No. 708,620. Patented Sept. 9, 1902.

E. A. BROMLEY.

AUTOMATIC REGULATOR FOR WINDMILLS.

(Application filed Feb. 6, 1902.)

(No Model.)

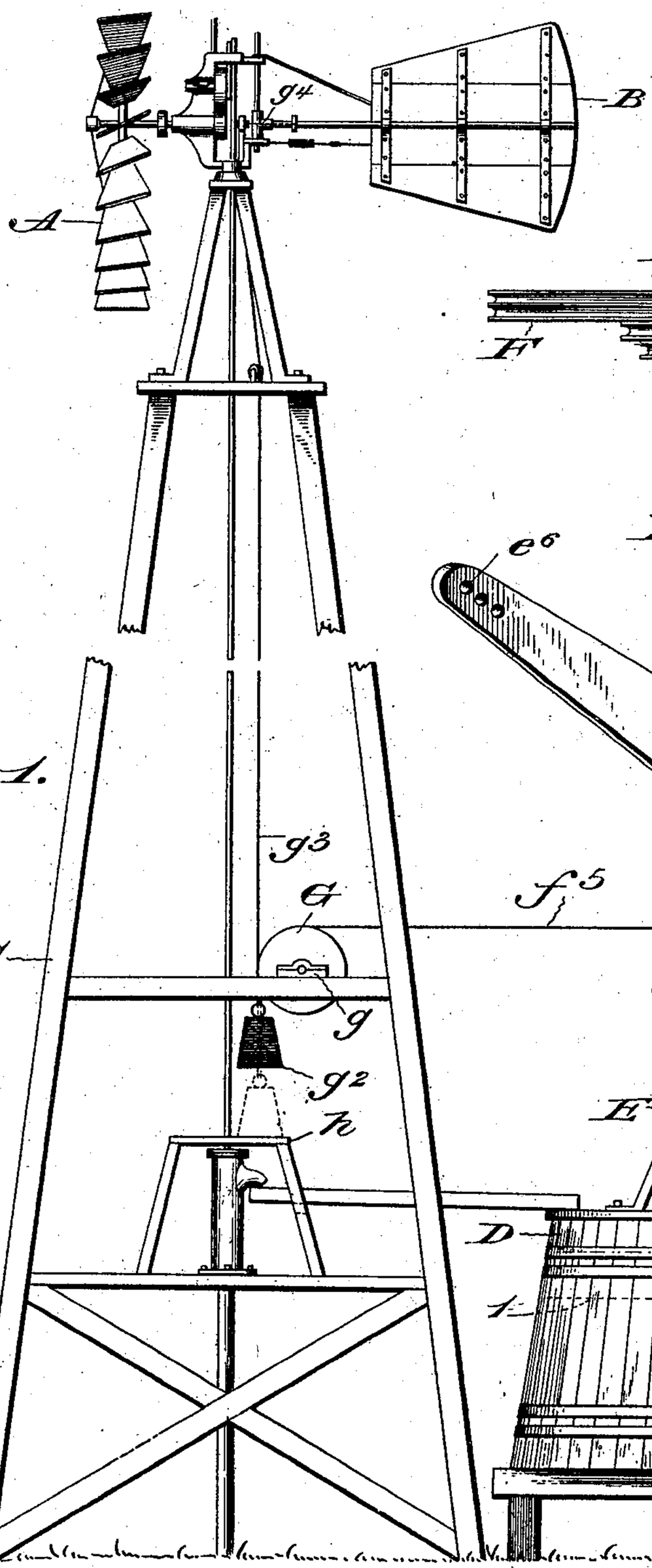

Fig. 1.

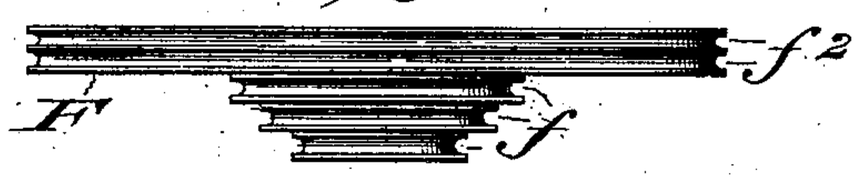

Fig. 2.

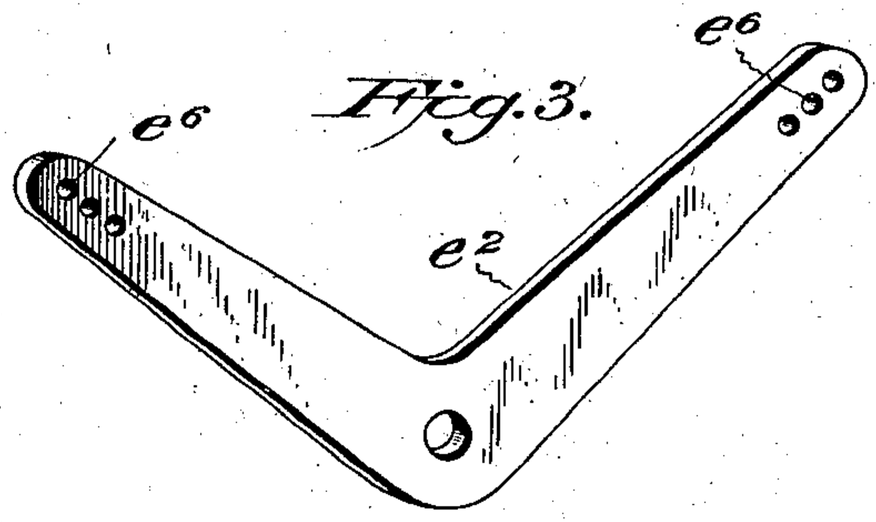

Fig. 3.

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UNITED STATES PATENT OFFICE.

EMMET A. BROMLEY, OF BRIGHTON, COLORADO.

AUTOMATIC REGULATOR FOR WINDMILLS.

SPECIFICATION forming part of Letters Patent No. 708,620, dated September 9, 1902.

Application filed February 6, 1902. Serial No. 92,842. (No model.)

To all whom it may concern:

Be it known that I, EMMET A. BROMLEY, a citizen of the United States of America, residing at Brighton, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Automatic Regulators for Windmills; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in automatic regulators for windmills.

The object of the invention is to automatically effect the starting and stopping of a windmill at a predetermined time by a system of weights and a float which connect by cables in a suitable manner with the vane of the windmill or to a counterbalance-weight arm when used in connection with a vaneless windmill, so as to render the wheel operative when the water in a tank in which said float operates falls below a certain point; and the invention further consists in certain novel features of construction, as will fully appear in the accompanying specification and claims.

In the accompanying drawings, Figure 1 is a side elevation of a windmill-tower, showing the application of the improved automatic regulator thereto. Fig. 2 is a view of the differential sheave forming a part of the regulator; and Fig. 3 is a view of a crank-lever, to one end of which the float-cord is attached.

In the accompanying drawings, forming part of this application, the letter A indicates the wind-wheel, B the vane, C the tower, and D the tank, all of which are of the common type.

Upon the top of the tank D is secured a pair of standards or supports E, the tops of which form bearings for a short shaft e, to which a differential sheave F is keyed. This sheave is arranged to form three sheaves f, which vary in diameter from the smallest, which may be three inches in diameter, to the largest, which may be nine inches in diameter, and a pair of twin sheaves f^2, which are much larger in diameter. To one of the standards E and below the sheave F is pivoted a crank-lever e^2, to one end of which is secured a cord or cable e^3, which carries a float e^4 at its lower end, while to the other end of the said crank-lever is secured a cable e^5, the free end of which passes around one of the small sheaves f and is secured thereto. Around one of the twin sheaves f^2 passes a cable f^3, carrying a weight f^4 at its free end, the end passing around the sheave being secured thereto. It will thus be seen by reference to the drawings that when the sheave F is turned in that direction to unwind cable f^3 and lower weight f^4 cable e^5 will be unwound from its sheave f, thus rocking the crank-lever e^2 and allowing float e^4 to descend.

Secured to the remaining twin sheave f and passing around the same in an opposite direction to the cable f^3 is a cable f^5, which extends to a sheave G, supported in bearings g, secured within the tower C. The cable f^5 after passing over the sheave G is attached at its free end to a weight g^2, which is heavier than either the weight f^4 or float e^4, but not so heavy as their combined weights. A second cable g^3 is attached to the weight g^2 and passes thence to the top of the tower C, where it connects with one end of the ordinary chain g^4, attached to the vane of the windmill, by which the said vane is turned to a position at right angles to its operative position when it is desired to stop the said windmill. When the improved regulator is used in connection with a vaneless windmill, the cable g^3 connects with the weight-arm by which the said wheel is opened and closed.

In Fig. 1 the windmill is illustrated as in operation, the water in the tank having dropped to the level represented by the dotted line 1 and the weight f^4 being supported by platform f^5, which limits its downward movement. Now as the tank begins to fill the float e^4 will be borne upward by the rising water, thus releasing its pull on crank-arm e^2 and sheave f, leaving only the weight f^4 to exert a pull on sheave F, which is counterbalanced by the opposite pull of the heavier weight g^2 through its cable f^5. The weight g^2 then descends, drawing upon cable g^3, which effects the swinging of the vane, so as to render the wheel inoperative. As long as the float is supported by the water in the tank the heavier weight g^2 will counterbal-

ance the lighter weight f^4 and remain in its lowered position supported upon platform *h;* but when the water in the tank begins to fall the float, as well as weight f^4, will depend from the sheave, and their combined weights will counterbalance that of weight g^2, which will be drawn upward, releasing its pull on cable g^3, which allows the vane to be drawn into operative position again in the well-known manner. While the weight f^4 drops a limited distance, the float e^4 may drop a greater or less distance, according to which of the sheaves is engaged by the cable e^5. The ends of the crank-lever e^2 are provided with a plurality of holes e^6, by which any desired adjustment of the cables attached thereto may be accomplished.

The device herein described forms a cheap and simple regulator—one that is positive in operation and not easily disarranged.

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

1. In a regulator for windmills, the combination with a water-tank and pumping mechanism therefor, of a sheave supported above the said tank; cables passing around the said sheave, one of which carries a weight, while the other carries a float; a cable which passes around the said sheave in an opposite direction to the before-mentioned cable, and over a similar sheave, supported by the windmill-tower; a weight depending from the said cable; a cable connecting the said weight with the pump-operating mechanism; the said weight being designed to drop by gravity and stop the mill, when the tank is full, and to be counterbalanced by the combined weights of the aforesaid float and weight, when the water in the said tank falls, so as to allow the mill to start, substantially as shown.

2. In a regulator for windmills, the combination with a water-tank and pumping mechanism therefor, of a differential sheave, and means, such as standards, for supporting the same, above the tank; a cable, one end of which passes around the said sheave, and is secured thereto, while the other end passes over a suitably-supported sheave within the windmill-tower, and is provided with a weight at its free end; a cable connecting the said weight with the pump-operating mechanism; a pair of cables secured to and passing around the said differential sheave in an opposite direction to the before-mentioned cable, one of said cables being provided with a weight, while the other is provided with a float, the combined weights of said float and weight being greater than that of the before-mentioned weight, so as to counterbalance the same, when the water falls in the tanks, and thus permit the pumping mechanism to operate, substantially as shown.

3. In a regulator for windmills, the combination with a water-tank and pumping mechanism, of a cable one end of which connects with the said pumping mechanism, while the other end carries a weight, which normally prevents the operation of said mechanism, a cable, one end of which is secured to the said weight, the said cable passing over a sheave in proximity thereto, and over a differential sheave secured above the water-tank, its free end being secured thereto; cables secured to the said sheave, and passing around the same in an opposite direction to the before-mentioned cable, one of said cables carrying a weight at its free end, while the other of said cables connects with one arm of a crank-lever, to the other arm of which is secured a cable, the lower end of which carries a float, the said float and weight acting in concert to overbalance the before-mentioned weight, when the water falls in the tank, so as to start the pump, while the before-mentioned weight drops when the tank is full, owing to the reduction in the pull exerted against it, as the float is borne up by the water, so as to stop the pump; and platforms upon which the weights rest, at the limit of their downward movement, substantially as shown.

4. In an automatic regulator for windmills, the combination with a water-tank and pumping mechanism therefor of a differential sheave secured above the tank, the said sheave comprising a plurality of small sheaves of varying diameters, and twin sheaves of larger diameter; a cable which passes around one of the twin sheaves one end of which is secured to the same, while the other end depends therefrom, and carries a weight; a cable which is secured to one of the smaller sheaves, and passes around the same; a bell-crank lever, one arm of which connects with the said cable, while to the other arm is secured a cable, the lower end of which carries a float, which is operated by the rise and fall of the water, in the said tank; a cable secured to the remaining twin sheave and passing around the same in an opposite direction to the before-mentioned cable, the said cable extending to and over a sheave supported within the windmill-tower, and carrying a weight at its free end; a second cable secured to the said weight and connecting the same with the pumping mechanism; the said weight operating when lowered to stop the pump and when lifted by the combined weights of the before-mentioned weight and float, as the water falls in the tank, to start the said pump; and platforms upon which the said weights rest when in their lowered position, substantially as shown.

5. In an automatic regulator for windmills, the combination with a water-tank and pumping mechanism therefor of a differential sheave supported above the tank; a second sheave in line with the first-mentioned sheave, supported within the windmill-tower; a cable secured to the differential sheave which passes around the same and over the second sheave, and carries a weight at its free end; means for connecting the said weight with the pumping mechanism; cables secured to and pass-

ing around the differential sheave in opposite direction to the before-mentioned cable, one of which carries a weight, while the other carries a float; the combined weights of said weight and float being greater than the before-mentioned weight, so that, as the water in the tank falls, their combined weights will turn the differential sheave, wind the cable connected with the before-mentioned weight, and lift the same, causing the pump to start, substantially as shown.

In testimony whereof I affix my signature in presence of two witnesses.

EMMET A. BROMLEY.

Witnesses:
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