2 Sheets—Sheet 1.

A. J. & F. E. HARRIS.

Apparatus for Indicating the Direction of the Wind.

No. 202,815. Patented April 23, 1878.

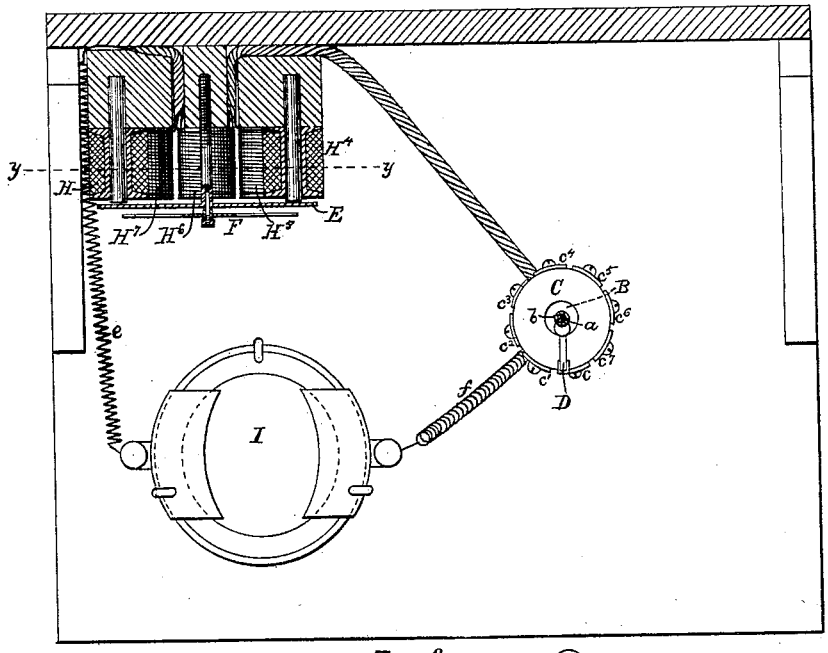

FIG. 2.

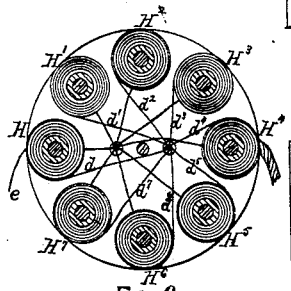

FIG. 3.

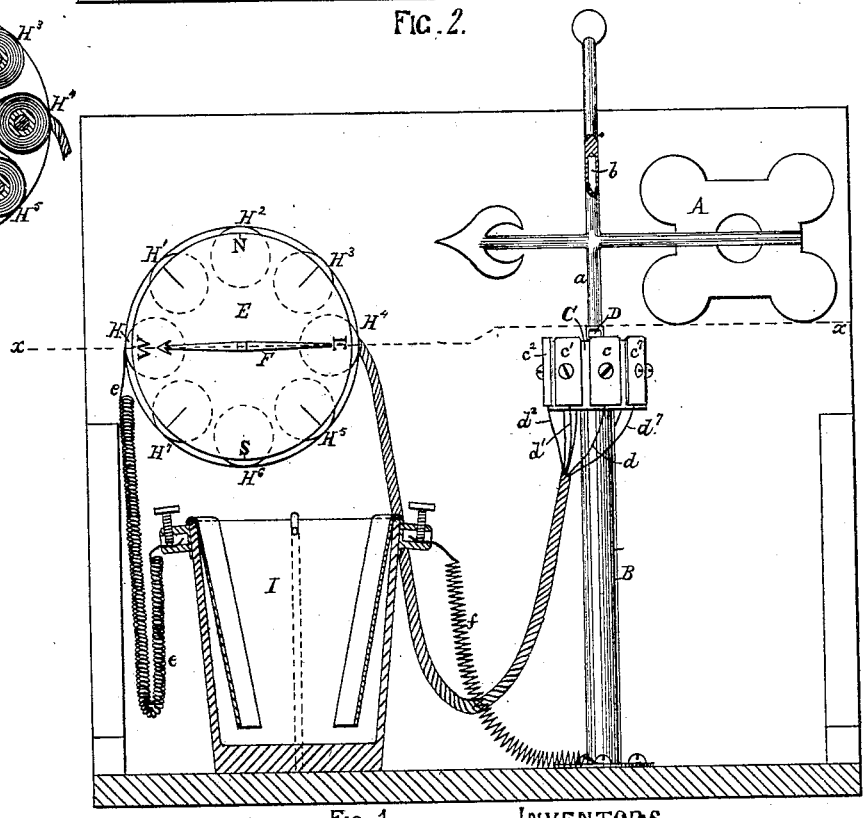

FIG. 1.

WITNESSES.

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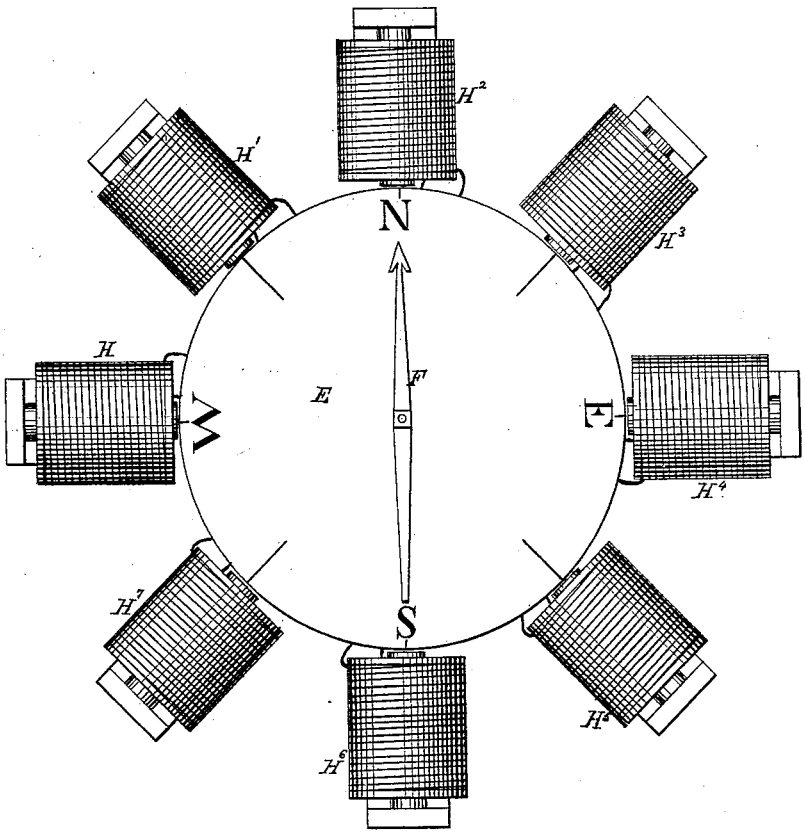

FIG. 4.

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ANSEL J. HARRIS AND FREDERICK E. HARRIS, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN APPARATUS FOR INDICATING THE DIRECTION OF THE WIND.

Specification forming part of Letters Patent No. **202,815**, dated April 23, 1878; application filed February 14, 1878.

To all whom it may concern:

Be it known that we, ANSEL J. HARRIS and FREDERICK E. HARRIS, both of Boston, in the county of Suffolk and State of Massachusetts, have jointly invented certain new and useful Improvements in Apparatus for Indicating the Direction of the Wind, of which the following, taken in connection with the accompanying drawings, is a specification.

Our invention relates to the means employed to move an index-hand upon a dial located within a room of a building, or upon the vertical exterior wall thereof, to indicate the direction of the wind; and has for its object the remedying of certain difficulties which have attended the working of such index-hands as heretofore operated by direct mechanical connection with the ordinary wind-vane by means of gears and shafting.

It is obvious that with such a construction the movements of the vane will be less free and sensitive to a light wind than if it had no long lines of shafting to turn.

Again, it often happens that the shafting leading from the vane to the index and dial has to be placed in positions not easily accessible, and the bearings become dry for want of oil, and, as a consequence, the vane becomes inoperative, except by the force of a high wind, and when it does move the shafting creaks in its dry bearings, and becomes a source of annoyance, especially in the night-time, in cases where the apparatus is attached to a dwelling-house.

Another disadvantage of the present mode of operating the index-hand is, that very often it happens that the dial and index are placed a long distance from the vane, and the shafting leading from the vane to the index has to turn many corners where cog-wheels have to be used to transmit the motion from a vertical to a horizontal shaft, or vice versa, and as the vertical shafts are, in many cases, of necessity mounted in bearings secured to brick or stone walls, and the horizontal shafts are mounted in bearings secured upon the wooden floor-timbers, a disengagement of the teeth of the gear-wheels will sometimes be occasioned by the shrinkage of the timbers or by a greater settling of one part of the building than another part.

These difficulties are entirely overcome by our invention, which consists in the use of a magnetic index-hand mounted upon a pivot, so as to revolve freely thereon, in combination with a disk or dial having engraved, painted, or otherwise affixed thereon certain lines, marks, or characters to indicate the principal points of the compass; a series of electro-magnets arranged in a circle concentric with the axis of the magnetic needle or index-hand, with the ends of their cores toward and in close proximity to the dial and the index; a vane mounted upon a vertical axis or center, about which it is free to be revolved by the action of the wind, and provided with a spring circuit closer and breaker projecting radially therefrom; a series of metal plates arranged in a circle concentric with the axis of said vane, and secured upon a non-conducting material at short and equal distances apart, and in such position relative to said circuit closer and breaker that when the vane revolves the circuit closer and breaker shall bear upon one or another of said plates, each of said plates being connected by suitable wires to one end of the coil of wire of one of the electro-magnets; and a battery, one pole of which is connected by a suitable wire to the pivot or axis upon which the vane revolves, and the other pole of which is connected with the other end of each of the wires forming the coils of the several electro-magnets, all so arranged that the electric current passing through the coil of a given magnet will cause said magnet to attract the magnetic needle or index, and cause it to assume a position with one of its poles directly over or pointing toward said magnet, which must correspond in position relative to the points of the compass, as marked or indicated on the dial, with the true points of the compass toward which the wind-vane is pointing, when the circuit-closer is in position to cause the electric current to flow through said magnet.

If the connections of the wires to the battery were reversed, then the direction of the wind would be indicated by the end of the needle or index directly opposite to the magnet through which the current is passing.

Figure 1 of the drawings is a sectional elevation of our improved apparatus, the cutting-

plane being through the center of the battery. Fig. 2 is a sectional plan cutting through line *x x* on Fig. 1. Fig. 3 is a transverse section through the series of magnets on line *y y* on Fig. 2, and Fig. 4 illustrates a modification of the arrangement of the magnets relative to the dial and index-hand.

A is an ordinary wind-vane, mounted by means of a tubular socket, *a*, a portion of which is shown in section, upon the conical point of the spindle *b*, as shown in Fig. 1.

The spindle *b* is set in the upper end of the column B, around the upper end of which is secured the circular collar C, of wood or other non-conducting material, around the outer periphery of which is secured a series of metal plates, *c* c^1 c^2 c^3, &c., arranged at equal distances from each other, and not touching each other, as shown.

D is a spring circuit closer and breaker, secured by one end to the tubular socket *a*, and projecting radially therefrom in such a position that its outer end rests upon the upper ends of one or more of the plates *c* c^1 c^2 c^3, &c., and adapted to revolve with the vane and its socket, and thus pass from one to another of the plates *c* c^1 c^2, &c.

The vane and other parts above described are placed in some elevated position, usually upon some high or isolated building, where the wind will have unobstructed access to the vane.

Upon the front wall of the building, in a convenient situation to be seen from the street by passers-by, or upon the vertical wall of some room within the building, is placed a dial, E, upon which are engraved, painted, or otherwise affixed the principal points of the compass, and in front of said dial is pivoted the magnetic needle or index-hand F, in such a manner that it is free to revolve about its axis in a plane parallel to the face of the dial E.

A series of electro-magnets, H H^1 H^2 H^3, &c., are arranged, in a circle concentric with the axis of the index-hand F, in the rear of the dial E, with the ends of their cores toward and in close proximity thereto, as shown in Figs. 1 and 2; or said magnets may be arranged with the axes of their cores radiating from the periphery of the dial, and in a plane parallel to the plane of revolution of the index-hand F, as shown in Fig. 4.

Each of the magnets H H^1 H^2, &c., is made up of a soft-iron core and a coil of insulated wire surrounding said core in a well-known manner, one end of each of the wires constituting said coils being connected to a wire, *d* d^1 d^2 d^3, &c., leading therefrom to and connected with one of the plates *c* c^1 c^2 c^3, &c., and the opposite ends of all of the wires of said coils being connected together and to a wire, *e*, leading to and connected by its other end to one of the poles of a battery, I, the opposite pole of which is connected, by means of the wire *f* and column B, with the spindle *b*.

The operation of our improved apparatus is as follows: With the vane standing in the position shown in the drawings, the circuit-closer is in contact with the plate *c*, thus causing the electric current to pass through the wire *d*, and through the coil of magnet H, the magnetic attraction of which will hold the index-hand in the position shown, pointing toward "W.," thus indicating that the vane is pointing toward the west, as shown in Fig. 1.

If, now, the wind should change, and the vane should turn on its axis till the circuit-closer is in contact with the plate c^1 and out of contact with plate *c*, then the electric current will flow through wire *d'* and the coil of magnet H^1, when the index-hand F will be attracted into a position over said magnet, or pointing to the division of the dial representing "N. W."

In the drawings only eight electro-magnets are shown, only eight points or divisions are shown on the dial, and only eight plates, *c* c^1 c^2, &c., are shown; but it is obvious that if it is desirable to more accurately represent on the dial the actual position of the vane, a greater number of divisions—say sixteen or thirty-two—may be made upon the dial, and an equal number of magnets and circuit-closing plates, *c* c^1 c^2, &c., may be used.

We do not claim, broadly, the use, in combination with a wind-vane, of a circuit closer and breaker and a series of plates, each connected with a different circuit of wire, as we are aware that such a device has been used before; but

What we claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an apparatus for indicating the direction of the wind, the combination of a wind-vane adapted to revolve about a vertical axis, a wire leading from said axis to and connected with one pole of a battery, a magnetic needle or index-hand, a disk or dial having engraved, painted, or otherwise affixed thereon the principal points of the compass, a series of electro-magnets, one end of each of the coils of which is connected with said battery, a series of wires leading from the other ends of said coils to a point near said vane, and a circuit closing and breaking device adapted to cause the electric current to pass through one or another of said electro-magnets, according to the position of said vane, substantially as and for the purposes described.

2. The combination of the vane A, provided with a tubular socket, and adapted to be revolved about a vertical axis, and provided with the radial spring circuit closer and breaker D, a series of plates, *c* c^1 c^2 c^3, &c., arranged in a circle concentric to the axis of said vane, and insulated therefrom by the collar of non-conducting material C, a series of electro-magnets, arranged as set forth, and connected by the wires *d* d^1 d^2 d^3, &c., to the plates *c* c^1 c^2 c^3, &c., a dial, E, having marked

thereon the principal points of the compass, a magnetic needle or index-hand, F, the battery I, wire *e*, leading from one pole of said battery to and connected with one end of each of the wires forming the coils of said magnets, and a wire leading from the opposite pole of said battery to and electrically connected with the axis about which said vane revolves, substantially as and for the purposes described.

Executed at Boston, Massachusetts, this 12th day of February, A. D. 1878.

ANSEL J. HARRIS.
FREDERICK E. HARRIS.

Witnesses:
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C. H. DODD.