

No. 619,954.

Patented Feb. 21, 1899.

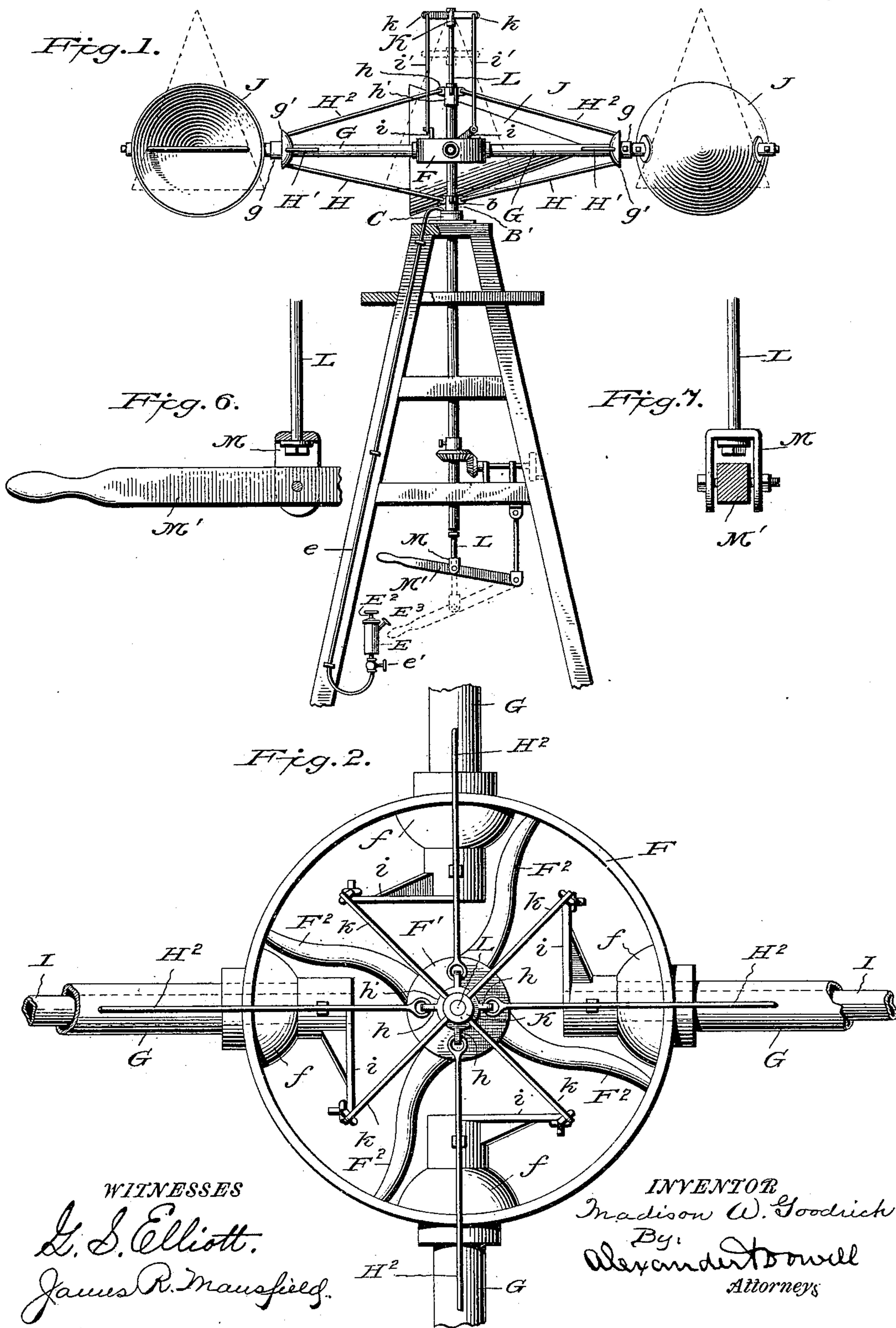
M. W. GOODRICH.

WINDMILL.

(Application filed Sept. 14, 1898.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES
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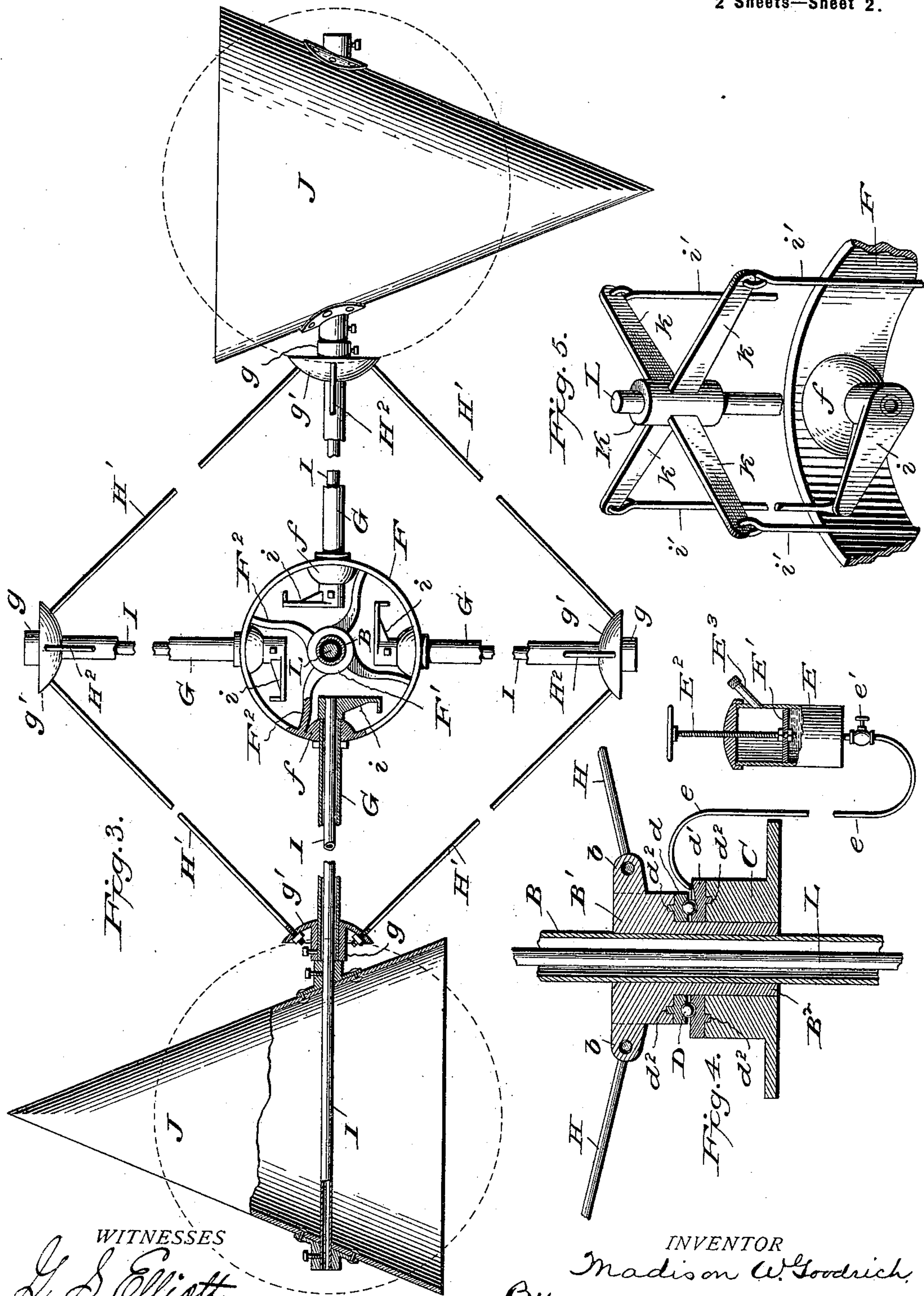
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UNITED STATES PATENT OFFICE.

MADISON W. GOODRICH, OF HARVEY, ILLINOIS.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 619,954, dated February 21, 1899.

Application filed September 14, 1898. Serial No. 690,950. (No model.)

To all whom it may concern:

Be it known that I, MADISON W. GOODRICH, of Harvey, in the county of Cook and State of Illinois, have invented certain new and useful
5 Improvements in Windmills; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

10 This invention is an improvement in windmills of that class using regularly-disposed vanes or cones mounted upon rocking arms by which the vanes can be turned in or out of operative position.

15 The present invention has especial reference to an improved means for supporting the vane-carrying arms and also to improved means for rocking said arms to throw the vanes into or out of operative position and
20 to a novel structure whereby the arms are thoroughly supported and braced.

The accompanying drawings illustrate a preferred form of an apparatus and form part of the present specification, reference being
25 had thereto by letters of reference marked thereon, and the invention will be summarized in the claims following the description.

Figure 1 is an elevation of my improved windmill. Fig. 2 is an enlarged plan view
30 with cones broken away. Fig. 3 is an enlarged plan view, partly in section. Fig. 4 is an enlarged vertical sectional view of the ball-bearing mechanism, showing the connection of the oiler. Fig. 5 is an enlarged detail view of the
35 spider, showing its connection with the cranks for turning the vanes. Figs. 6 and 7 are detail views of the lever connections for throwing the vanes into and out of operation.

Referring to the drawings, A is a mill-tower
40 of any usual or approved construction.

B designates a vertical tubular central shaft supported in the tower by means of a collar B', which is provided with a depending sleeve B², which is journaled in a block C, made fast
45 to the top of the tower. Ball-bearings D are interposed between the meeting faces of the collar B' and block C, an annular grooved plate *d* being attached to the under side of the collar B' and a likewise annular raceway
50 *d'* being fastened to the top of block C, as shown in Fig. 4. The raceways *d d'* are fixed

to the collar B' and block C by lugs or pinions *d*², as shown in Fig. 4. As these bearings support all the moving parts of the mill, the utility of the ball-bearings is obvious, and
55 in order to facilitate the oiling of these bearings I provide the oil-receptacle E, which is provided with the screw-pressed follower E' and is connected to the bottom by a pipe *e*, leading to the ball-bearings, this pipe being
60 provided with a valve *e'*, by which it can be closed. The screw E², controlling the follower, can be operated by hand, and the receptacle E can be filled through a spout E³, as
65 desired, the follower being then raised above the spout. When the valve *e'* is opened and the follower screwed down, oil or other lubricant will be forced through pipe *e* to the ball-bearings, as is obvious.

Secured to the tubular shaft B above the
70 collar B' is an annulus F, having a hub F', fitted to the shaft B and connected to the hub by radial spokes or arms F². This annulus F is provided with equidistant sockets *f*, in which are fitted the inner ends of tubular
75 arms G, said arms radiating in horizontal directions from said annulus and having attached to their outer ends tubular castings *g*, provided with semispherical flanges *g'*, which
80 are perforated for the passage of stay and brace rods by which the arms are held rigidly in position, the collars being connected to lugs
85 *b* on collar B' by radially-disposed brace-rods H. The adjoining collars are connected by transverse tie-rods H', and the collars are connected by upper brace-rods H² to lugs *h* on a
90 collar *h'*, fixed to the upper end of shaft B, as shown. By this construction, it will be observed, the tubular arms G are most strongly braced and are held stiffly in position in re-
95 lation to each other. The employment of the flanged castings *g* enable the stay-rods to be nutted down on both ends, so that they can be drawn taut without the employment of turn-buckles.

100 Journaled in each tubular arm G is a shaft I, which may be preferably tubular for the sake of lightness. The shafts I project through and beyond the arms G, and on their outer ends are supported the vanes J, which are preferably cone-shaped, so that they will catch and retain the wind when their mouths open

toward the wind, but will offer little resistance to their movement against the wind during their rotation.

On the inner ends of shafts I are short
5 cranks i , which are connected by rods i' to
arms k of a spider K, fastened to the vertical
rod L, which depends through and below tube
B. The lower end of rod L passes through a
loop M, pivoted to a lever M', which in turn
10 is pivoted to a rigid support M², attached to
the tower in any convenient position, the
lower end of rod L being headed, as at l , and
the washer l' being interposed between the
head and loop M, so as to allow the rod L to
15 rotate without disturbing or moving the lever
M' by raising or lowering rod L. The spider
K will be raised or lowered, and through its
connections the shafts I will be rocked, so as
to throw the cones J into or out of operative
20 position at the will of the operator.

Power may be transmitted from shaft B to
a pump or other suitable device.

It will be observed from the foregoing that
the entire moving part of the windmill is car-
25 ried on the ball-bearings, that the shafts I,
carrying the cones, are practically journaled
throughout the entire length of the arms G,
that these arms are rigidly supported at both
their inner and outer ends by means of brace
30 and stay rods, and that the mill as an en-
tirety is very simple, strong, and durable in
construction and has proven effective in op-
eration.

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

1. With the framework of a windmill, the
combination of the shaft, the annulus and
spider thereon, the collars above and below
40 the annulus, the tubular arms attached to
and radiating from said annulus, braces con-
necting the outer ends of said arms to the
collars above and below the annulus and the
stays connecting the outer ends of the ad-
45 joining arms; with the shafts journaled in
and projecting from said arms, the vanes or
cones attached to the outer ends of said shafts,
and means for rotating said shafts so as to
throw the cones into and out of operative po-
50 sition, substantially as described.

2. In a windmill, the combination of the
shaft, the annulus and spider thereon, the
collars above and below the annulus, the tu-
bular arms attached to and radiating from
55 said annulus, braces connecting the outer
ends of said arms to the collars above and
below the annulus and the stays connecting
the outer ends of the adjoining arms; with
the shafts journaled in and projecting from
60 said arms, the vanes or cones attached to the

outer ends of said shafts, and means for ro-
tating said shafts so as to throw the cones
into and out of operative position, and crank-
arms on the inner ends of said shafts; with
a vertically-movable spider, rods connecting 65
said spider to said crank-arms, and the rod
for raising and lowering said spider, and a
lever having a swivel connection to the lower
end of said rod, for the purpose and substan-
tially as described. 70

3. In a windmill, the combination of the
tower, the block thereon, the collar journaled
on said block and having a sleeve depending
therethrough and journaled therein, the ver-
75 tical hollow shaft depending through said col-
lar and fastened thereto, the annulus attached
to said shaft above the collar, and the hollow
arms G radiating from said annulus, the
flanged castings g on the outer ends of said
arms, the said rods connecting said flanged 80
castings to the said collar, the said rods con-
necting the adjoining castings to each other,
and the rods connecting said castings to an-
other collar on said hollow shaft above the
annulus, the rock-shafts journaled in said 85
arms, the vanes or cones on the outer ends of
said shafts, and means for rocking said arms,
substantially as described.

4. In a windmill, the combination of the
tower, the block thereon, the collar journaled 90
on said block and having a sleeve depending
therethrough and journaled therein, the ver-
tical hollow shaft depending through said col-
lar and fastened thereto, the annulus attached
to said shaft above the collar, and the hollow 95
arms G radiating from said annulus, the
flanged castings g on the outer ends of said
arms, the said rods connecting said flanged
castings to the said collar, the said rods con-
necting the adjoining castings to each other, 100
and the rods connecting said castings to an-
other collar on said hollow shaft above the an-
nulus, the rock-shafts journaled in said arms,
the vanes or cones on the outer ends of said
shafts, and means for rocking said arms; with 105
the crank-arms on the inner ends of said cone-
shafts, a vertically-movable spider having ra-
diating arms connected to said crank-arms, a
rod for raising and lowering said spider, de-
pending through said hollow shaft, and a lever 110
for raising and lowering said rod, having
swivel connections therewith, for the purpose
and substantially as described.

In testimony that I claim the foregoing as
my own I affix my signature in presence of 115
two witnesses.

MADISON W. GOODRICH.

In presence of—

A. P. SAMUELS,
S. A. HARRIS.