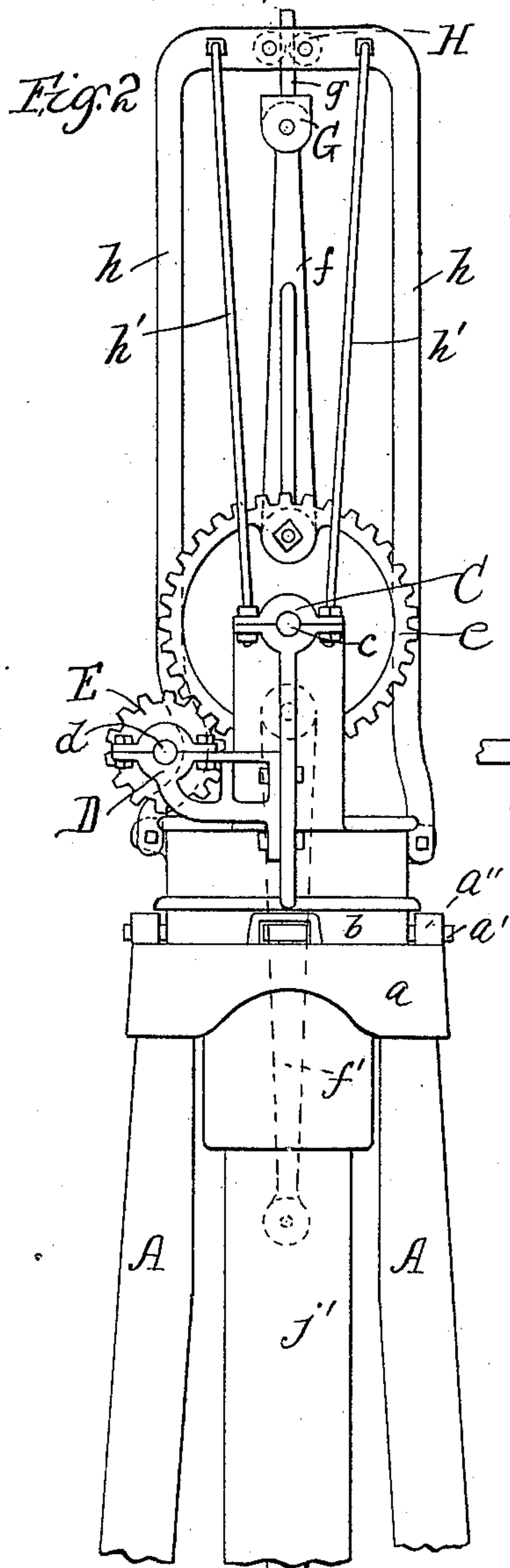


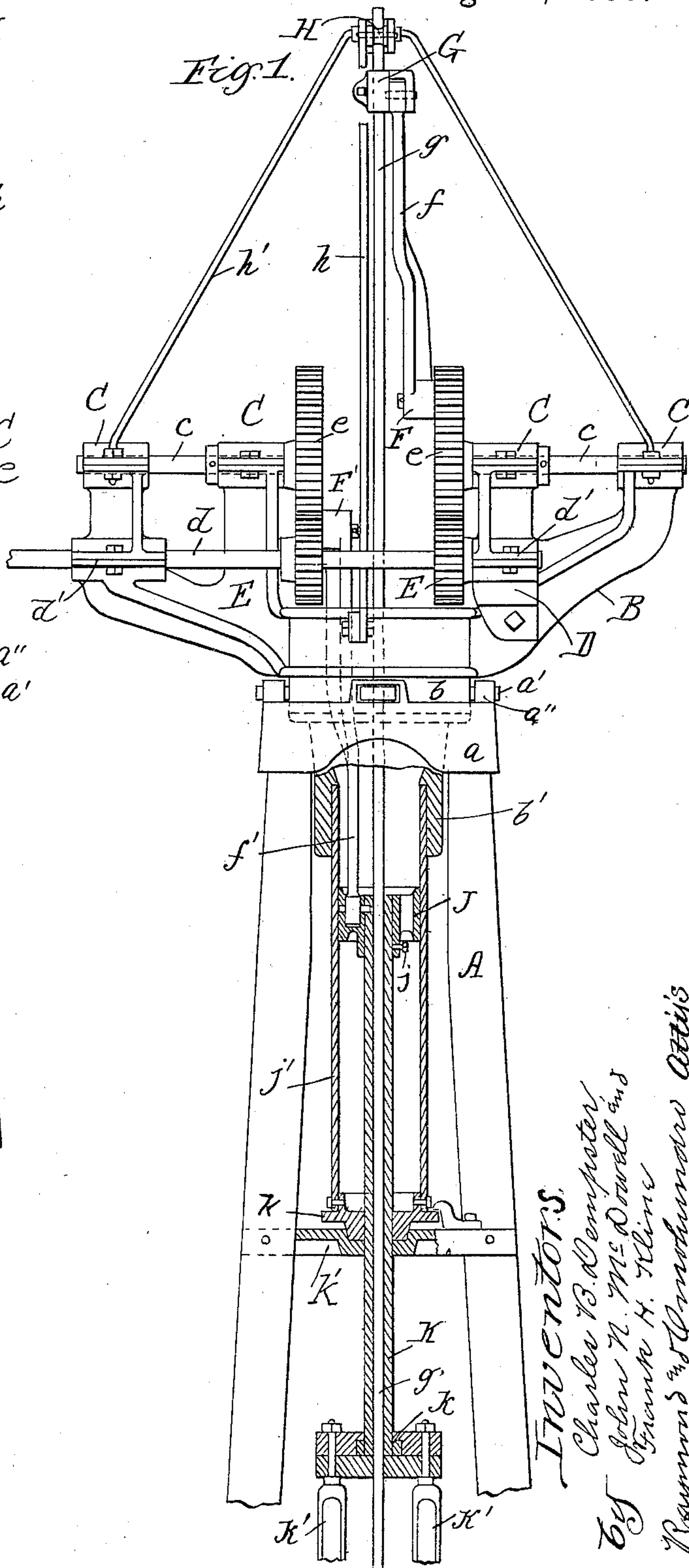
2 Sheets—Sheet 1.

## GEARING FOR WINDMILLS.

Patented Aug. 25, 1896.



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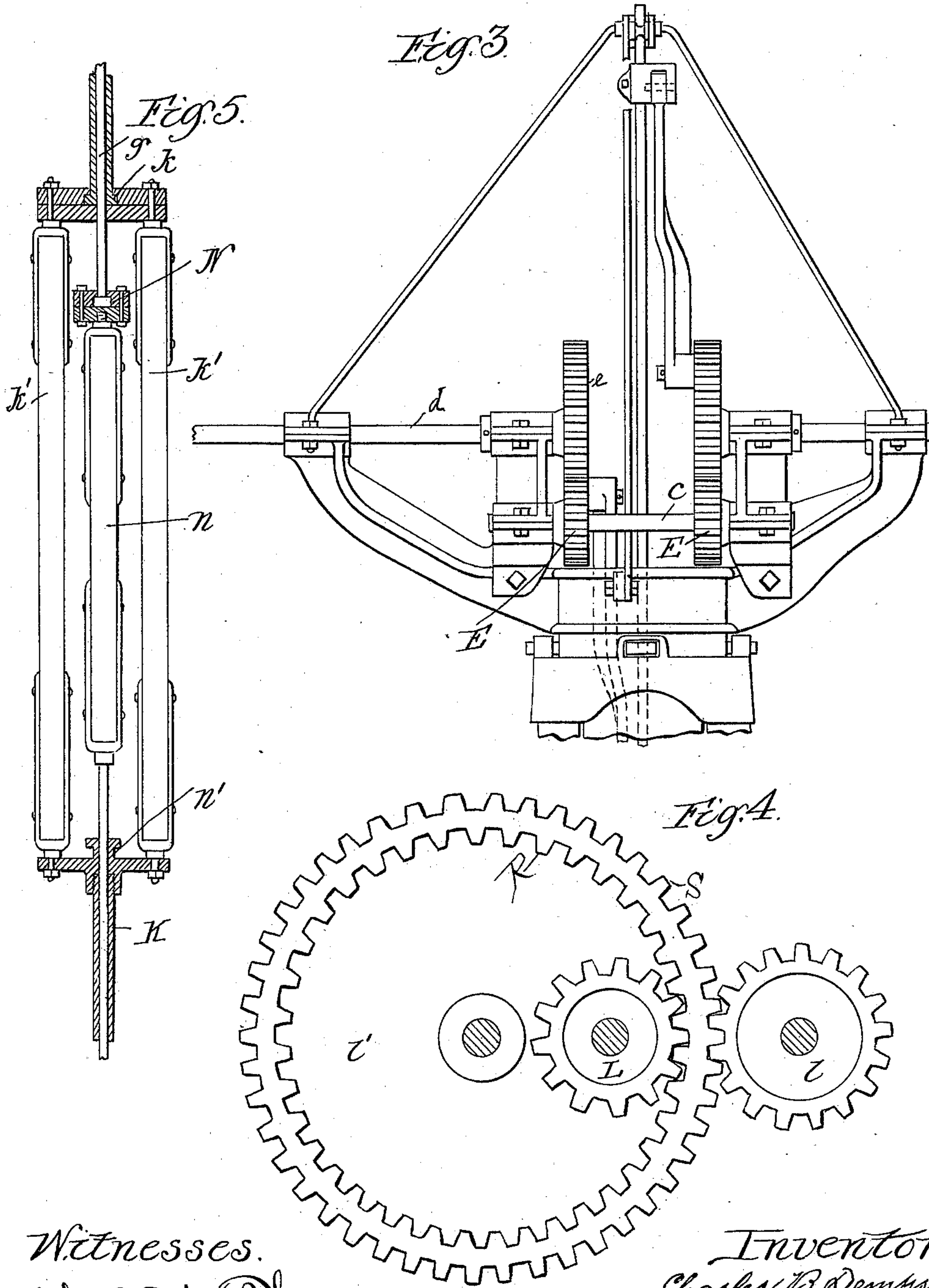
(No Model.)

2 Sheets—Sheet 2.

C. B. DEMPSTER, J. N. McDOWELL & F. H. KLINE.  
GEARING FOR WINDMILLS.

No. 566,380.

Patented Aug. 25, 1896.



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# UNITED STATES PATENT OFFICE.

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## GEARING FOR WINDMILLS.

SPECIFICATION forming part of Letters Patent No. 566,380, dated August 25, 1896.

Application filed January 11, 1896. Serial No. 575,127. (No model.)

*To all whom it may concern:*

Be it known that we, CHARLES B. DEMPSTER, JOHN N. McDOWELL, and FRANK H. KLINE, citizens of the United States, residing at Beatrice, in the county of Gage and State of Nebraska, have invented certain new and useful Improvements in Gearing for Windmills, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

Our invention relates to improvements in windmills, and it may be embodied in a direct-stroke mill as well as a geared-back mill.

An object of the invention is to utilize and control the power derived from the revolution of the wind-wheel in such a way that no power will be lost and so that the entire revolution of the wheel will be active in lifting the liquid being pumped.

A further object is to simplify and improve the general and detail construction of the mill whereby the operation thereof will be greatly facilitated and the capacity increased; and a further object is to provide suitable means for maintaining the reciprocating shafts in their proper position irrespective of the rotatory movement of the mill.

With these and other ends in view our invention consists of the construction and arrangement of devices and the peculiar combination of parts, which will be fully and clearly pointed out and claimed hereinafter.

In the accompanying drawings, Figure 1 is a view, partly in section, of a geared-back mill embodying our invention. Fig. 2 is an end elevation. Fig. 3 is a side view of a direct-stroke mill to which our invention is applied. Fig. 4 illustrates an internal and external gearing, either of which may be employed in connection with our improvements; and Fig. 5 is a sectional view showing the construction and arrangement of the reciprocating shafts.

Referring to the drawings, in which like letters of reference denote corresponding parts in all the figures, A designates the tower or frame on which the mill is supported, and it is surmounted by a suitable cap-piece *a*, which is provided with a series

of antifriction-rollers *a'*, mounted in the sockets *a''*.

The mill-frame B is provided with a circular base *b*, which is arranged to operate upon the cap-piece *a* and revolve freely thereon between the rollers. Beneath the base is a hollow circular extension *b'*, which fits in the upper end of the tower for a purpose hereinafter described. The frame is provided with upwardly-projecting arms having suitable bearings C thereon for the counter-shafts *c*. A supplemental frame D is secured on one side of the mill-frame, and the main shaft *d* is journaled in bearings *d'* in said supplemental frame. The wind or sail wheel is mounted on the outer end of this main shaft, but it is not considered necessary to show said wheel in the drawings, as any kind of wheel may be employed which will answer the purposes of the invention.

The main shaft carries two pinions E, which mesh with and are adapted to actuate the gear-wheels *e*, mounted on the ends of the counter-shafts *c*. The inner opposing surfaces of these gear-wheels *e* constitute face-plates to which the bearings F for the upwardly-extending pitman *f* and the downwardly-extending pitman *f'* are attached. The upwardly-extending pitman *f* is secured loosely to the collar G, which is rigidly fastened to the solid vertical shaft *g*, and as said pitman is operated by the gear-wheel *e* it reciprocates the vertical shaft.

In order to maintain the shaft *g* in its proper vertical position, we provide guide-rollers H, which are mounted in suitable bearings in a vertical frame *h*, and this frame is held rigidly in place by the braces *h'*. As the shaft *g* is raised and lowered, it is guided by the rollers H and prevented from binding in the hollow shaft in which it works below.

The downwardly-extending pitman *f'* is secured loosely to a collar J, rigidly fastened on the hollow shaft K by means of a set-screw *j*. The collar J is arranged snugly within the cylinder *j'*, which is secured in a suitable manner in the hollow extension *b'* of the base *b* and thus forms a guide for the hollow shaft K. This cylinder is provided with a base-plate *k*, which rests upon a bracket *k'* on the



tower. By this arrangement and construction of parts, as the gear-wheels *e* revolve, the bearings *F* will always be in directly opposite points of a circle around the imaginary continuation of the shafts *c*, and therefore the vertical shafts *g* *K*, actuated by the pitmen *ff'*, will be given a reciprocating stroke, whereby one rises as the other descends. The shafts *g* *K* are connected to separate plungers in any well-known form of double-acting pump.

In the construction heretofore described the main power-shaft rotates several times to one revolution of the gear-wheels, but this gearing may be changed and altered as desired. In Fig. 3 we have illustrated our invention as applied to a direct-stroke mill, in which one of the gear-wheels *e* is mounted on the main power-shaft *d*, and motion is communicated from said wheel to the other gear-wheel through the medium of the pinions *E* on the single counter-shaft *c*, and in Fig. 4 we have shown how the invention can be used in connection with an internal back-geared windmill, in which *L* is the driving-pinion, *l* the counter-shaft pinion, and *l'* the face-plate, the said face-plate being provided with an internal gear *R*, which meshes with the driving-pinion *L*, and an external gear *S*, which meshes with the counter-shaft pinion *l*.

In order that the frame may turn on the tower, so that the wind-wheel may adjust itself according to the direction of the wind, we provide swivel-bearings to prevent the vertical shafts from twisting and getting out of order. A swivel-bearing *N* is arranged on the divided solid shaft *g*, and it is connected with the upper end of the lower part of said shaft by a rod *n*. The hollow vertical rod *K* is also divided, and a swivel-bearing *k* on the lower end of the upper part is connected to a cross-head *n'* on the upper end of the lower part of said hollow shaft by the side rods *k'*. By this construction the mill is free to turn in any direction without in any way affecting the lower parts of the divided shaft.

We are aware that changes in the form and proportion of parts and details in the construction of our invention may be made without departing from the spirit or sacrificing the advantages thereof, and we therefore reserve the right to make all such changes which fall within the scope and spirit of the invention.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a windmill, the combination with a main power-shaft, of gear-wheels adapted to be driven by said power-shaft, the inner surfaces of said gear-wheels constituting face-plates, a solid vertical shaft, a pitman connecting said solid shaft with one face-plate, a hollow vertical shaft, a cylinder arranged around said shaft, a collar *J* secured to the upper end of the hollow shaft and fitting snugly in said cylinder, and a pitman con-

necting said collar and the other face-plate, substantially as described.

2. In a windmill, the combination with a main power-shaft, of gear-wheels adapted to be driven by said power-shaft, the inner surfaces of said gear-wheels constituting face-plates, a solid vertical shaft, guides for said shaft, a collar on the shaft, a pitman connecting the collar and one face-plate, a hollow vertical shaft, a cylinder around said shaft, a collar secured on the shaft and operating snugly in said cylinder, and a pitman connecting said collar and the other face-plate, substantially as described.

3. In a windmill, the combination of a frame having a circular base, a downward circular extension on said base, a power-shaft mounted in the frame, gear-wheels adapted to be driven by said power-shaft, the inner surfaces of said gear-wheels constituting face-plates, a vertical shaft, a pitman connecting said shaft and one face-plate, a hollow vertical shaft, a collar on said shaft, a pitman connecting said shaft and the other face-plate and a cylinder secured in the circular extension on the base and forming a guide for said collar and hollow shaft, substantially as described.

4. In a windmill, the combination with a main power-shaft, of gear-wheels adapted to be driven by said power-shaft, the inner surfaces of said gear-wheels constituting face-plates, a solid vertical shaft and a hollow vertical shaft, pitmen connecting said shafts to the face-plates respectively, and a swivel forming a part of each of said shafts, and located intermediate of the ends thereof substantially as described.

5. In a windmill, the combination with a main power-shaft, of gear-wheels adapted to be driven by said power-shaft, the inner surfaces of said gear-wheels constituting face-plates, a solid vertical shaft, a swivel in said shaft, a pitman connecting said shaft and one face-plate, a hollow vertical shaft divided into two parts, a swivel on the lower end of the upper part, a cross-plate on the upper end of the lower part, the side rods connecting said swivel and cross-plate, and a pitman connecting said hollow shaft and the other face-plate, substantially as described.

6. In a windmill, the combination with a main power-shaft, of gear-wheels adapted to be driven by said power-shaft, the inner surfaces of said gear-wheels constituting face-plates, a solid vertical shaft divided into two parts, a swivel on the lower end of the upper part, a rod connecting said swivel and the upper end of the lower part, a hollow vertical shaft divided into two parts, a swivel on the lower end of the upper part, a cross-plate on the upper end of the lower part, the side rods connecting said swivel and cross-plate, and a pitman connecting said hollow shaft and the other face-plate, substantially as described.

7. In a windmill, the combination with a



main power-shaft, of a solid vertical shaft,  
a hollow vertical shaft divided into two parts,  
parallel rods connecting the parts of said  
hollow vertical shaft and arranged on oppo-  
5 site sides of the solid vertical shaft, and  
means for operating said vertical shafts, sub-  
stantially as described.

8. In a windmill, the combination with a  
main power-shaft, of a hollow vertical shaft  
10 divided into two parts, a swivel-bearing on  
the lower end of the upper part, a cross-head  
on the upper end of the lower part, the side  
rods connecting said swivel-bearing and cross-

head, a solid vertical shaft operating in the  
hollow vertical shaft and divided into two 15  
parts, a swivel-bearing on one of said parts  
of the solid shaft, and a rod connecting the  
said swivel-bearing to the end of the other  
part, and means for operating said shafts,  
substantially as described.

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