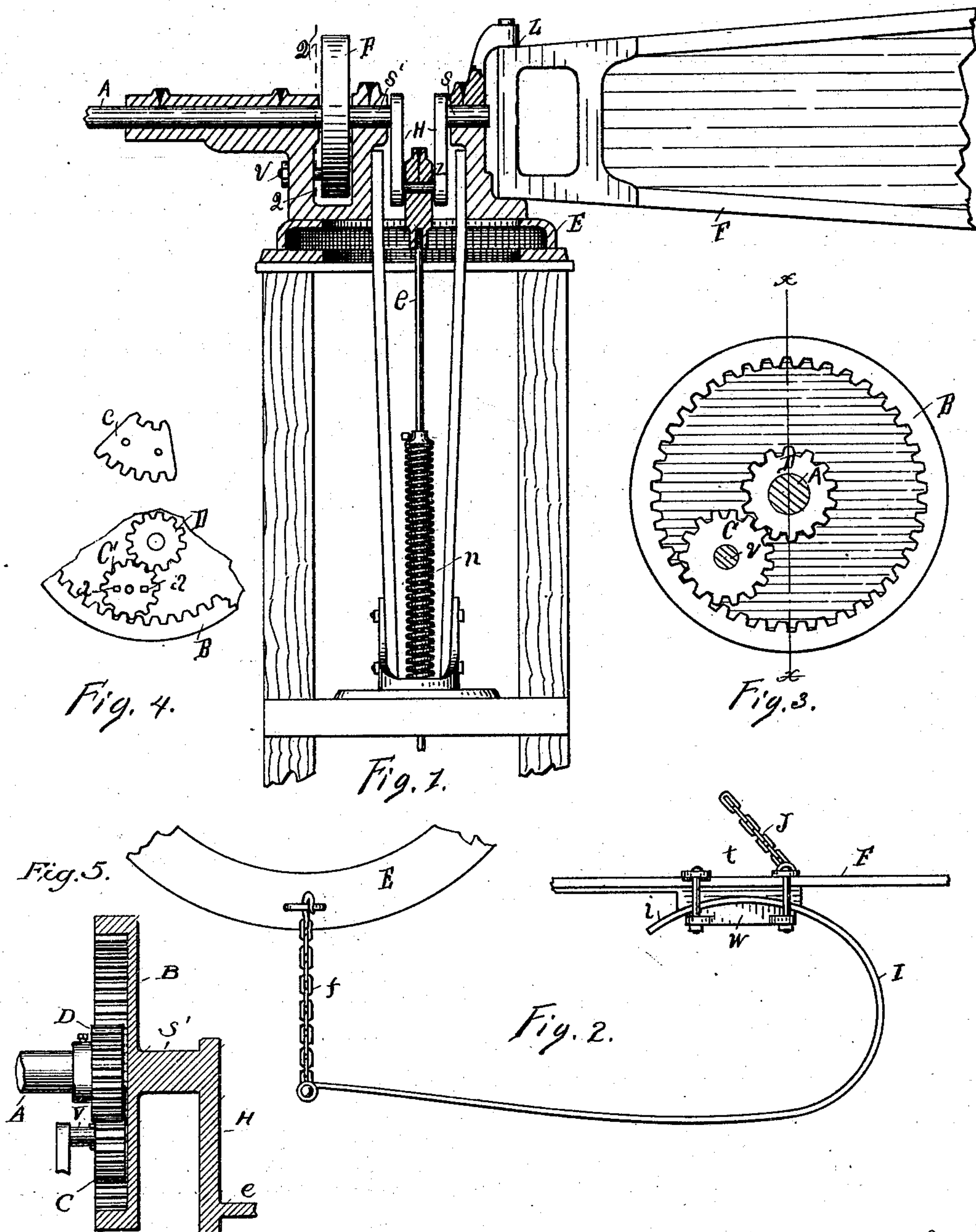


(No Model.)

M. B. WILLIAMS & W. H. ATHEY.
WINDMILL.

No. 503,635.

Patented Aug. 22, 1893.



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PLACE.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 503,635, dated August 22, 1893.

Application filed June 13, 1892. Serial No. 436,496. (No model.)

To all whom it may concern:

Be it known that we, MALCOLM B. WILLIAMS and WILLIAM H. ATHEY, citizens of the United States, residing at Kalamazoo, county of Kalamazoo, and State of Michigan, have invented a new and useful Windmill, of which the following is a specification.

This invention relates to that class of wind mills which are "geared back" so that the pitman and its connections will run slower than the wind wheel.

One object of the invention consists in certain improvements in the mechanism for gearing back, which mechanism is convertible from one condition to another, whereby the wind wheel, and the pitman and its connections, will both run at the same speed or can be changed so that the pitman and its connections will run slower than the wind wheel, as desired.

Other objects will appear in the description and claims.

In the drawings, Figure 1 is a broken elevation of the mill, parts being in vertical section; Fig. 2 a plan view of the governor hereinafter described; Fig. 3 an enlarged section on line 2—2 in Fig. 1, looking from a point at the left. Fig. 4 shows details for converting the mill from one condition to another, as fully described below, and Fig. 5 is an elevation of lettered details from Figs. 1 and 3, parts being in section on line *x—x*, in Fig. 3, looking from a point at the left.

Referring to the lettered parts of the drawings, A is the wheel-shaft, having bearings in suitable supports on the head, E. The wind wheel, not here shown, would of course be attached to the left hand end of the wheel-shaft, here shown broken away. The inner end of the wheel-shaft, A, is provided with a pinion, D, rigidly attached thereto.

The crank, H, with its axes, S and S', and wrist-pin, *z*, are all made integral with each other, and to the forward one S' of said axes is integrally attached an internal gear, B, Fig. 5. By thus integrally casting all these parts together, trueness, and economy in labor, are secured. The axes, S and S', are on a horizontal line, when viewed in side elevation, as in Fig. 1, with the wheel-shaft, A, hence the

pinion, D, of the wheel-shaft, A, comes centrally within the internal gear, B, the diameter of the pinion being one third that of the internal gear.

At C, Figs. 3 and 5, and, loosely mounted upon an axis, *v*, is an intermediate pinion, of a diameter corresponding to that of the pinion D and in position to mesh with said pinion D and the internal gear B. While the pinions C and D, as here shown, correspond with each other in diameter, of course they may be made to vary in size, when it is desired to make the pitman or plunger run faster or slower in its relation to the speed of the wheel than it does by the construction here shown. The axis, *v*, of the pinion, C, as here shown, is attached to the bearing support of the wheel-shaft, A, Figs. 1 and 5, but it may be attached to any suitable support on the head of the mill. As thus far described, when the wind wheel is in motion, the pinion D, of the shaft A, will impart motion to the pinion C, and thence to the internal gear, which will of course operate the crank, H, to the wrist pin, *z*, of which crank the plunger or pitman, *e*, is connected, and said pitman will operate at one third of the speed made by the wind wheel.

If the pinions C and D were of different diameters, as above stated, of course the difference of speed between the pitman or plunger and the wheel, would vary according to the variation of the sizes of the pinions. By thus employing the pinion C, we are enabled to have the crank axes and the wheel-shaft on a line with each other and on a line with the vane, and to form all the gears comparatively small in size, making the whole mill and gear compact and light.

Another important advantage consists in the convertibility of the mill, by being enabled to gear it forward again to a direct acting mill, in which the speed of the wind wheel and of the pitman and its crank are the same. This may be done by locking the gears of the wheel-shaft and of the crank axis together. Fig. 4 illustrates the idea, in which the axis, *v*, of the pinion C, has been removed and said pinion bolted to the back closure of the internal gear, as at *a a*. When the gears

are thus locked, the speed of the wheel-shaft A, internal gear B, and its integral crank H, are all the same. These parts may be locked by employing a segment of a combined internal and external gear, c, between the pinion D and the internal gear B, in lieu of the pinion C.

The spring governor referred to is illustrated in Fig. 2, consisting of the spring, I, curved or bowed at the rear end, the forward end being attached to the head, E, of the mill, by a chain, f. The curved shank, I, of the spring governor, is held in a curved seat, t, attached to the vane, F, by clip w, and bolts, as shown in Fig. 2; thus by moving the shank i longitudinally in its seat, the governor is caused to exert a more accurate and desirable elastic control of the vane than can be accomplished by lengthening and shortening the chain f, at the free end of said governor. This governor is not shown in Fig. 1, but its position in relation to the head E and vane F will be readily understood, the curved seat, t, being of course attached to the vane in the rear of the hinge, L, of said vane, and the chain f being attached to the head E, as stated.

At J is shown the end of a chain attached to the vane, F, the rest of said chain not being here shown, said chain being employed to swing the vane around when desiring to throw the wheel out of the wind, as in prior constructions.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a wind mill, the combination of a crank having the axes, and internal gear attached to the forward one of said axes, a wheel-shaft on a line with the crank axes and provided with a pinion within said internal gear, and an intermediate pinion meshing with the wheel-shaft pinion and the internal gear, said intermediate pinion having a suitable bearing support on the mill head; substantially as set forth.

2. In a wind mill, the combination of a crank having the axes, an internal gear attached to the forward one of said axes, a wheel-

shaft on a line with the crank axes and provided with a pinion within said internal gear, and an intermediate pinion or its described equivalent, locking the wheel-shaft pinion with the internal gear; substantially as set forth.

3. In a wind mill, the combination of a crank having the axes, an internal gear attached to the forward one of said axes, a wheel-shaft on a line with the crank axes and provided with a pinion within said internal gear, and means for locking the wheel-shaft pinion with the internal gear; substantially as set forth.

4. In a wind mill, the combination of a crank having the axes, an internal gear attached to the forward one of said axes; said crank, its axes, wrist pin and the internal gear, all being made integral with each other; a wheel-shaft on a line with the crank axes and provided with a pinion within said internal gear, and an intermediate pinion meshing with the wheel-shaft pinion and the internal gear, said intermediate pinion having a suitable bearing support on the mill head; substantially as set forth.

5. In a wind mill, the combination of a crank having the axes, an internal gear attached to the forward one of said axes, said crank, its axes, wrist pin and the internal gear all being made integral with each other, and a wind wheel-shaft gear connected with said internal gear; substantially as set forth.

6. In a wind mill, the combination of a head and hinged vane of a wind mill, a curved seat attached to said vane, the spring having the curved rear end, adjustably clamped in said seat, and flexible means attaching the free end of said spring to the head of the mill; substantially as set forth.

In testimony to the foregoing we have hereunto subscribed our names in the presence of two witnesses.

MALCOLM B. WILLIAMS.
WM. H. ATHEY.

Witnesses:

GLENN J. BARRETT,
FRANK P. JOHNSTON.