No. 705,195. Patented July 22, 1902.

C. F. BAMFORD.

WIND MOTOR.

(Application filed Sept. 16, 1901.)

(No Model.)

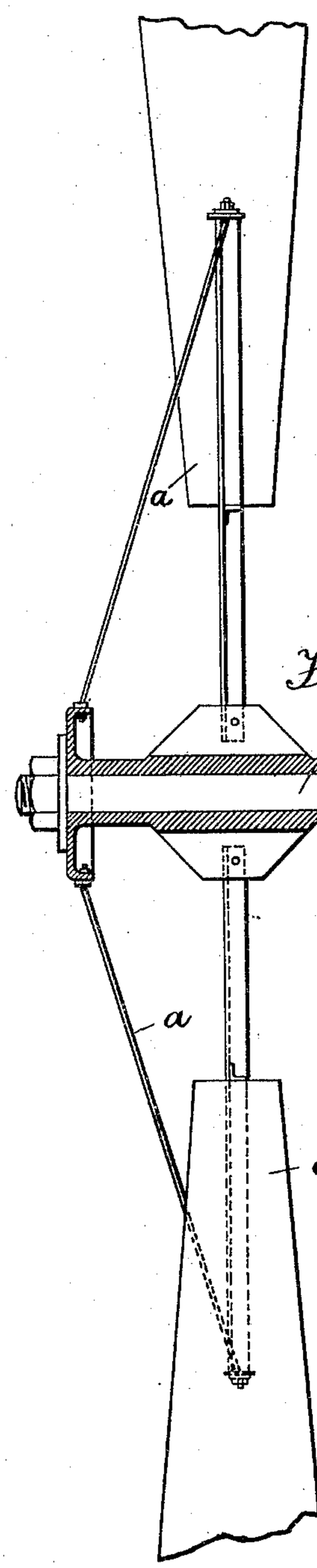

Fig. 1

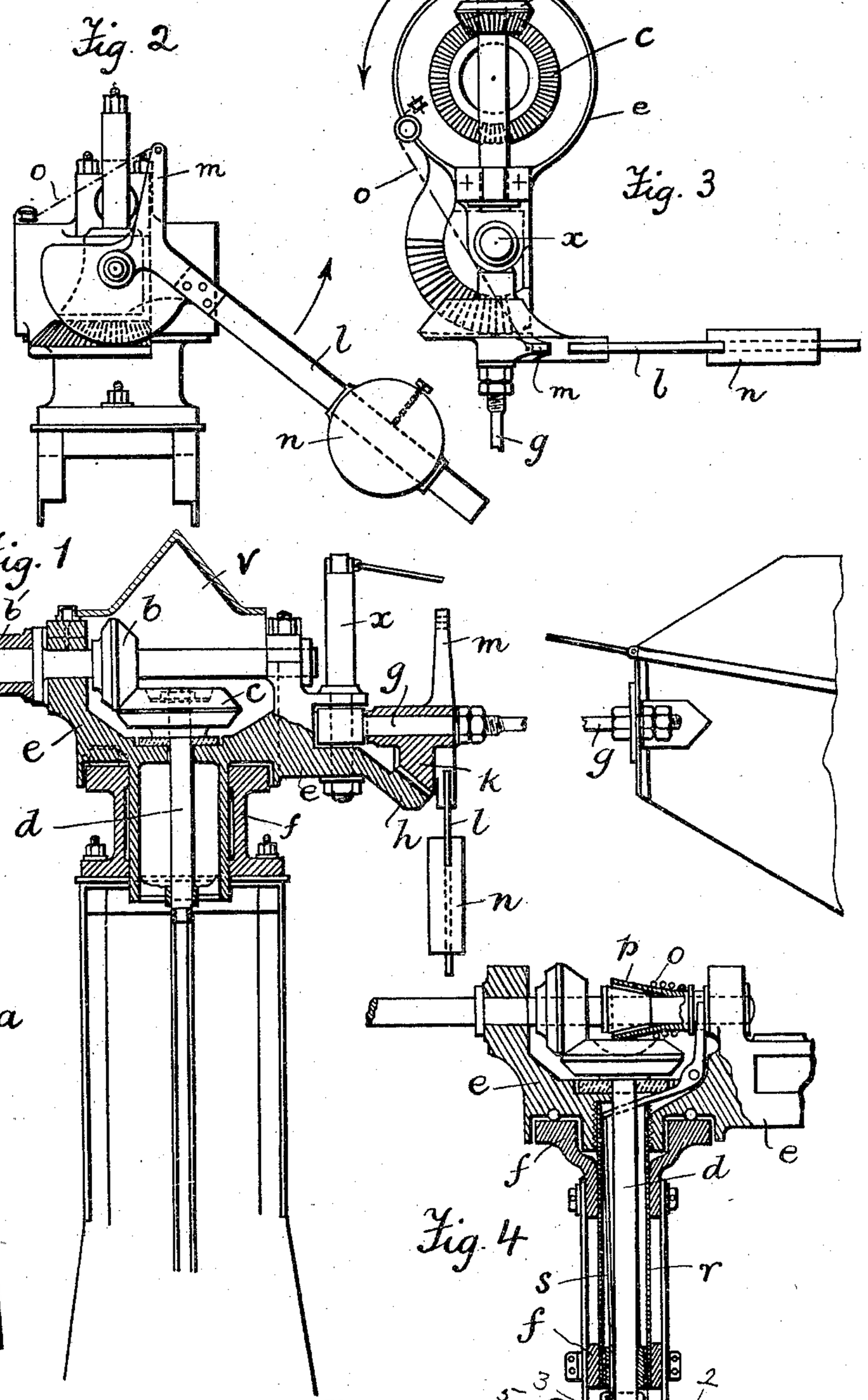

Fig. 2

Fig. 3

Fig. 4

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CHARLES FREDERICK BAMFORD, OF BEDFORD, ENGLAND.

WIND-MOTOR.

SPECIFICATION forming part of Letters Patent No. 705,195, dated July 22, 1902.

Application filed September 16, 1901. Serial No. 75,591. (No model.)

To all whom it may concern:

Be it known that I, CHARLES FREDERICK BAMFORD, civil engineer, a subject of the King of England, and a resident of 6 Goldington avenue, Bedford, in the county of Bedford, England, have invented a certain new and useful Improvement in Wind-Motors, (for which invention I have applied for Letters Patent in Great Britain, No. 15,841, dated August 6, 1901,) of which the following is a full, clear, and exact description.

This invention relates to improvements in wind-motors, and in particular to new or improved means for automatically controlling the same in working.

The object of the invention is to enable the motor to turn automatically from its self-adjusted position when the wind exceeds a predetermined strength, returning to face the wind once more when the latter again lessens. The motor can also be stopped by hand when desired.

My invention consists, essentially, in the application to the horizontally-rotatable bracket of the main spindle to which the wind-wheel is secured of a weighted device pivoted upon the vane-spindle and capable of being controlled by hand, if desired, which device acts, by means of gear-wheels or the like, upon the said bracket.

The invention is illustrated upon the annexed drawings as applied to ordinary wind-motors for obtaining and furnishing rotary motion.

In the drawings, Figure 1 is a sectional elevation of the upper portion of a wind-motor, showing the ordinary wind-wheel, vane, and bevel-gearing. Fig. 2 is a view in elevation of the weighted device seen at right angles to Fig. 1. Fig. 3 is a plan of Fig. 2, and Fig. 4 is a sectional elevation of a modified form of the bracket shown in Fig. 1.

As will be seen from the drawings, the wind-wheel *a* may be of any desired pattern and is secured to a main spindle *b'*, fitted with a bevel-pinion *b*, gearing with a bevel-wheel *c*, and thereby rotating the vertical shaft *d* in the usual manner. The main spindle is journaled with plain, ball, or roller bearings in a bracket or head *e*, having a dependent neck and capable of revolving upon a collar *f*, secured to the standard or post of the machine. The upper portion of the bracket *e* is covered by a casing *v* for the exclusion of rain, dust, &c. Upon the side of the head *e*, remote from the wind-wheel *a*, is secured a vertical pin *x*, acting as a pivot for the horizontally-movable spindle *g*, upon which is secured the ordinary vane or rudder, (partly illustrated). The further construction of the vane itself being well known need not be described.

From the head or bracket *e* there projects an extension *h* in the form of a toothed quadrant or segment curved to an arc struck from the center of the vertical pin *x*. (See Fig. 3.)

Pivoted upon the vane-spindle *g* is a pinion *k*, gearing with quadrant *h* and provided with a long arm *l* and short arm *m*, as clearly and fully shown in Fig. 2. Upon the longer arm *l* is a slidable weight *n*, capable of being adjusted to and secured in any desired position. This arm *l* may be graduated or scaled to leverage distances corresponding with various wind-pressures. To the short arm *m* is secured a cord or chain *o*, passing over suitable guide-pulleys and led down toward the base of the standard.

The working of the device is as follows: The vane, as usual, remains parallel with the direction of the wind, normally keeping up to its work the wheel *a*, of which the plane is at right angles to the vane. (See Fig. 1.) Should the wind become too strong, the wind-wheel *a* tends to swing around horizontally, the neck and head revolving in the collar *f*, as indicated by the arrow in Fig. 3. This horizontal swing of the spindle of wind-wheel *a* is caused by the pinion *b* traveling around on pinion *c*, because the increased pressure of wind on wheel *a* accelerates its peripheral velocity. This increased speed of pinion *b* instead of driving pinion *c* at a higher speed results in pinion *b* traveling to a small extent (up to a right angle) around pinion *c*, thus causing wheel *a* to assume a position other than one in which its plane is at right angles to the wind. Continuing this swing the surface of the floats exposed to the wind would be further decreased until when the wheel is in line with the wind and parallel to the vane (the horizontal spindle having moved in plane through ninety degrees) its revolution would cease, the floats offering no sur-

face to the wind. The horizontal swing of wheel *a* also causes the segment *h* to rotate, thereby raising weight *n* by means of pinion *k*, and the wheel *a* will remain in this position so long as the wind continues at this pressure. It is to be noted that the vane *g* remains in its position always parallel to the direction of the wind and is not affected by this movement of the wheel *a* and pinion *k*. As soon as the wind decreases in force the wheel *a* is returned to or toward its former position by means of the weight *n* automatically falling. The weight must be adjusted upon the lever-arm according to the maximum power or pressure of wind required to drive the wind-wheel.

In order to stop the motor by hand, the cord *o* is pulled, thereby rotating the pinion *k* by means of its short arm *m*, and consequently raising the weighted arm *l*. The pinion *k* then travels around the toothed extension from the bracket, the vane being thus drawn around parallel to the wind-wheel. In this position the vane has been brought to a position in which it is at right angles to the wind and fully exposed thereto. The force of the wind acting on the vane in the usual manner causes this to return to the position from which it was moved when the cord *o* was pulled, and the wind-wheel is thus brought around to its sheltered or stopping position—*i. e.*, the position in which the plane of the wind-wheel is parallel with the wind. This cord *o* can, if so desired, be attached to a bell-crank lever, throwing into gear a friction-clutch *p* on the main spindle, which may serve merely to brake or retard the speed of the same.

In the modification shown in Fig. 4, which is more particularly adapted for small-diameter wind-wheels, the bracket *e* revolves upon a bearing fitted with an inner guide-tube *r* for the vertical rod. The collar *f* is shown in two parts, in which this guide-tube revolves. This form of collar is clamped to the framework in any suitable manner. Upon pulling the cord *z* the intermediate lever draws down a rod *s* and brings the parts of the friction-clutch together by means of the ordinary striking-fork shown. When cord *z* is released, a weight upon the intermediate lever frees the rod *s*.

If the cord *o* from arm *m* be attached to the outside half or shell of a friction-clutch *p* and it is desired to stop the wind-wheel, the striking-fork is operated and the outer shell *p* thrown upon the inner cone, the inner one is revolving with the main spindle, so that by friction the outer cone revolves also, and the cord is wound up, thus drawing over the vane until the wind-wheel stops.

The intermediate lever 2 is pivoted at 3 to the framework and is fitted with a collar 4. When the rod Z is released, the weight 5 falls, raises the rod *s*, and releases the friction-clutch.

Having thus described my invention, what I claim as such, and desire to secure by Letters Patent, is—

1. In means for controlling wind-motors, the combination of a bevel-pinion fast to the wind-wheel spindle, of a bevel-wheel secured to the vertical driving-shaft and engaged by said wind-wheel pinion, so that the latter drives or can travel around said bevel-wheel, of a toothed extension from a rotatable bracket supporting said wind-wheel spindle, of a pinion mounted upon the vane-spindle so as to be revoluble around said vane-spindle and said pinion having a weighted lever-arm rising and falling at all times perpendicularly to the vane-spindle, substantially as described.

2. In means for controlling wind-motors, the combination with the vane-spindle and with a toothed extension from the rotatable bracket to which the vane-spindle is movably pivoted of a pinion mounted revolubly upon said vane-spindle and having a weighted lever-arm, and of a second arm projected from the pivot of said pinion and controlled by a cord, whereby the vane can be drawn around to a position at right angles to the plane of the wheel, substantially as described.

3. In wind-motors, a horizontally-rotatable bracket carrying the main spindle and provided with a toothed segment, a vane-spindle hinged to a vertical pivot on said bracket and capable of being swung horizontally, a pinion pivoted on said vane-spindle and traveling on said toothed segment, an arm fitted with a weight projecting from said pinion, a shorter arm connected by a cord with a friction-cone, and said cone being capable of being rotated frictionally with the main spindle, substantially as above described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

CHARLES FREDERICK BAMFORD.

Witnesses:
VICTOR F. FEENY,
FRED C. HARRIS.