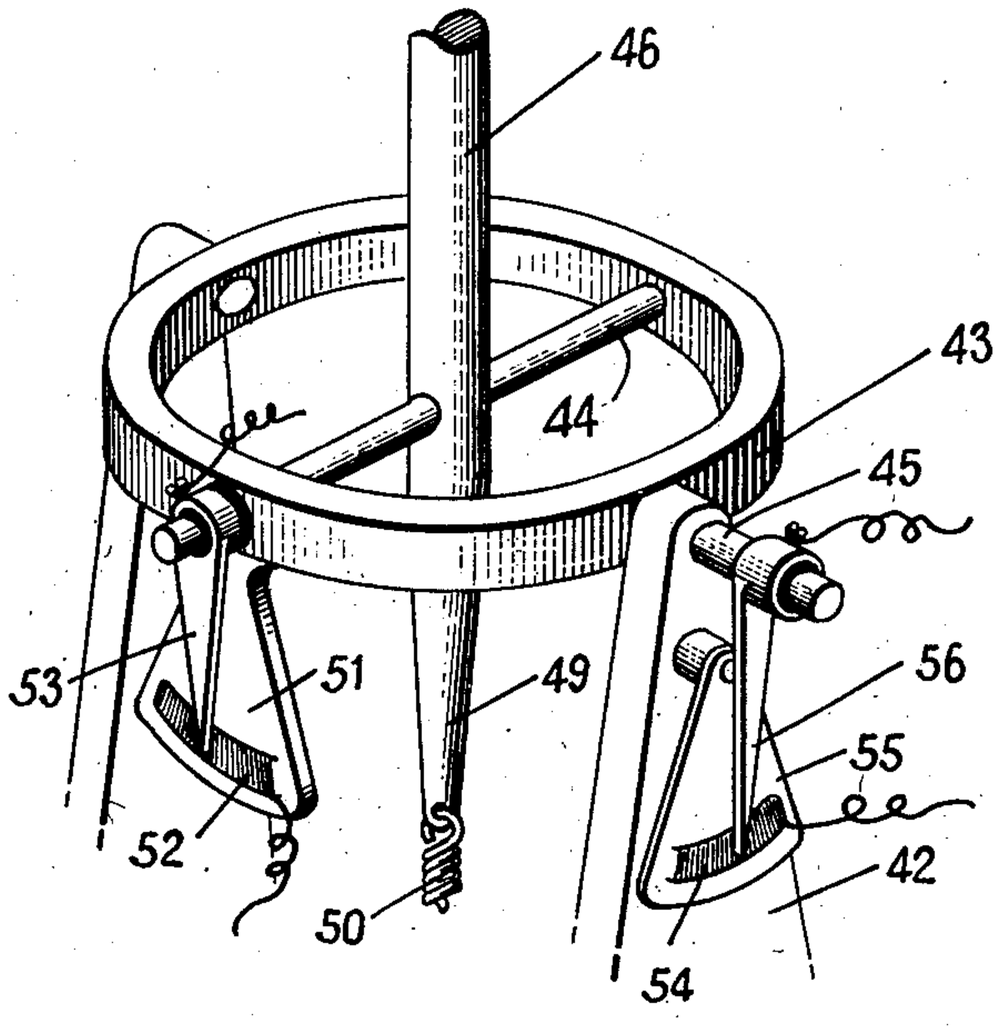

Fig. 8.

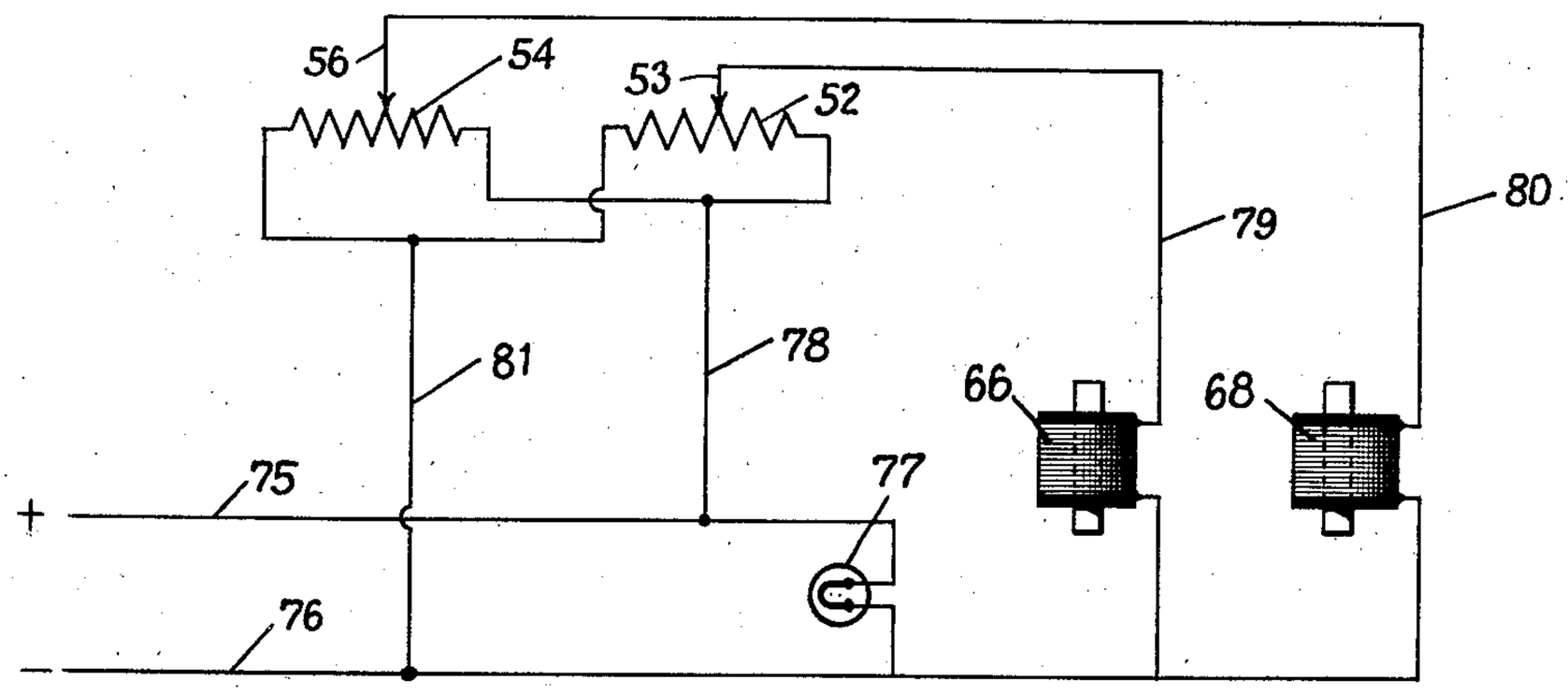

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Fig. 9.

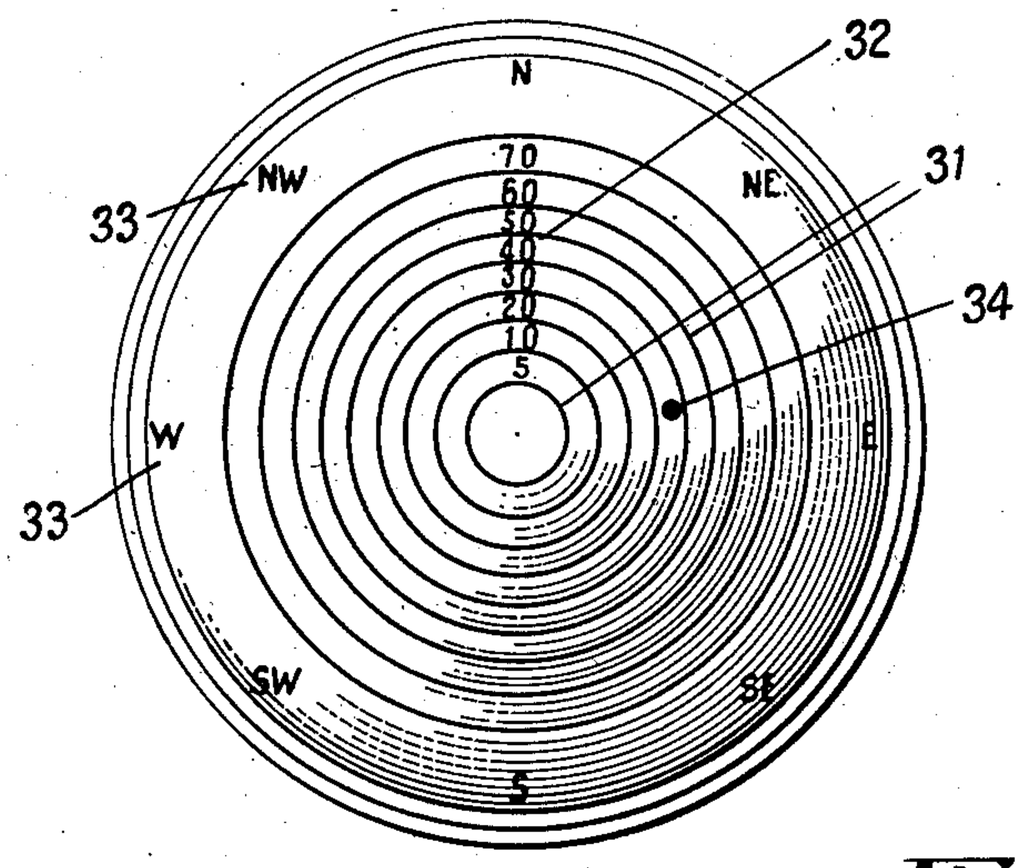
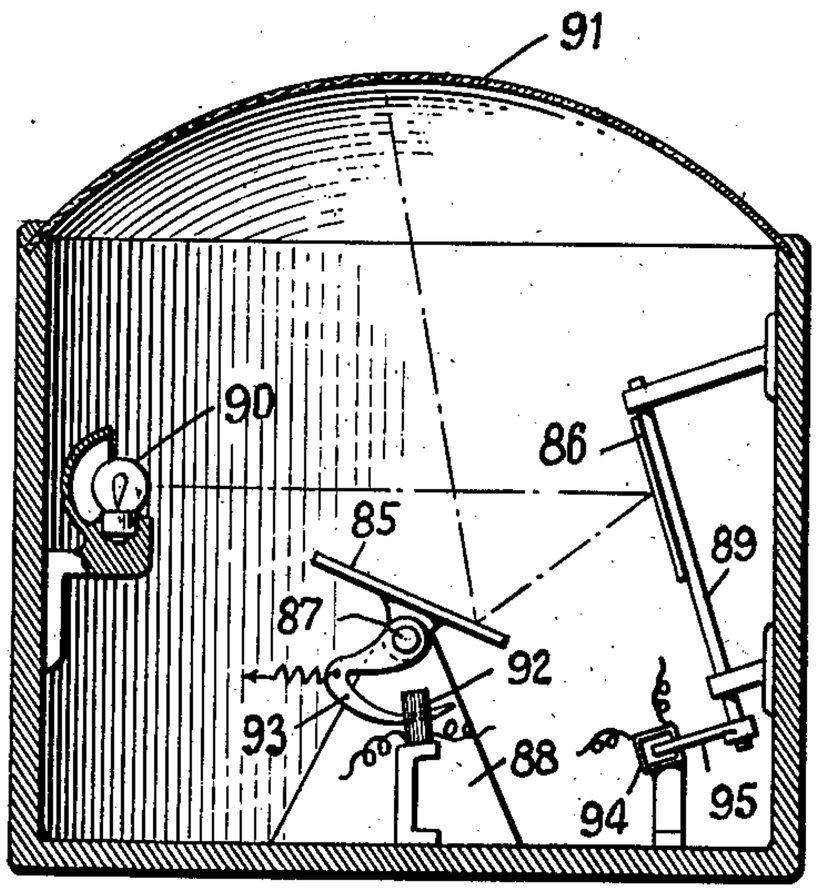
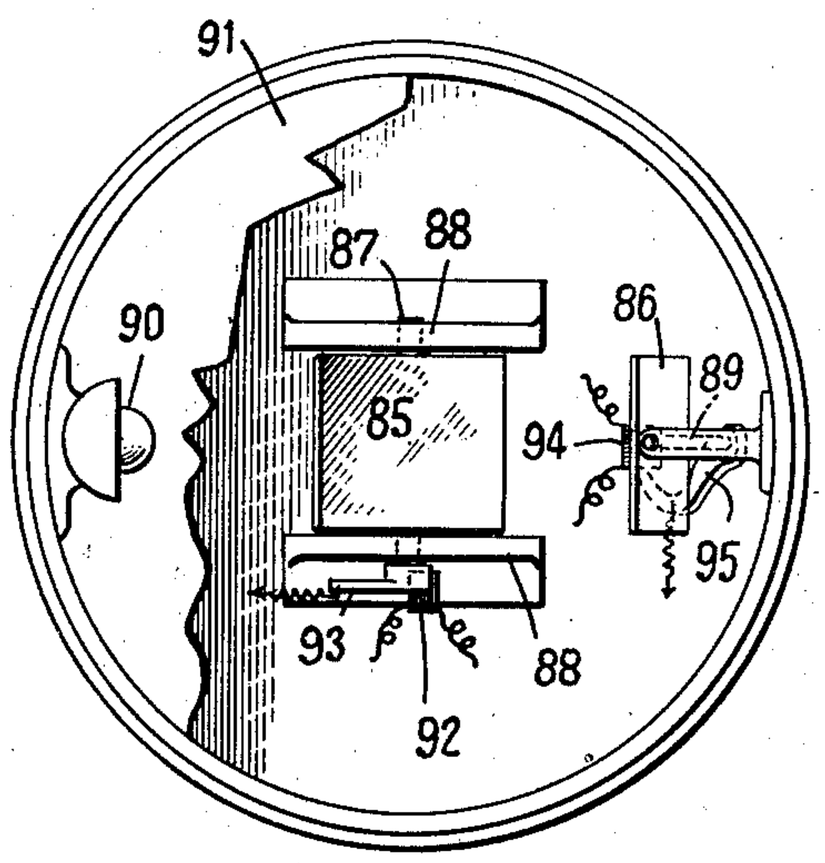


Fig. 11.

Fig. 10.





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Patented Aug. 2, 1938 2,125,365

UNITED STATES PATENT OFFICE

2,125,365

ANEMOMETER

Fred Waller, Huntington, N. Y.

Application December 29, 1936, Serial No. 118,050

16 Claims. (Cl. 73—55)

This invention relates to anemometers.

It is an object of the invention to provide a device comprising two connected units, an exterior unit adapted to be placed in an exposed position and having a movable member responsive to changes in wind direction and velocity, and an interior unit adapted to be placed indoors and having a movable member controlled by the movable member of the exterior unit. Said interior unit is preferably provided with a calibrated scale such that direct readings of wind velocity and direction may be had.

Other objects and advantages of the invention will appear hereinafter.

A preferred embodiment of the invention selected for purposes of illustration is shown in the accompanying drawings, in which,

Figure 1 is a vertical sectional view through the exterior unit.

Figure 2 is a vertical sectional view through the interior unit.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is a vertical section through the exterior unit of a modified form of the device.

Figure 5 is a vertical sectional view of the interior unit of said modified form.

Figure 6 is a section on the line 6—6 of Figure 5.

Figure 7 is a perspective view of the interior mechanism of the exterior unit.

Figure 8 is a wiring diagram.

Figure 9 is a top plan view of the calibrated scale of the interior unit.

Figure 10 is a vertical section through the interior unit of a second modification.

Figure 11 is a top plan view of the same with the cover removed.

Referring to the drawings, the exterior unit of the device illustrated in Figures 1, 2 and 3 comprises a substantially hemispherical shell 1 within which is rigidly mounted a spider 2 which carries three expansible units such as the sylphon bellows 3. These bellows are equally spaced around the circumference of the hemispherical shell 1 as illustrated in Figure 3. Supported at the center of the spider 2 is a stud 4 having a spherical head 5 which supports the spherical socket 6 of the arm 7, thus forming a ball and socket joint. The arm 7 in turn is connected to a second substantially hemispherical shell 8 of a diameter sufficient to fit over the shell 1 as illustrated in Figure 1. The stud 4 is so adjusted on the spider 2 that the center of the head 5 is at the center of the spherical shells 1 and 8, so that the shell 8 and the arm 7 may be moved in any direction on the head 5 as a center. A second spider 9 is connected to the arm 7, and each of the arms of the spider 9 is connected to the upper free end of one of the sylphon bellows 3 by means of a flexible link 11.

Mounted at the top of the hemispherical shell 8 is a light hollow cylinder 12 which is exposed to the wind, and which when acted upon by the wind can tilt the shell 8, the arm 7 and the spider 9 in any direction. When tilted, of course, one or more of the sylphon bellows 3 will be expanded and one or more will be contracted, depending upon the direction of the wind acting against the cylinder 12, and the extent to which the sylphon bellows are expanded or contracted will be dependent upon the force of the wind as hereinafter explained.

The lower part of the hemispherical shell 1 carries a bushing 14 and a cap 15 providing a socket for the ball 16 which is integrally connected to the fitting 17. The said fitting may be secured to a roof or any other suitable exposed position, and the ball and socket joint permits the unit to be adjusted so that the cylinder 12 normally stands vertically.

The bushing 14 is provided with the passage 18, and the ball 16 and fitting 17 are provided with a passage 19 which serve as conduits for the capillary tubes 20, three in number, one of said tubes being connected to the interior of each of the sylphon bellows 3.

The interior unit illustrated in Figure 2 comprises a housing 22 having three brackets 23 mounted therein, each bracket supporting an expansible unit such as the sylphon bellows 24 similar to the sylphon bellows 3. Each of the bellows 24 is connected by a flexible link 25 to a spider 26 carrying a lamp socket 27 having a lens 28 adapted to project a beam of light against a hemispherical shell 29 formed of translucent material such as ground glass or celluloid. The spider 26 carries a depending weight 30 which serves to normally maintain the spider 26 in horizontal position so that the beam of light is normally projected vertically. The interior of each of the bellows 24 is connected to one of the capillary tubes 20.

The shell 29 is provided with a calibrated scale such that both force and direction of the wind can be read directly therefrom. Thus, as illustrated in Figure 9, a plurality of concentric circles 31 are provided, and each circle has associated therewith a numeral 32 indicating the force of the wind. In addition, compass markings 33

are provided which indicate the direction of the wind. Thus, if the beam of light showed at the point 34 of Figure 9, the observer would immediately know that the wind was blowing at the rate of thirty-five miles per hour from the direction east northeast.

The operation of the device will be apparent from the foregoing description. The sylphon bellows 3 and 24 and the capillary tubes 20 are filled, of course, with a suitable fluid, such as glycerine or oil, and any movement of the sylphon bellows 3 under the influence of wind acting on the cylinder 12 is immediately transmitted to the corresponding sylphon bellows 24. As a result the spider 26 is tilted correspondingly to the tilting of the spider 9, and the motion of the beam of light which is projected on the shell 29 follows the motion of the cylinder 12.

In the modified form of the device illustrated in Figures 4 to 8 inclusive electrical instead of hydraulic means are used to transmit motion from the exterior to the interior units. In the embodiment illustrated, the base member 40 of the exterior unit supports the lower hemispherical shell 41, and is provided with a pair of standards 42 on which is pivotally mounted a gimbal ring 43. Pivotally mounted on the ring 43 is a shaft 44 whose axis is perpendicular to the axis of the shaft 45 which supports the ring. The shaft 44 carries an arm 46 which is secured to the hemispherical shell 47 which fits over the shell 41 as in the previously described embodiment. The shell 47 also carries a cylindrical member 48 which serves the same functions as the cylinder 12. The arm 46 is provided with a depending portion 49 which may carry a weight similar to the weight 30 or which may be connected to a spring 50 which serves to maintain the cylinder 48 in normally vertical position.

Mounted on the ring 43 is an apron 51 of suitable insulating material, carrying a variable resistance element 52 cooperating with the contact member 53 mounted on the shaft 44. A similar variable resistance element 54 is mounted on the apron 55 of suitable insulating material, carried by the bracket 42 and cooperates with the contact member 56 secured to the shaft 45. It will be understood that the contact members 53 and 56 are suitably insulated from the respective shafts on which they are mounted.

The interior unit comprises a housing 60 within which is mounted a bracket 61 carrying a pair of gimbal rings 62 and 63, the ring 62 being pivoted on the bracket 61 by means of shaft 64, and the ring 63 being pivoted on the ring 62 by means of shaft 65. A solenoid 66 is mounted on the bracket 61 and cooperates with an armature 67 mounted on shaft 64 and a solenoid 68 is mounted on ring 62 and cooperates with an armature 69 mounted on shaft 65.

As in the previous embodiment, a beam of light is projected against a translucent shell 70, and it is possible to secure the lamp socket directly to the inner gimbal ring 63, but in the interest of accuracy, it is preferred to mount the lamp socket 71 on the housing 60 and to direct the beam therefrom against a mirror 72, mounted in the gimbal ring 63, the arrangement being such that the beam of light is focused on the shell 70. It will be understood that as the mirror 72 is tilted, the beam of light will move on the shell 70.

The wiring diagram for this embodiment is illustrated in Figure 8, wires 75 and 76 being connected to a suitable source of current, and being connected directly to the lamp 77. A wire 78 connects the wire 75 to the variable resistors 52 and 54, and the contacts 53 and 56 are connected to the solenoids 66 and 68 through wires 79 and 80 respectively. Return wire 81 connects the variable resistors to the wire 76. The wires 78, 79, 80 and 81 may be cabled together to connect the exterior unit to the interior unit as illustrated in Figures 4 and 5.

As will be understood, the arm 46 is moved under the influence of wind acting on the cylinder 48, and the contacts 53 and 56 moving along the resistors 52 and 54 will vary the voltage of the current flowing through the solenoids 66 and 68 and will thereby cause movement of their respective armatures. This results in movement of the gimbal rings 62 and 63 and movement of the beam reflected from the mirror 72 in a manner corresponding to the movement of the cylinder 48 and will thereby provide an indication of the direction and force of the wind in the manner previously described.

The modified form of the interior unit illustrated in Figures 10 and 11 is intended to be used in connection with the exterior unit illustrated in Figure 4. It differs from the interior unit illustrated in Figures 5 and 6 in that two independently operated mirrors 85 and 86 are used in place of a single mirror. In this form of the device, the mirror 85 is mounted on a horizontal shaft 87 supported on the bracket 88 and the mirror 86 is mounted on a shaft 89 lying in a vertical plane, but tilted in order to reflect the beam from the lamp 90 against the mirror 85 which in turn reflects the beam against the translucent shell 91. The mirror 85 is controlled by the solenoid 92 cooperating with the armature 93 and the mirror 86 is actuated by the solenoid 94 cooperating with the armature 95. The solenoids 92 and 94 are connected to the electrical circuit in the same manner as the solenoids 66 and 68 in Figure 8.

As a further modification, the variable resistors may be replaced by variable transformers if desired.

It will be understood that the invention may be variously modified and embodied within the scope of the subjoined claims.

I claim as my invention:

1. An anemometer comprising a member mounted for universal movement and adapted to be tilted in any direction by wind acting thereon, a second member remote from said first member and independently mounted for universal movement, and means controlled by said first named member to cause said second named member to move responsively to movements of said first named member.

2. An anemometer comprising a member mounted for universal movement and adapted to be tilted in any direction by wind acting thereon, a second member remote from said first member and independently mounted for universal movement, means controlled by said first named member to cause said second named member to move responsively to movements of said first named member, and means including a scale whereby the position of said second named member may indicate on said scale both the velocity and direction of the wind.

3. An anemometer comprising a member mounted for universal movement and adapted to be tilted in any direction by wind acting thereon, yielding means tending to restore said member to normal position, a second member remote from said first member and independently mounted for

universal movement, and means controlled by said first named member to cause said second named member to move responsively to movements of said first named member.

4. An anemometer comprising a member mounted for universal movement and adapted to be moved in any direction by wind acting thereon, yielding means tending to restore said member to normal position, the direction of said movement being controlled by the direction of the wind, and the amplitude of said movement being controlled by the force of the wind, and means remote from said member and independently mounted for universal movement and controlled by said member to move responsively to movements of said member.

5. An anemometer comprising a member mounted for universal movement and adapted to be moved in any direction by wind acting thereon, yielding means tending to restore said member to normal position, the direction of said movement being controlled by the direction of the wind, and the amplitude of said movement being controlled by the force of the wind, means for producing a beam of light, and means controlled by said member for causing said beam to move responsively to movements of said member.

6. An anemometer comprising a member mounted for universal movement and adapted to be moved in any direction by wind acting thereon, yielding means tending to restore said member to normal position, the direction of said movement being controlled by the direction of the wind, and the amplitude of said movement being controlled by the force of the wind, a translucent shell, means for projecting a beam of light thereon, and means controlled by said member for causing said beam to move responsively to movements of said member.

7. An anemometer comprising a member mounted for universal movement and adapted to be moved in any direction by wind acting thereon, means for producing a beam of light, means mounted independently for universal movement for supporting said light beam producing means, and means controlled by said member for causing said beam of light to move responsively to movements of said member.

8. An anemometer comprising a member mounted for universal movement and adapted to be moved in any direction by wind acting thereon, means whereby the extent of such motion in any direction is in relation to the force of the wind, means for producing a beam of light, and means controlled by said member for causing said beam of light to move responsively to movements of said member.

9. An anemometer comprising a member mounted for universal movement and adapted to be moved in any direction by wind acting thereon, yielding means tending to restore said member to normal position, means for producing a beam of light, and means controlled by said member for causing said beam of light to move responsively to movements of said member.

10. An anemometer comprising a member mounted for universal movement and adapted to be moved in any direction by wind acting thereon, a plurality of expansible units connected to said member and adapted to be expanded or contracted by movement thereof, a second series of expansible units remote from the first but operatively connected thereto, and means operated by said second series of expansible units to move responsively to movements of said member.

11. An anemometer comprising a member mounted for universal movement and adapted to be moved in any direction by wind acting thereon, a plurality of expansible units connected to said member and adapted to be expanded or contracted by movement thereof, a second series of expansible units remote from the first but operatively connected thereto, means operated by said second series of expansible units to move responsively to movements of said member, and yielding means tending to maintain said member in normal upright position and exerting increasing force as said member is moved away from normal position.

12. An anemometer comprising a member mounted for universal movement, a pair of variable resistors connected thereto, said resistors being mounted on perpendicularly disposed axes and being operated by movement of said member to vary the effective resistance thereof, a pair of solenoids having armatures mounted on perpendicularly disposed axes, said solenoids being in circuit with said resistors and controlled thereby, and means operated by said solenoids to move responsively to movements of said member.

13. An anemometer comprising a member mounted for universal movement, a pair of variable resistors connected thereto, said resistors being mounted on perpendicularly disposed axes and being operated by movement of said member to vary the effective resistance thereof, a pair of solenoids having armatures mounted on perpendicularly disposed axes, said solenoids being in circuit with said resistors and controlled thereby, means operated by said solenoids to move responsively to movements of said member, and yielding means tending to maintain said member in normal upright position and exerting increasing force as said member is moved away from normal position.

14. An anemometer comprising a member mounted for universal movement, means for producing a beam of light, a pair of solenoids, means operated by said solenoids for varying the direction of said beam of light, and means controlled by said member for varying the current flowing through said solenoids.

15. An anemometer comprising a member mounted for universal movement and adapted to be tilted in any direction by wind acting thereon, a second member remote from said first member and independently mounted for universal movement, and fluid pressure means controlled by said first named member and operating said second named member to cause said second named member to move responsively to movements of said first named member.

16. An anemometer comprising a member mounted for universal movement and adapted to be tilted in any direction by wind acting thereon, a second member remote from said first member and independently mounted for universal movement, and electrical means controlled by said first named member and operating said second named member to cause said second named member to move responsively to movements of said first named member.

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