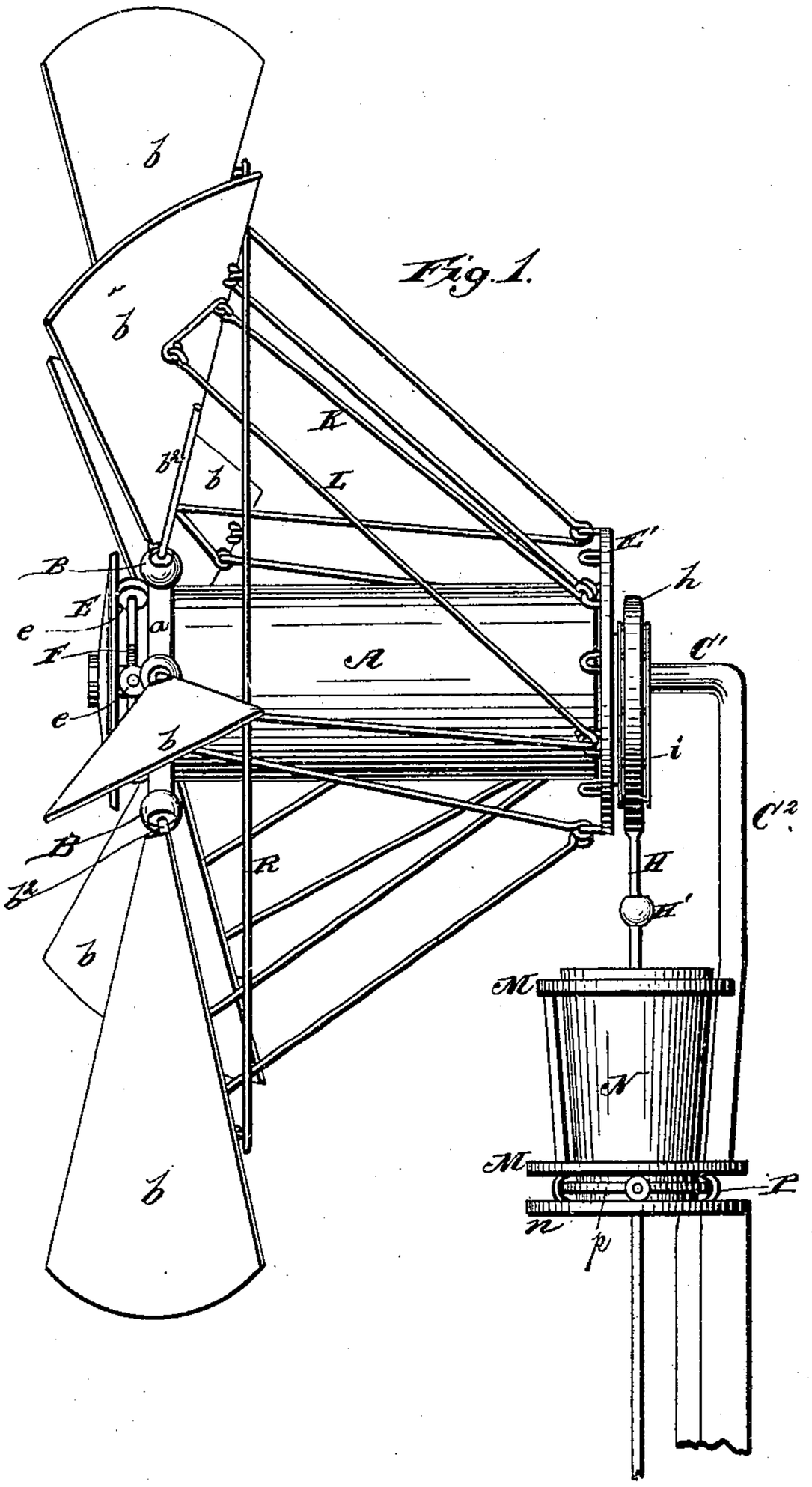
(Model.) 2 Sheets—Sheet 1.

C. F. WILLNER.

WINDMILL.

No. 249,715. Patented Nov. 15, 1881.

Fig. 1.



Witnesses.
Robert Everett.
J. A. Rutherford

Inventor.
Christian F. Willner.
By James L. Norris.
Atty.

(Model.) 2 Sheets—Sheet 2.

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Fig. 2.

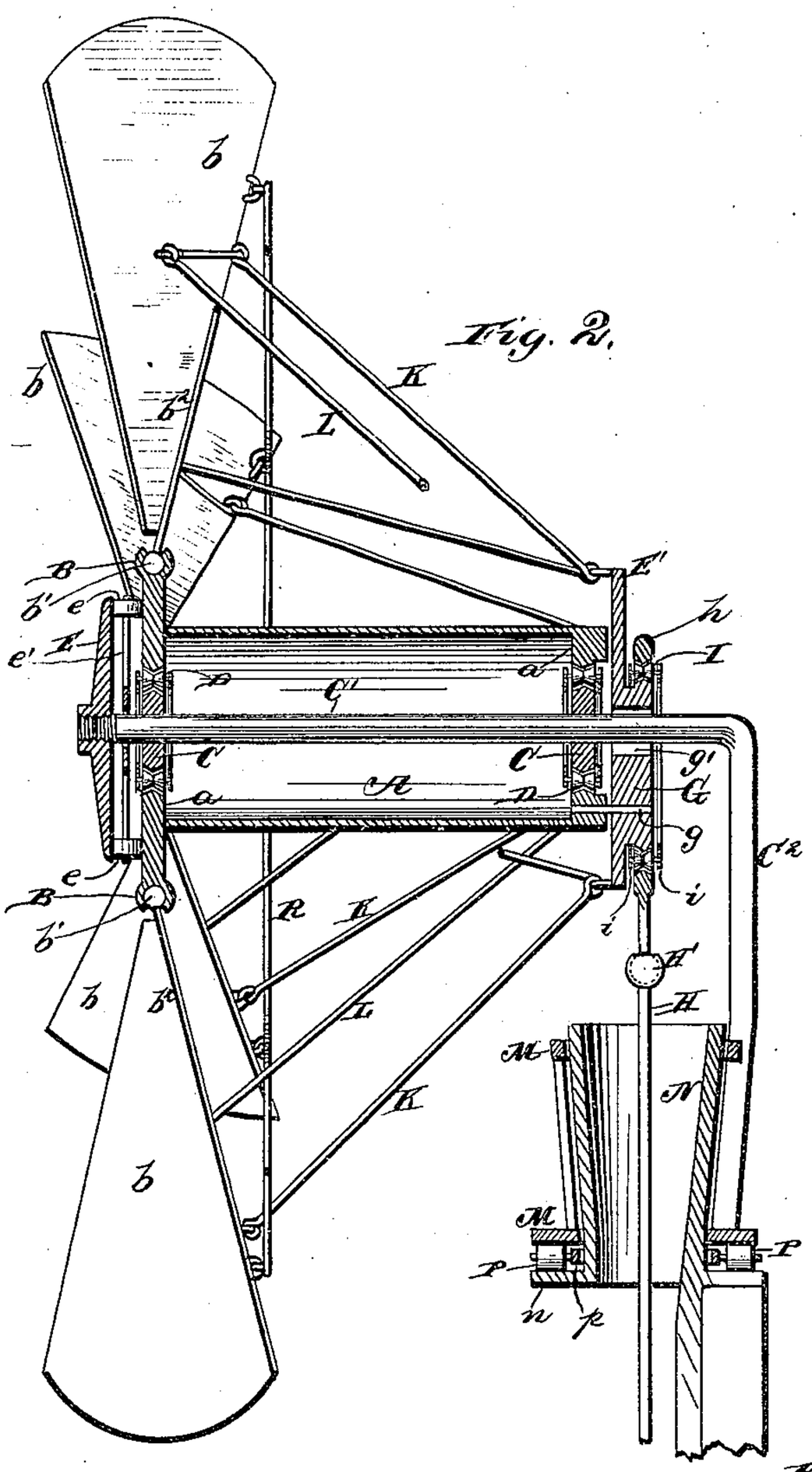


Fig. 4.

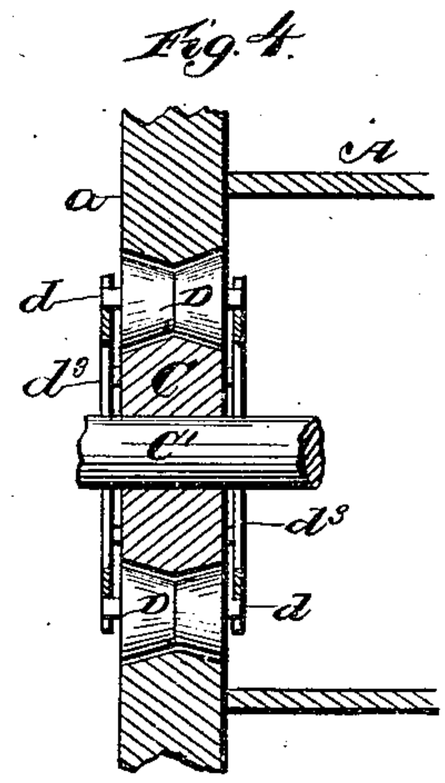


Fig. 3.

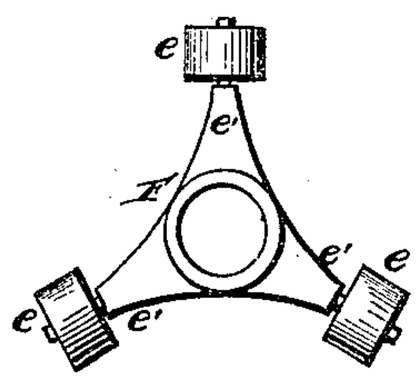
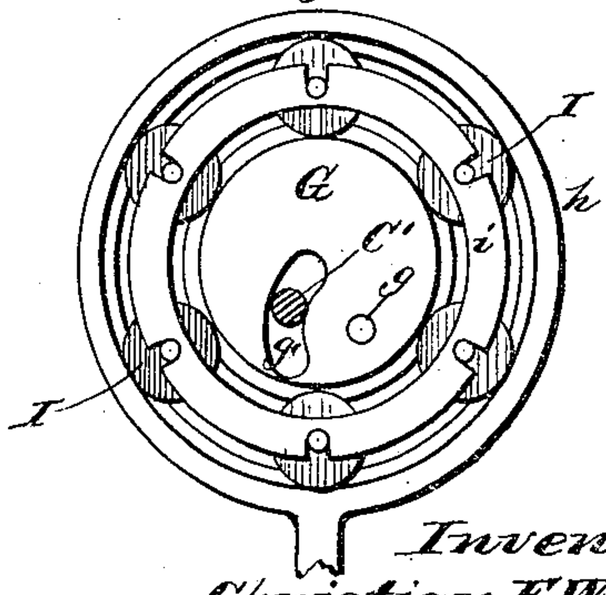


Fig. 5.



Witnesses,
Robert Everett.
J. A. Rutherford

Inventor:
Christian F. Willner.
By James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

CHRISTIAN F. WILLNER, OF GREAT BEND, KANSAS.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 249,715, dated November 15, 1881.

Application filed May 7, 1881. (Model.)

To all whom it may concern:

Be it known that I, CHRISTIAN F. WILLNER, a citizen of the United States, residing at Great Bend, in the county of Barton and State of Kansas, have invented new and useful Improvements in Windmills, of which the following is a specification.

The object of my invention is to provide a windmill in which the length of stroke of the piston will be governed by the velocity of the wind, a heavy wind turning the edges of the vanes to the wind and causing a long stroke, and a moderate wind causing a short stroke of the piston, the fans in this instance being drawn by the piston with their full breadth to the wind.

A further object of my invention is to provide means for obviating, to a great extent, the friction usually incident to the operative parts of a windmill.

These objects I attain by the construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation of a windmill constructed in accordance with my improvement. Fig. 2 is a central longitudinal section taken on a vertical plane. Fig. 3 is an enlarged end view of one of the hubs carrying a series of anti-friction rollers. Fig. 4 is an enlarged sectional view, taken on the same plane as Fig. 2, through one of the annular disks *a*, and the two rings carrying a series of anti-friction rollers, that are arranged between said annular disk and the collar or disk C, that is rigid upon the main shaft. Fig. 5 is an enlarged end view of the annular pitman-head, the eccentric, and the anti-friction rollers arranged between the eccentric and the annular pitman-head.

The wind-wheel comprises a rotary drum, A, provided at each end with an annular disk, *a*, and arranged to revolve around a horizontal supporting-shaft. The annular disk at the outer end of the wheel is formed with a peripheral series of sockets, B, and the several vanes or fans *b b* of the wheel are swiveled upon the said disk by means of balls *b'*, that are secured upon the fan-spindles b^2, and arranged within these sockets, whereby the vanes can turn upon their axes, in order to present more or less surface to the wind.

A disk or annular shoulder, C, is secured to or formed with the shaft C', between the shaft and each one of the annular disks *a*, and between these inner disks, C, and the outer disks, *a*, are arranged the series of anti-friction rollers D, the axles *d* of which are parallel with the central shaft and journaled in the rings d^3, which are arranged to revolve around the main or central shaft in planes at the sides of the disks or shoulders C. These rollers are grooved circumferentially, and the edges of the disks between which they are arranged are formed with double bevels, so as to fit into the grooves of the rollers, whereby the latter will be prevented from shifting endwise during operation.

Upon the outer end of the central shaft is secured a cap-plate, E, between which and the outer face of the disk *a*, at this end of the wheel, are arranged the anti-friction rollers *e e*, the axes of these rollers being formed by the radial arms *e'* of a hub, F, which is arranged to turn upon the central shaft.

G indicates the eccentric, which is eccentrically secured to or formed with a disk, E', that is mounted upon the shaft C' at the inner end of the drum or wheel A, and pivoted upon the latter by a pivot-pin, *g*, that passes into the disk *a* at this end of the wheel. The eccentric is provided with a slot, *g'*, which is likewise formed through the disk E', that is practically a flange of the eccentric, through which slot the shaft passes, whereby the eccentric can be maintained at different degrees of eccentricity with respect to the shaft, in order to vary the length of stroke of the piston-rod H, which is provided with an annular head, *h*, surrounding the eccentric.

In order to support the entire wheel upon anti-friction rollers I provide, in addition to the rollers already described, a series of grooved anti-friction rollers I I, which are arranged between the annular head of the piston and the periphery of the eccentric, the opposing edges of the said annular head and eccentric being formed with double bevels, so as to fit in the grooves of the rollers, and thereby prevent displacement of the same. The axles of these rollers are journaled in the rings *i i*, which are arranged to revolve around the central shaft in a manner similar to the rings d^3.

By the arrangement of rings and anti-friction rollers which I have described, it will be seen that all of the rollers will turn upon their individual axes during the rotation of the

wheel, while at the same time they will be slowly carried round with the rings, so as to revolve around the central shaft.

In order to connect the eccentric with the fans or vanes I pivot the eccentric to the wheel by means of the pivot-pin *g*, in the manner already set forth, and connect the disk E, that is alongside the inner end of the wheel, with the said fans by means of a series of rods arranged obliquely to the axis of the wheel, and in pairs, one pair of rods serving to connect each fan with the said disk. The shorter rods K of these pairs are hinged to the vanes at points on the axes of the latter, and constitute braces, while the longer rods L of said pairs are hinged at points at or about the centers of the fans or vanes, and constitute the operating medium between the fans and the eccentric, which is connected with the wheel in the manner before set forth.

The piston H of the pump or other device to be operated by the wind-wheel is provided with a ball-and-socket joint, H′, so that its upper section can turn as the wheel shifts round with the wind, and in order to provide for such shifting of the wheel I form the central shaft, C′, with a vertical portion, C^2, which is secured to rings or bands M M, arranged to turn around a cylinder, N, through which the piston passes. This cylinder is provided with an annular flange, *n*, at its base, and between the lower one of the rings or bands M and this flange I arrange a series of anti-friction rollers, P P, the axles of which radiate from and are secured to a sleeve, *p*, loosely fitted upon the cylinder, whereby the shaft C^2 will move freely around the cylinder when the wheel is shifted by the wind.

In order to steady the vanes I connect them by means of a series of rods, or by a ring, R, which is hinged to the vanes at points on their axes, whereby while steadying the vanes the said ring will not prevent them from turning.

The velocity of the wind changes the length of stroke of the piston in the windmill constructed as above, a heavy wind causing a long stroke, and a moderate wind a short stroke, of the piston, whereby regularity of action will be obtained and all danger of breakage avoided. In a heavy wind the eccentric will be drawn to one side of the shaft, whereby the eccentricity of the said eccentric with respect to the axis of the wheel will be increased, and hence the stroke of the piston lengthened, the edges of the vanes in such case being presented to the wind. In a lower moderate wind, however, the piston-rod will draw the eccentric back, so as to cause a short stroke of the piston, and turn the full breadth of fans to the wind, thus regulating the operation of the apparatus and avoiding all breakage.

By applying a suitable brake to the piston-rod the same will cause the fans to be drawn with their edges to the wind and cause the mill to stand still.

What I claim is—

1. The combination, with the swiveled vanes in a windmill, of the rotary drum A, the eccentric connected with the vanes by rods, said eccentric being provided with a slot, through which the shaft passes, and being also pivoted to the drum, whereby the vanes in turning upon their axes will adjust the eccentric to different degrees of eccentricity with respect to the axis of the wheel, substantially as described.

2. In a windmill, the rotary drum, the eccentric pivoted to the drum, and the shaft, all supported by anti-friction rollers, substantially as described.

3. The combination, with the rotary drum A in a windmill, of the vanes carried by the said drum, and having balls upon their spindles arranged to turn in sockets, the brace-rods K, connecting the disk E′, on which the eccentric is secured, with the vanes at points on the axes of the latter, the longer rods L, connecting said disk, with which the eccentric is formed, or to which it is secured, with the centers, or thereabout, of the vanes, the eccentric G, pivoted to the drum and provided with a slot, through which the central shaft passes, and the piston having an annular head arranged upon the eccentric, substantially as described.

4. The combination, in a windmill, of the rotary drum A, having the annular disks *a a*, with the grooved anti-friction rollers D, carried by the rings d^3, arranged in pairs, and the disks or collars C on the shaft, at each end of the drum, for supporting the rollers, the adjustable eccentric G, and the annular piston-head, arranged around the eccentric, with a series of anti-friction rollers between the two, substantially as described.

5. The combination, in a windmill, of the horizontal shaft C′, having a vertical portion, C^2, with the cylinder through which the piston-rod passes, formed with a flanged base, the bands secured to the vertical portion of the said shaft and arranged to turn upon the cylinder, and a series of anti-friction rollers arranged between the flange of the cylinder and the lower one of the bands to the shaft, said rollers being carried by radial arms of a hub fitting loosely upon the cylinder, substantially as described.

6. The combination, in a windmill, of the drum A, having the end disks, *a*, with the shaft passing centrally through the drum, a cap-plate secured upon the outer end of the shaft, and the series of anti-friction rollers *e*, mounted upon the radial arms of a hub arranged loosely upon the shaft, said rollers being located between the end of the drum and the cap-plate on the end of the shaft, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHRISTIAN F. WILLNER.

Witnesses:
C. M. SMITH,
CLINTON GOIT.