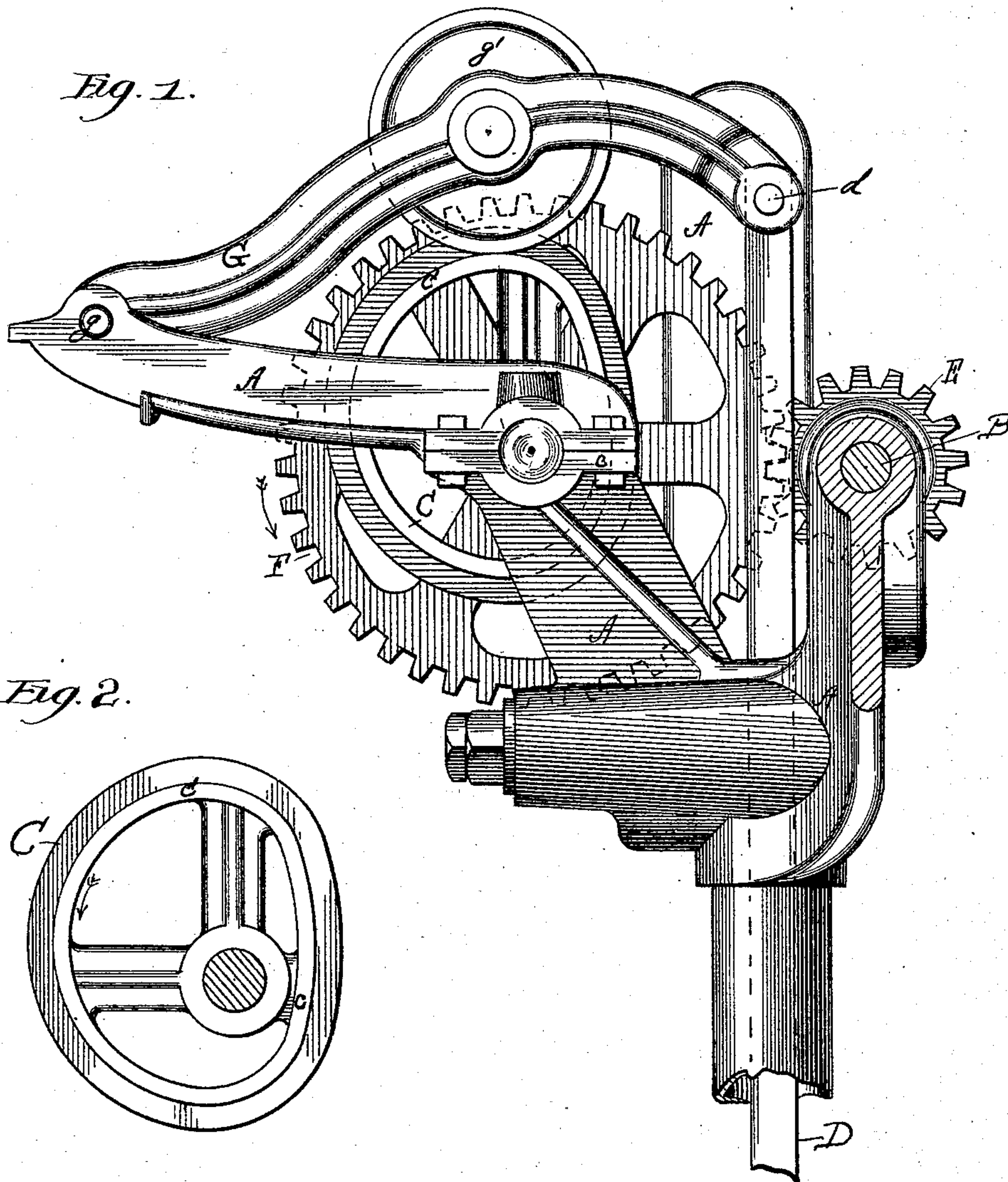


(No Model.)

W. C. WESTAWAY.
GEARING FOR WINDMILLS.

No. 455,423.

Patented July 7, 1891.



Witnesses:

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UNITED STATES PATENT OFFICE.

WALTER C. WESTAWAY, OF DECORAH, IOWA.

GEARING FOR WINDMILLS.

SPECIFICATION forming part of Letters Patent No. 455,423, dated July 7, 1891.

Application filed November 3, 1890. Serial No. 370,169. (No model.)

To all whom it may concern:

Be it known that I, WALTER C. WESTAWAY, a citizen of the United States of America, residing at Decorah, in the county of Winne-

shiek and State of Iowa, have invented a certain new and useful Improvement in Gearings for Windmills, of which the following is a specification.

In the accompanying drawings, wherein like reference-letters indicate like parts, Figure 1 is a side elevation of the mill-head, showing the wind-wheel shaft in section; and Fig. 2 is a side elevation of the cam, showing a section of the shaft common to said cam and to the pinion F.

In windmills employed for pumping water by means of an ordinary lifting-pump, in which the power of the wind-wheel is communicated to the pump by a reciprocating vertical rod, a great desideratum is to so economize and apply the power that it will effectively operate the pump in a very light wind; and to this end it has been common to gear down the mechanism, so that two or three revolutions of the wind-wheel are necessary to each complete reciprocation of the pump-rod. To gear down farther than this has been found undesirable on account of the loss of speed, and yet it is very desirable to still further increase the power applied to the lifting-rod in order to utilize light winds not otherwise available for pumping purposes. The power can of course be further increased by adding leverage; but this shortens the stroke of the pump and reduces its efficiency both for light and strong winds. The problem is to supplement the gearing-down wheels by means which will still further increase the power without reducing either the speed or length of the pump-stroke.

My invention is for the purpose of accomplishing this object; and, taking advantage of the fact that with a lifting-pump mechanical force may be applied only to raise the pump-bucket, leaving gravity to automatically effect its descent, the principle of my invention consists in connecting the geared-down wheel to the lifting-rod by means of an intervening cam, so constructed as to utilize more than one-half of each revolution of said wheel in lifting the rod, leaving gravity to effect the rapid descent of the rod during the remain-

ing fraction of said revolution. This principle may be embodied and applied in several different ways general equivalents of each other, of which the form represented in the drawings is regarded by me as the preferable construction, and is therefore selected for the purpose of illustrating the invention.

In said drawings, A indicates the mill-head, B the wind-wheel shaft, and D the vertically-reciprocating rod by which the power of the wind-wheel is communicated to the pump-bucket. By the preferable means of a small pinion E on the shaft B gearing into a larger pinion F, suitably mounted on the mill-head, I gear down the rotary motion to any extent desired, and preferably to the extreme practical limit of reduction, which I regard as about one revolution of wheel F to three of wheel E. Any further reduction than this unduly retards the action of the pump, and is therefore undesirable, although, if employed, it would be no departure from the principle of my invention. I now connect to the wheel F, so as to be rotated therewith and preferably upon the same center of rotation, a cam C, whose function is to lift and drop the rod D once during each revolution of said wheel F. The connection is preferably made by means of a lever G, pivoted to the mill-head at *g*, articulated to the rod D at *d* and provided with a friction-roller *g'*, which rides upon the upper surface of the cam. There is considerable advantage in arranging the friction-roller directly above the axis of rotation of the cam, because the latter will in that case operate upon it only by a true cam action uncomplicated with the element of adverse leverage. The acting-surface of the cam is eccentric to its center of rotation and so shaped as to continuously lift upon the rod D during more than one-half of each revolution of the cam. I find it practicable to cause it to thus lift during about two-thirds of each revolution, and of course the greater the arc over which the lifting function is spread the greater the increase of power effected by the cam without reducing the aggregate speed of the pump. As here shown, the cam revolves in the direction indicated by the arrow marked upon it, and for lifting purposes utilizes an arc of about two hundred and forty degrees, commencing at the point *c*, to gradu-

ally diverge from the axis of rotation to the point marked c' , and then sharply converging from the point of beginning, so that the friction-roller g' in riding from c to c' is
5 forced upward by the wedging action of the cam, and then descends from c' to c by the action of gravity.

The net gain effected by this improvement is as follows: If the rod D were actuated by
10 a crank or wrist-pin revolving with the wheels F, only three-sixths of the revolution of said wheel would be utilized for lifting purposes; or, in other words, the wind-wheel would utilize a revolution and a half in raising the rod
15 and waste a revolution and a half in lowering it, whereas with my improvement, which employs four-sixths of the revolution of wheel F for lifting purposes, the wind-wheel utilizes two revolutions in raising the rod and
20 wastes only one in lowering it, giving thereby a net gain of thirty-three and one-third per cent. in power over the crank or wrist-pin device, with the same aggregate speed of action and length of stroke in the pump.

25 It will of course be understood that I do not confine myself to the specific proportions here given, nor to the specific form of the gearing-down device or the number of its wheels, nor to a lever-connection between the

cam and the actuating-rod, as well-known 30 mechanical substitutes may be employed for any of these purposes without departing from the principle of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters 35 Patent, is—

1. In a windmill, the combination of a wind-wheel shaft B and an actuating-rod D with wheels E F for gearing down the rotary motion derived from the shaft, and with a 40 cam C for communicating motion from wheel F to rod D, said cam being so constructed as to lift upon the rod during more than one-half of its own revolution, substantially as described. 45

2. In a windmill, the combination of the wind-wheel shaft B, gearing-down wheels E F, and cam C, constructed and operating substantially as described, with an actuating-rod D, so arranged and connected that its weight 50 is borne by the cam at a point directly above the axis of rotation of the latter, as herein set forth.

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Witnesses:

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