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W. D. BRUNDAGE.

WINDMILL.

No. 414,491. Patented Nov. 5, 1889.

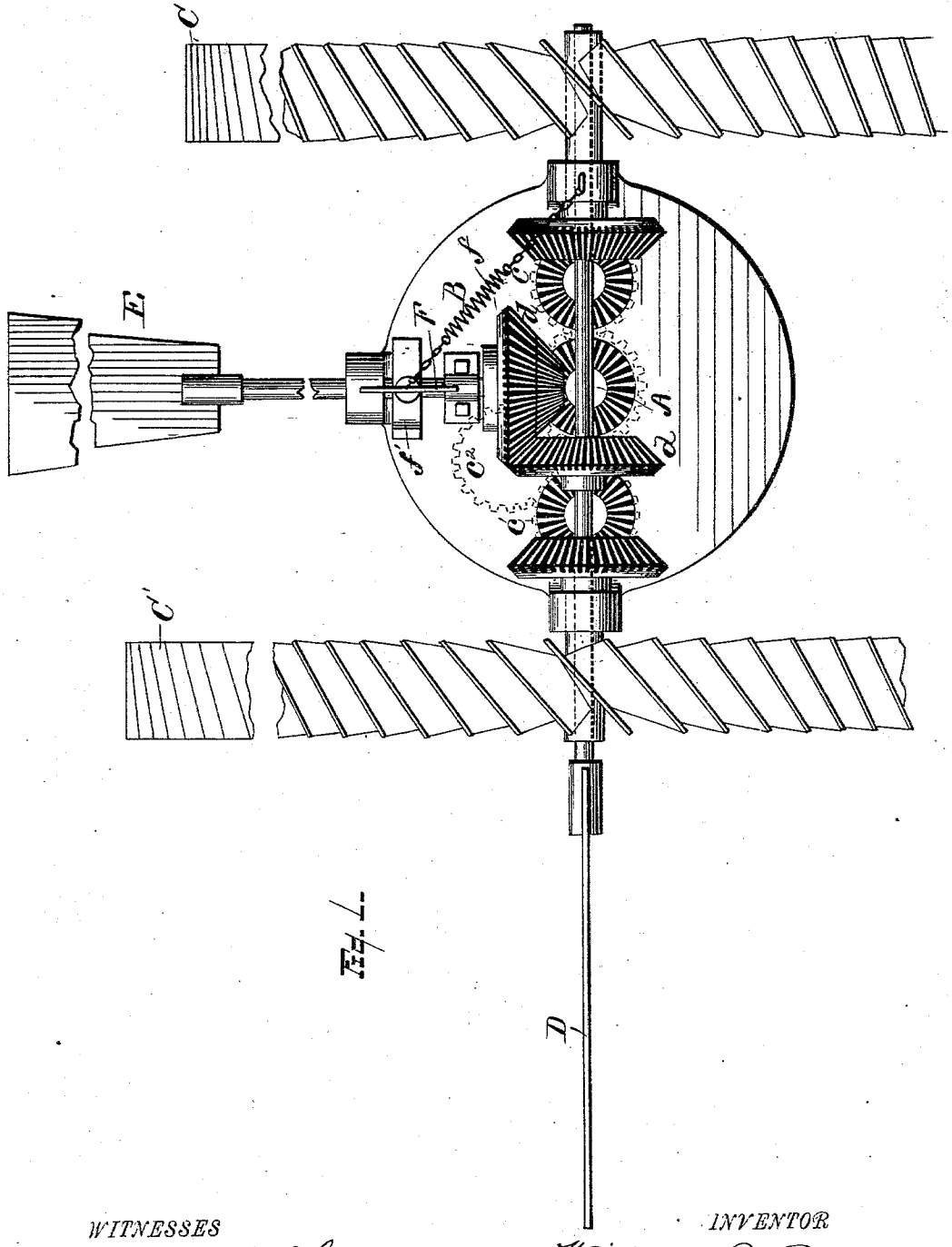


Fig. 1.

WITNESSES

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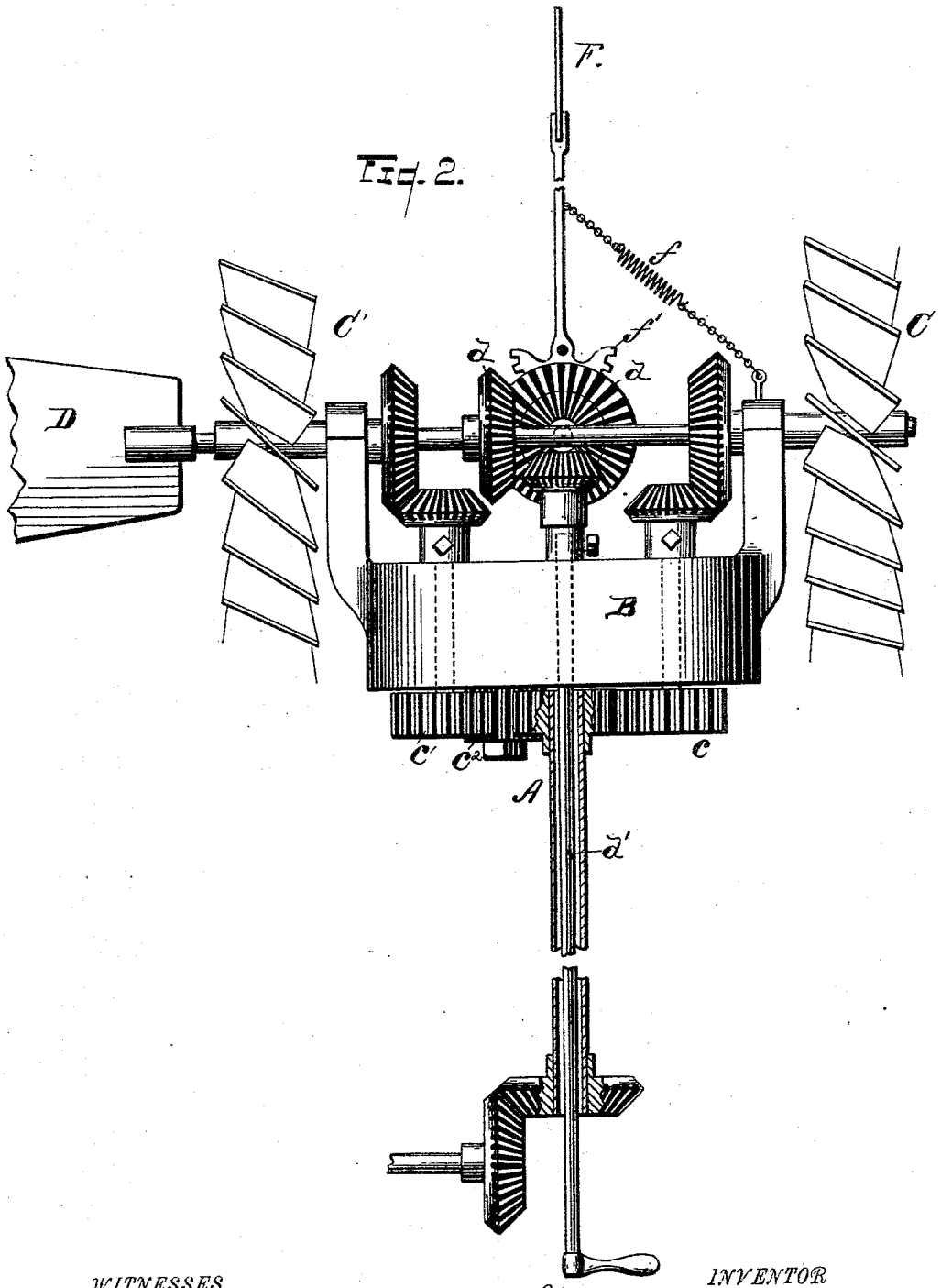
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Fig. 2.



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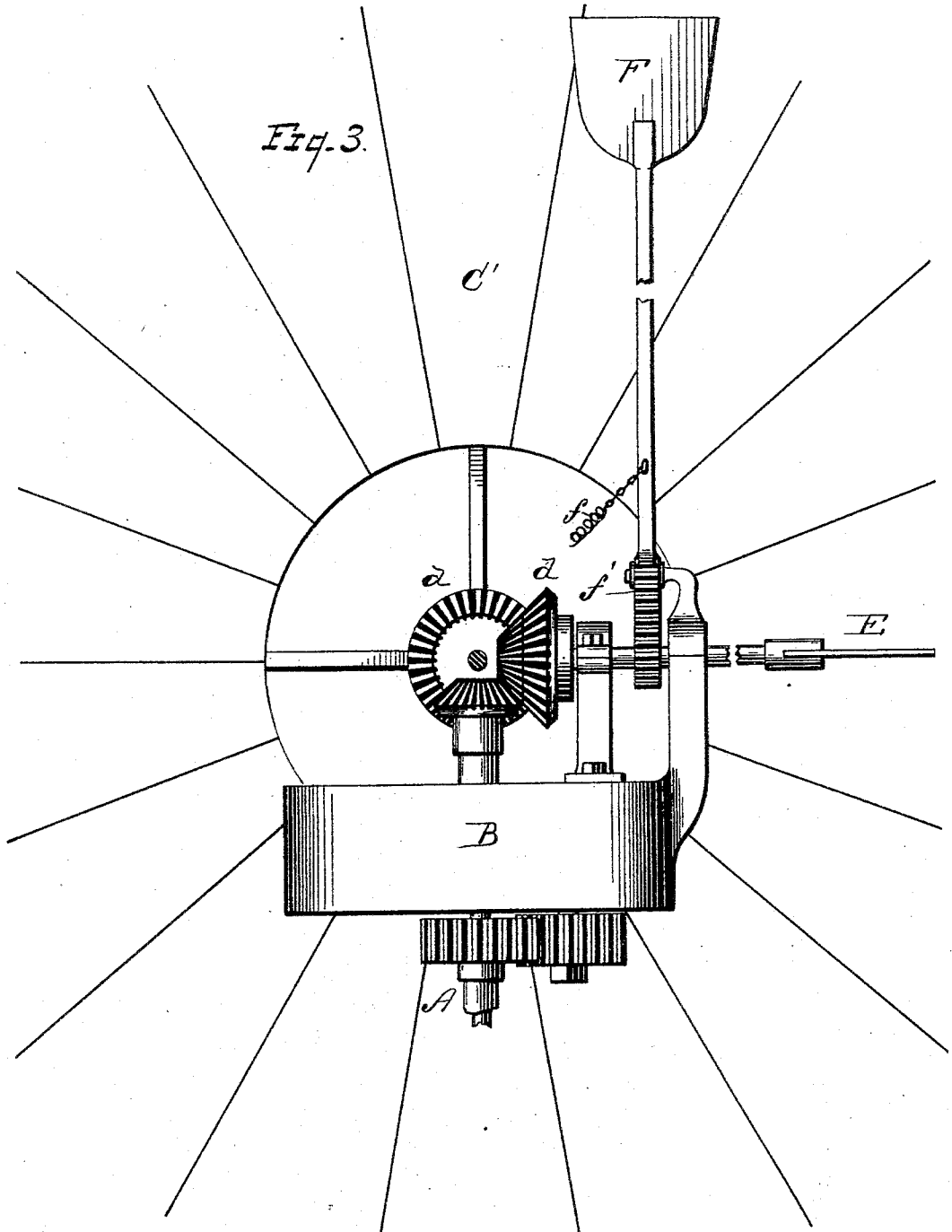
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Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM D. BRUNDAGE, OF BATTLE CREEK, ASSIGNOR OF TWO-THIRDS TO EUGENE C. LESTER AND HORATIO GALE, OF ALBION, MICHIGAN.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 414,491, dated November 5, 1889.

Application filed November 20, 1888. Serial No. 291,310. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM D. BRUNDAGE, a citizen of the United States, residing at Battle Creek, county of Calhoun, State of Michigan, have invented certain new and useful Improvements in Windmills; and I declare the following to be a full, clear, and exact description of the same, 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, which form a part of this specification.

In the drawings, Figure 1 is a plan view of a windmill apparatus embodying my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a view at right angles to Fig. 2 with one wind-wheel and a part of the gearing removed.

My invention relates to windmills, and has for its object certain improvements in the construction thereof, as will be more fully pointed out in the annexed drawings, and embraced in the claims.

In carrying out my invention, A is a windmill-shaft. B is its rotary table or head. C and C′ are two wind-wheels mounted thereon. The wind-wheel C is on one side of the windmill-shaft, and is engaged, through the medium of pinions *c*, with the shaft, while the wheel C′ is on the opposite side of the windmill-shaft, and is likewise engaged by the pinion c' and pinion c^2 with the shaft, the pinion c^2 being interposed to change the direction of the motion, so that the wheel C′ may travel in the same direction as the wheel C. By this construction the tendency of one wheel to creep in one direction is exactly neutralized by the tendency of the other wheel to creep in the opposite direction. The wheel C′ is preferably made somewhat larger than the wheel C, so that by catching more wind at its periphery compensation is had for the wind of which it is partially robbed by the other wheel in front of it, and the two are thus caused to exert substantially like energy upon the wind-wheel shaft.

D is a vane located in the direction of the wind-wheel shaft; E, a similar vane at right angles thereto. These two vanes are geared with each other by suitable gears *d*, so that they turn together. When the vane D stands in a vertical plane, the wheels are brought into the wind and the vane E stands in a horizontal plane. When the vane D is in a horizontal plane, the vane E is in a vertical plane, and the wind acting upon it shifts the wheels C C′ out of the wind. A suitable operating-rod d' is provided for operating these vanes at will.

F is a governing-vane. It stands vertically and is held upright by a spring *f*. At its lower end is a segment-gear f', which engages a pinion on the shaft of the vane E. The purpose of this vane F is as follows: Suppose the wheels C C′ to be running at their normal speed and to be standing fully in the wind. Now if the wind increases the vane F is pressed against, the spring *f* yields, and the segment f'' turns in a corresponding degree, the vane E allowing it to take a little wind. At the same time it turns the vane D a little out of the wind, and the operation results in slightly shifting the wheels C C′ out of the wind, so that the speed is held uniform under this varying pressure of the wind. Again, the shifting of the wheels by the turning of the platform serves at the same time to turn the vane F about its vertical axis, and so carries it a little out of the wind, and so reduces the action of the wind upon it. This mechanism thus constitutes an effectual governing mechanism to maintain a uniform and steady motion.

What I claim is—

1. In a windmill, two wind-wheels, one upon each side of the windmill-shaft and adapted to revolve in the same direction, one geared directly with said shaft and the other geared, through an intermediate pinion c^2, with said shaft, the construction being such as to avoid the tendency to creep, substantially as described.

2. The combination, with two wind-wheels C C′, one on each side of the windmill-shaft, and both adapted to revolve in the same direction, of the vane D, located in the direction of the wind-wheel shafts, the vane E, located at right angles to said shafts, the gears *d*, con-

necting said vanes, so that they turn together, the blade of one vane being in a vertical plane when the other is in a horizontal plane, a rod d' for operating said vanes to shift the wheels into and out of the wind, and the vertical governing-vane F, geared with the shaft of one of the other vanes to control the speed of the wheels according to varying pressure of the wind, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

WILLIAM D. BRUNDAGE.

Witnesses:

M. B. O'DOGHERTY,

SAMUEL E. THOMAS.