

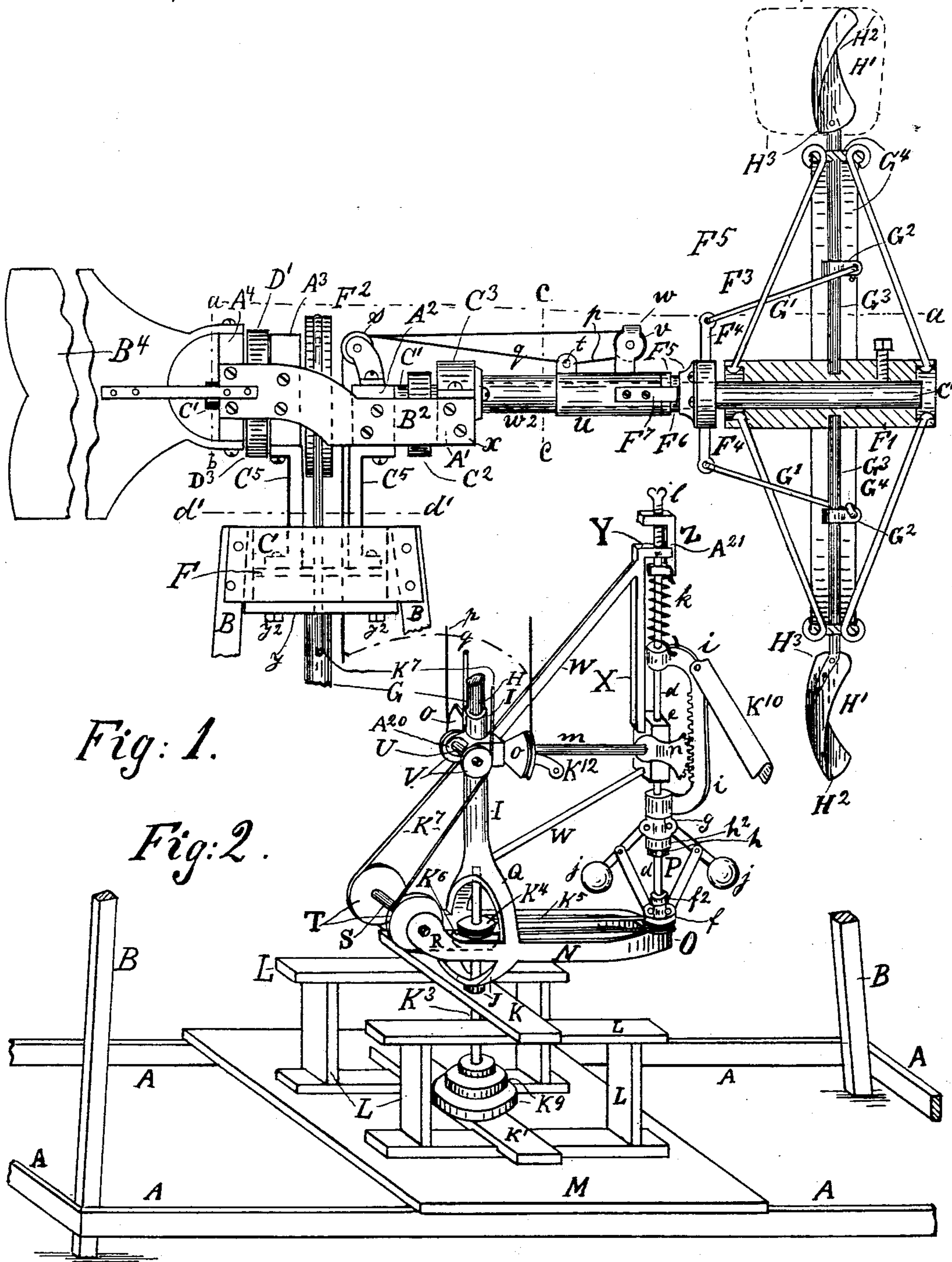
(No Model.)

2 Sheets—Sheet 1.

H. H. VELIE.
WINDMILL.

No. 541,301.

Patented June 18, 1895.



WITNESSES:

F. A. Polka
E. C. Carlson

INVENTOR:
Henry H. Velie.
BY his ATTORNEY:
A. M. Carlson.

(No Model.)

2 Sheets—Sheet 2.

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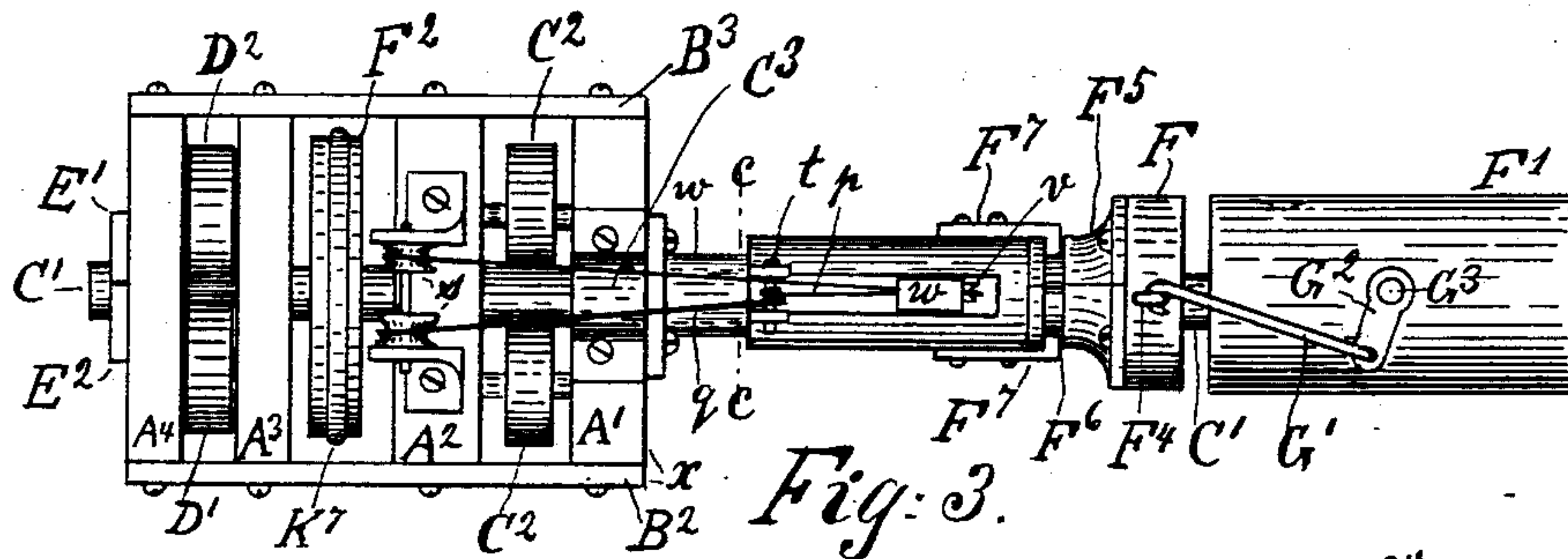


Fig: 3.

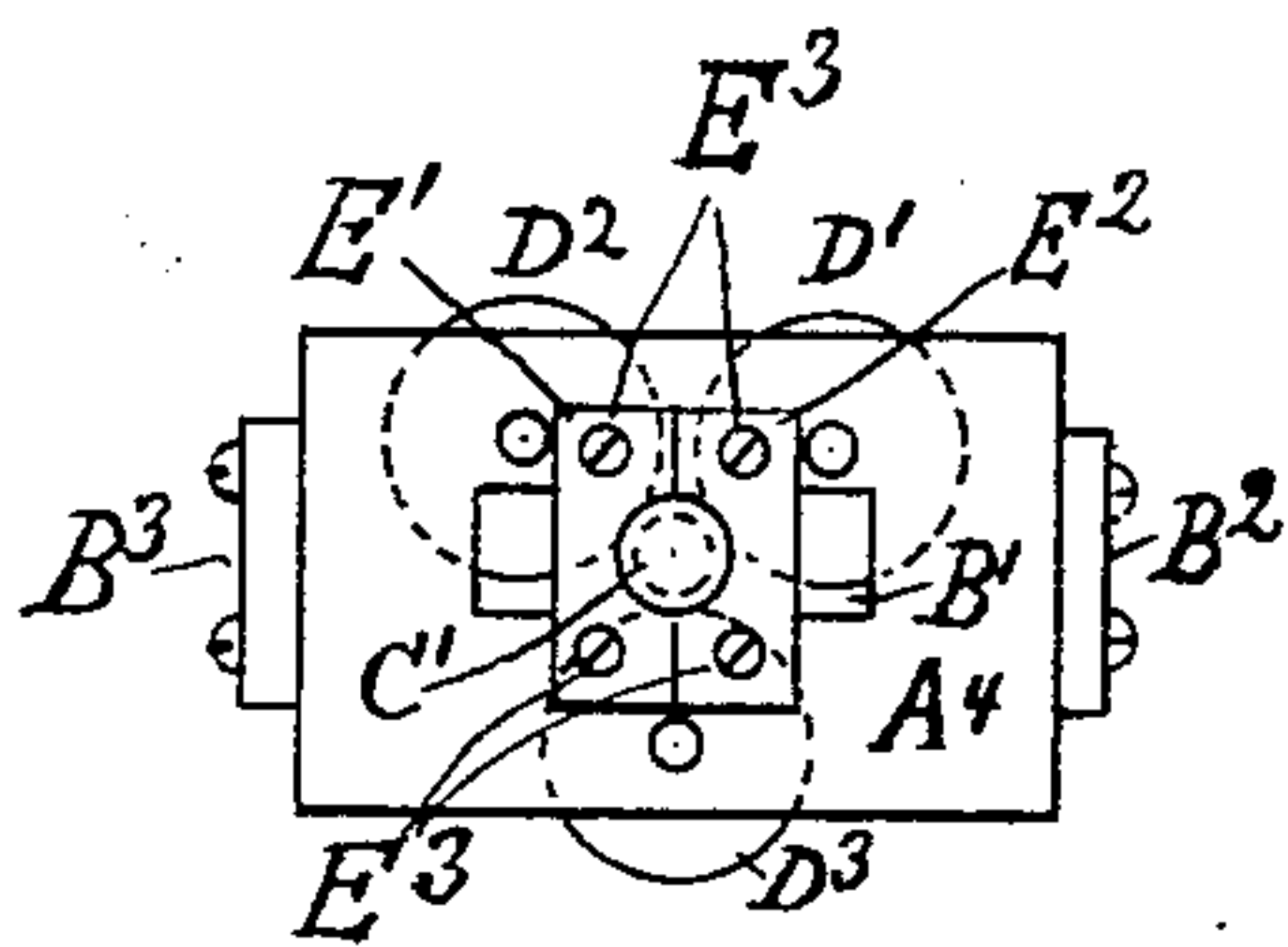


Fig: 4.

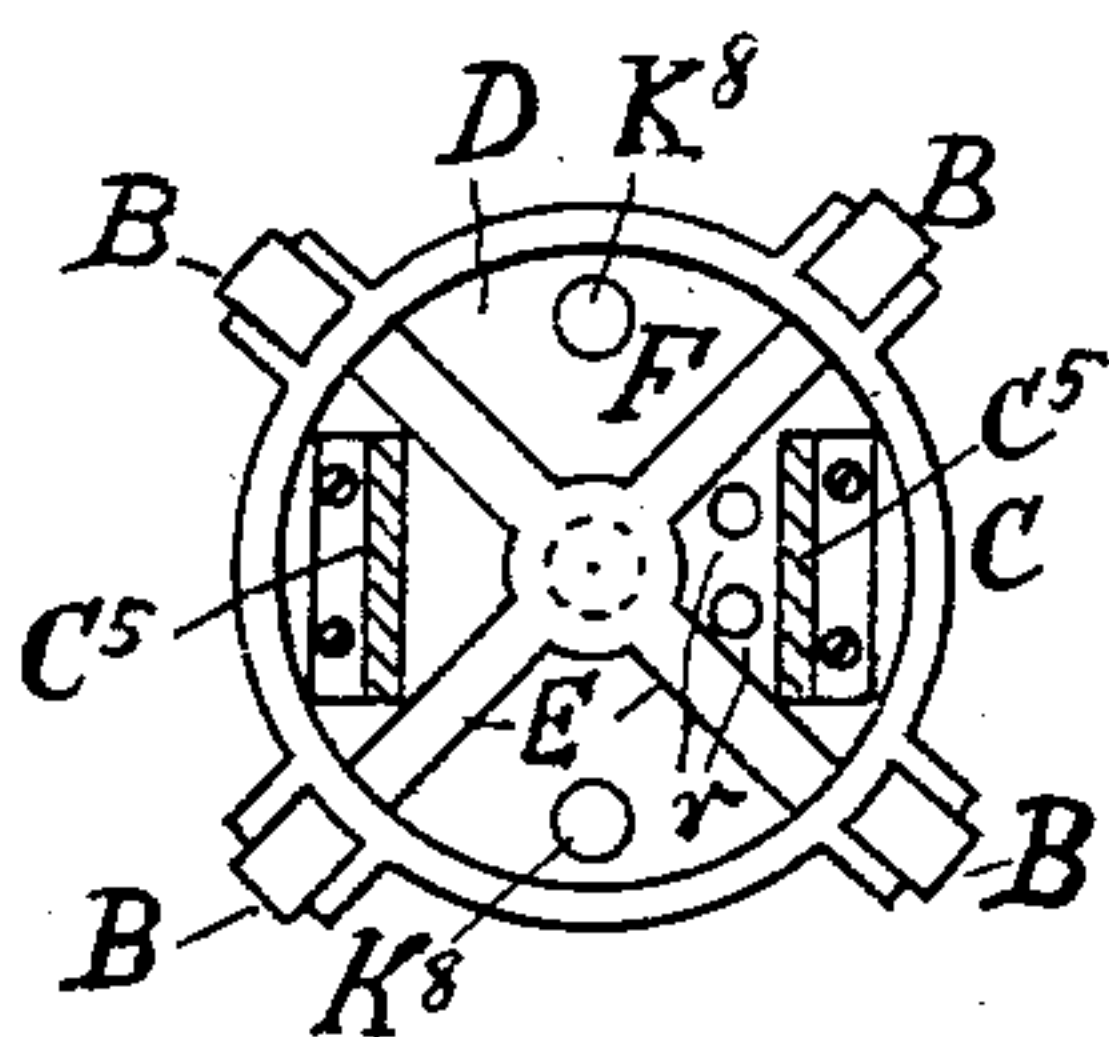


Fig: 6.

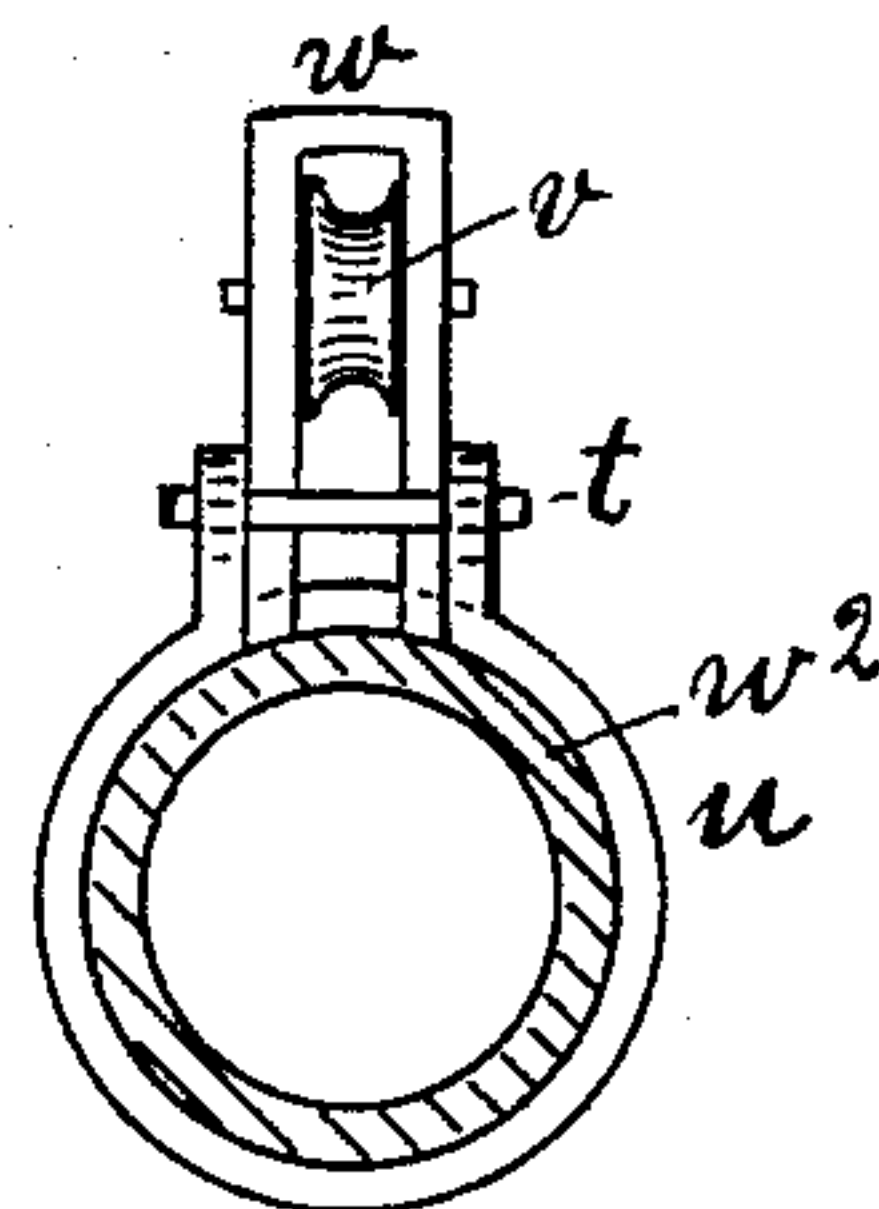


Fig: 5.

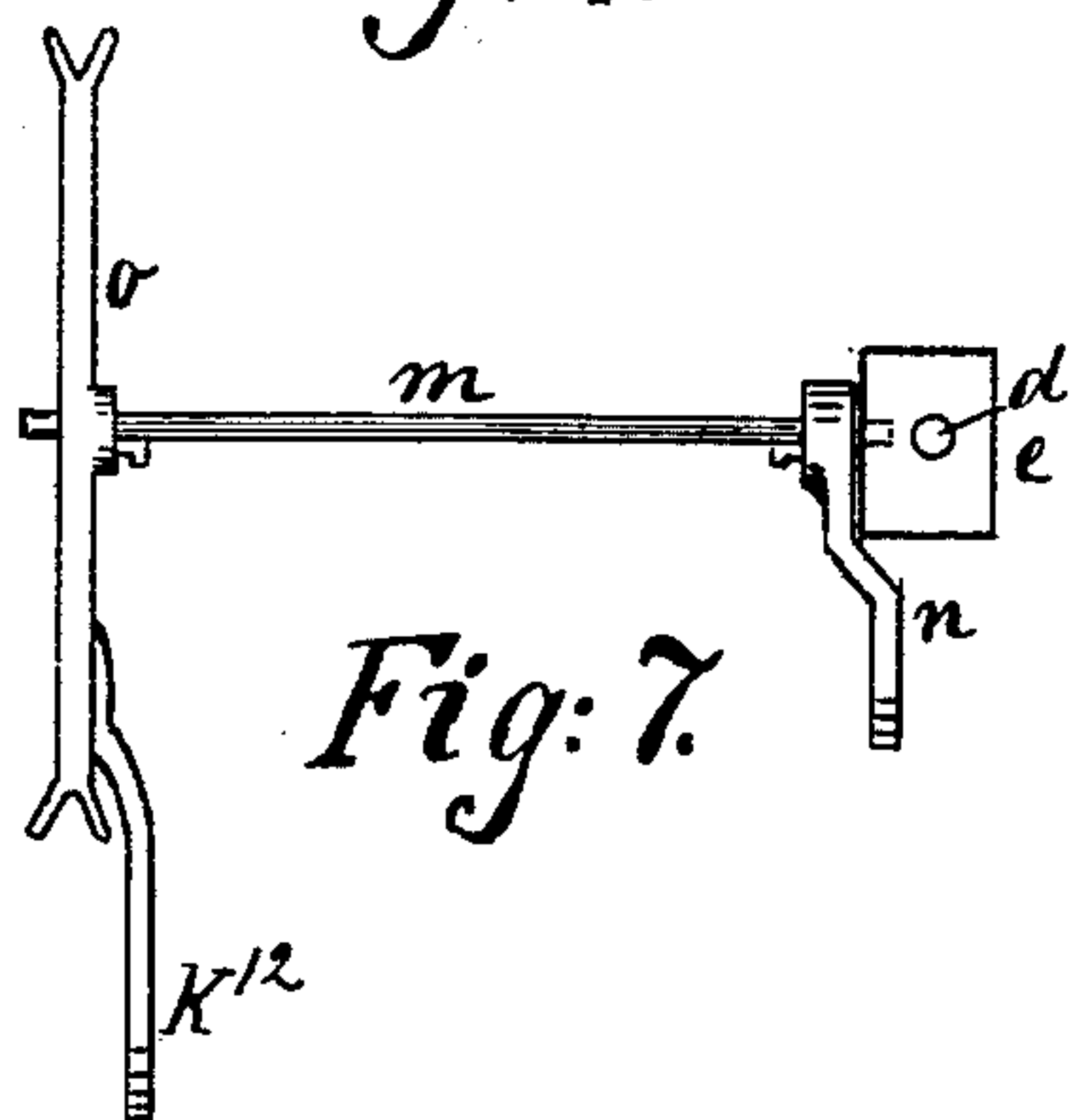


Fig: 7.

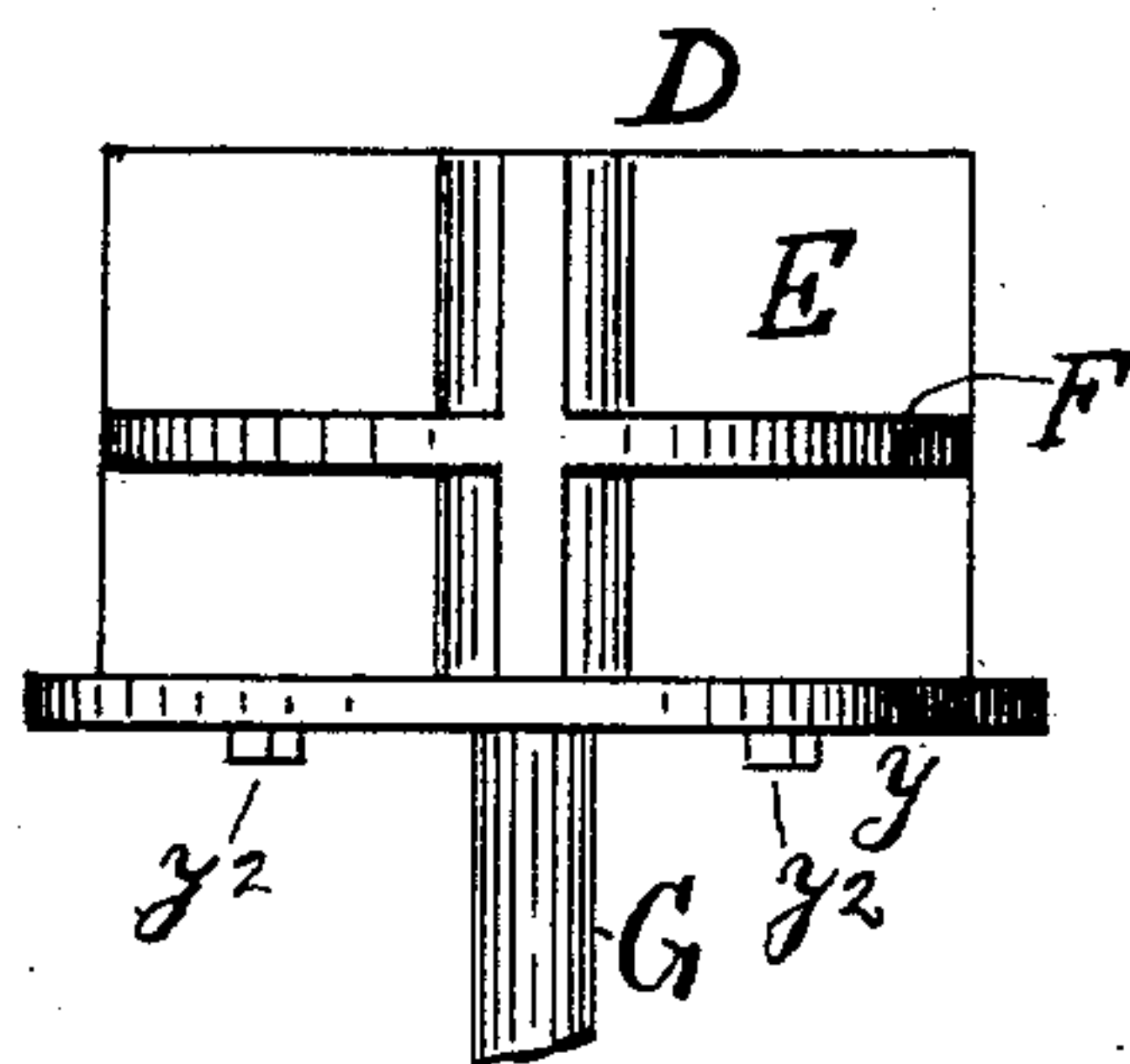


Fig: 8.

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UNITED STATES PATENT OFFICE.

HENRY H. VELIE, OF THORSON, MINNESOTA, ASSIGNOR OF ONE-HALF TO
JOSEPH COOK, OF SAME PLACE.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 541,301, dated June 18, 1895.

Application filed February 13, 1892. Serial No. 421,654. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. VELIE, a citizen of the United States, residing at Thorson, in the county of Pope and State of Minnesota, have invented certain new and useful Improvements in Windmills; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in windmills.

The objects of my invention are, first, to provide a windmill that will utilize the current of the air to a greater extent than in ordinary windmills; second, to provide a windmill with a proper speed governor at or near its base, where it may be readily reached for oiling and regulation; third, to provide a windmill, to the lower part of which may readily be put several beltings in different directions for running several machines at one time; fourth, to provide a windmill that runs with as little friction as possible and whose main wearing parts may be readily replaced by new ones without taking the mill apart or down. I attain these objects by the novel construction and arrangement of parts illustrated in the accompanying drawings, in which—

Figure 1 is a side view of the upper part of the tower and mill with the wind-wheel in central section. Fig. 2 is a perspective view of the lower part of the tower with the speed-governor and other parts mounted therein. The intermediate portion of the tower between Figs. 1 and 2 is cut away. Fig. 3 is an enlarged top plan view of the portion *a a* of the upper part of Fig. 1. Fig. 4 is a rear end view of Fig. 3 or a rear sectional view on the line *a b* of Fig. 1. Fig. 5 is a sectional view on the line *c c* of Fig. 1. Fig. 6 is a sectional top plan view of the top collar of the tower and the casting turning therein, taken as on the line *d' d'* in Fig. 1. Fig. 7 is a detail view of certain parts of Fig. 2. Fig. 8 is a detail side view of the head turning in the top collar of the tower.

Referring to the drawings by letters, A represents the horizontal timbers at the base of the tower. B are uprights secured to the said cross-timbers A with their lower ends, and with their top ends to an open ended cylindrical casting or top collar C, inside of which is loosely placed a revoluble cross-like casting D, which is formed of the four ribs E and a circular disk or web F which being located inside the cylindrical collar C forms a swivel joint for the windmill to revolve on, in adjusting itself to the different directions of the wind. This revoluble head D is secured to and held in its elevated position by a centrally located rod preferably an iron pipe G, of which the lower end H is secured to or in the top portion I, of the metallic frame I, Q, N, J. The bottom portion J, of the said frame forms a revoluble bearing center upon and journal in the plank K, of the frame-work L, mounted on the platform M upon the base timbers A.

The frame N of which I and J are the extreme top and bottom, is formed with two side pieces N, which to the right unite and form the seat O for the ball governor P. From the side pieces N, extend upwardly the two arms Q, Q, which unite at their top and form the frame portion I. Between the upward bent free ends R of the frame N, are mounted on the pin S, two rope pulleys or sheaves T. In the arms A²⁰ of the frame portion I is further secured a pin U, upon the ends of which revolve two other rope sheaves V.

W. W. are braces or arms extending from the frame portion I to the upright bar X which has an overbent top portion Y provided with a notch, A²¹ in which the screw buckle or yoke Z is loosely inserted and guided. The rigid round iron bar *d*, the block *e*, the upright X and the braces W, constitute the frame for the governor P and its connections. The round rod *d* is secured with one end in the frame portion O of the frame N. and with its other or top end in the horizontal portion Y of the standard X. Near the middle of the rod *d* the block *e* is secured upon it. Upon this rigid rod *d* revolve the governor P. and governor pulley *f* which by the collar *f*² is prevented from rising. The upper collar *g* of the governor revolves, not direct upon

the rod *d*. but upon a tubular extension *h*. formed at the lower end of the yoke *i*. where it is retained between the yoke above it and the set screw collar *h*² below it, so that when the governor swings its balls *j*. outward the yoke *i*. is drawn downward on the standard *d*. and when the balls are at rest or hang down the collar *g*. and *h*. will push the yoke upward. Upon the standard *d*. is further placed a coil spring *k*. secured with its lower end to the top end of the yoke *i*. and its upper end to the sliding screw buckle *Z*. in which is screw threaded a thumb screw *l*. the lower end of which bears upon the arm *Y*. so that by turning the thumb screw *l*. the spring *k*. is stretched more or less according to the resistance it is desired to give the governor balls when they try to spread outward.

In the block *e*. a suitable projection upon the frame portion *I*. is journaled the shaft *m*. upon which is fixed the toothed cam *n*. that engages with the teeth at the inner edge of the yoke *i*. whereby the cam is swung up and down and the shaft *m*. is rocked by the action of the governor on the said yoke *i*. At the other end of the rock shaft *m*. is fixed a double cam *o*. (best shown in Fig. 7) from the grooved segmental-shaped ends of which extend two wires or wire ropes *p*. and *q*. up to the top of the tower, where they pass through two apertures *r*. in the web *F*. (see Fig. 6), thence over the rope sheaves *s*. *s*. and are secured one of them direct to the pin *t*. in the sliding sleeve *u*. which by sliding back and forth endwise, tilts the wings of the wheel in more or less powerful position to the wind, as will hereinafter be more fully described. The other rope *p*. passes over a sheave *v*. and returning underneath it is also secured to the pin *t*. The sheave *v*. is mounted in its hood *w*². of the frame or saddle *x*. which is secured upon the top of the swivel head *D*. which is retained from upward movement by a ring or flange *y*. screwed on to its ribs from below by the bolts *y*² and projects out under the lower edges of the head collar *C*. The swivel head *D*. is provided also with an upper flange (not shown) but which covers up the top of the collar *C*. so as to prevent snow from falling into the collar, and with the upward projecting arms *C*⁵, to which the saddle *x* is secured.

The swivel-head *D*. with its top collar or cover (not shown) and its arms *C*⁵ and the frame or saddle *x*. make up what is usually termed the turn-table, and may be formed of one or more pieces or parts. The saddle is further formed with four cross bars *A*¹ *A*² *A*³ *A*⁴ the latter being double or provided with an opening *B*¹, as shown in Fig. 4. These four bars are united by the side bars *B*², and *B*³. The vane *B*⁴ is of usual construction and serves the usual purpose of keeping the wind wheel against the wind. The shaft *C*¹ is journaled in the cross bars *A*¹ and *A*² upon two friction rollers *C*², arranged between said

bars and is kept from upward motion by a cap *C*³. The rear end of said shaft *C*¹ is journaled between the three friction rollers *D*¹ *D*² *D*³ provided between and journaled in the cross bars *A*³ and *A*⁴.

*E*¹ *E*² are two metallic strips secured by bolts *E*³, to the cross-bars or bar *A*⁴. These strips *E*¹ and *E*², are provided with adjoining semicircular notches adapted to encircle a narrow portion of the shaft, formed by an annular groove near the extreme rear end of the shaft. These plates *E*¹ and *E*² inserted in said groove in the shaft keep the latter from longitudinal motion. Upon the front end of the shaft *C*¹ is rigidly secured the wind wheel hub *F*¹ and near the rear end the pulley *F*². The rest of the shaft revolves freely in the above described bearings and in the inner sleeve *w*². The sliding head *F*³ is provided with rigid arms *F*⁴. The latter are, by connecting rods *G*¹ pivotally connected with the rocking arms *G*² secured upon the rock-shafts *G*³ which are journaled in the hub *F*¹ and the ring *G*⁴ of the wheel, and carry at their outer ends the wings or sails *H*¹. which may be of any desired number. The said wings are made in such peculiar shape that the entire wing forms a groove or part of a side of a cylinder with the groove running diagonally from the corner *H*² to the corner *H*³ of the wing. Said shape of the wings serves the twofold purpose of first, gathering the wind toward the center of the wing, thereby causing a greater density of air to press upon the wing. The second purpose is to guide the dead air along the groove from *H*² to *H*³ thereby sending it into the open spaces between the arms or spokes *G*³ of the wheel, where the life current passing through said spaces can carry it away. This is a decided advantage over the ordinary windmills, in which the dead air slides off from the front of one wing to the back of the next wing causing great resistance to the latter's forward motion.

The sliding and revolving head *F*³ is built of three pieces, namely, the main-head in which the arms *F*⁴ are secured, and the portion *F*⁵, bolted thereto as shown and which is split or made in two halves, so that it may be removed and a new one replaced whenever it wears out, without taking other parts of the mill to pieces. This part *F*⁵ of the sliding collar has an annular groove *F*⁶ in which engage the two hooks *F*⁷, which are secured upon the sliding sleeve *u*. that slides on the stationary sleeve *w*². (See Figs. 1, 3 and 5.)

In the planks *K*. and *K*¹ of the bottom frame *L*. *L*. and in the upper junction of the metallic frame portions *Q*. *Q*. is journaled an upright shaft or spindle *K*³, upon which is secured a pulley *K*⁴, for driving the governor by the belt *K*⁵. On said spindle is further secured the pulley *K*⁶ which receives the belt *K*⁷, from the pulley *F*², on the upper shaft *C*¹ which belt is guided over the sheaves *T*. and *V*. and passes through apertures *K*⁸ in the swivel-head *D*. (See Fig. 6.) Finally there

is secured on the spindle K^3 a series of pulleys K^9 , of various sizes, for receiving belts from several working machines that may be placed in different directions around the base of the windmill and driven by the latter.

K^{10} is a grooved strip of metal pivoted at its upper end to the yoke i . When it hangs down in its normal position it forms a guide that prevents the cam n . from slipping sideways out of engagement with the rack at the inner edge of the said yoke i , but when it is desired to disengage the cam from said yoke the guide is swung out of the way as illustrated in the drawings, until the disengagement has taken place.

K^{12} , is an arm or handle projecting from the double rope cam o .

In operation, the wind wheel revolves the shaft C' , and pulley F^2 , which by means of the rope or chain K^7 revolves the spindle K^3 , and all its pulleys. The governor being run by the belt K^5 , acts on the yoke i , cam n . shaft m . and cams o . Ropes p . and q ., move the sleeve u . and sliding head F^3 more and more toward the tower, the more speed the governor gets. This causes the arms F^4 , rods G' , arms G^2 , and rock-shafts G^3 , to tilt the wings more and more edgewise against the wind, thereby diminishing the speed of the wind wheel. When it is desired to obtain extra high speed of the mill, the thumb screw l . is turned so as to stretch the spring k . and thus resist the action of the governor. Again, if it is desired to obtain extra great or extra small power, the position of the wings to the wind may be changed by swinging away the guide K^{10} , swing the yoke i . out of engagement with the cam n ., set the latter a few teeth up or down in the yoke and swing the guide strip K^{10} , into place again.

If it is desired to stop the mill for a shorter or longer time, the operator disengages the yoke i . from the cam n ., takes hold of the handle K^{12} , and by swinging it downward and keeping it there by a weight or other means the wings will stand edgewise to the wind as shown in dotted lines in Fig. 1, (the upper wing.)

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

1. In a wind mill and mounted in a suitable tower, the combination with a wind wheel having a horizontal shaft as C' and a drive pulley as F^2 , secured thereon, the saddle x , carrying said shaft and pulley, and having a downward extending head or journal as D , provided with apertures as K^8 for an endless rope, belt or chain to pass through from the machinery below and over the pulley F^2 ; the cylindrical collar C , secured between the top ends of the uprights of the tower and forming a journal box for the journal D to revolve in; said journal and box being of sufficient diameter to permit the rope, belt or chain from the pulley F^2 , to pass freely down inside the journal and revolve with it; the standard G

H , carrying said saddle, the revoluble frame I Q R N J , substantially of the shape shown, secured to and supporting the standard G H , the stationary frame L , having the plank K , supporting the said revoluble frame, which is journaled in and on said plank a short distance above the ground; the vertical spindle K^3 , journaled in said revoluble frame, centrally below the standard G H , and being provided with the tight pulley K^6 , inside the revoluble frame and a series of tight pulleys as K^9 , below the revoluble frame and its supporting plank, so as to be independent of the revolving of the frame, the endless rope, belt or chain K^7 , driven by the pulley F^2 , and driving the pulley K^6 , and the spindle K^3 , and suitable guiding pulleys or sheaves as T and V , provided upon the revoluble frame for guiding the rope K^7 , substantially as shown and described and for the purpose set forth.

2. In a wind mill, and mounted in a suitable tower and frame work, the combination of the turn-table x , D , having the apertures, r , the central standard G , H , carrying said saddle the revoluble frame I , Q , N , J , secured to the lower end of said standard and having the horizontal arms N , united as at O , a ball governor as P , mounted upon the junction of said arms and having a pulley as f and a belt as K^5 , for receiving motion from the pulley K^4 , the spindle K^3 journaled in the revoluble frame centrally with the standard G , H , the pulley K^4 , secured on the spindle and means for driving said spindle; the standard d , upon which the governor revolves the block e , bar X , and braces W secured to the frame portion, I , and holding the standard d , the toothed yoke i , the toothed cam n , engaging therewith, the double rope cam o , having the controlling arm K^{12} , with a hole in it for attaching a weight, the rock shaft m , connecting said rope cams rigidly with the toothed cam n ; said yoke i , having the guide K^{10} , the pulling coil spring k , and the screw buckle Z , for regulating the tension of said spring, the ropes or wires p , and q , extending from the double ended cam or lever o , which together with the governor is located within the reach of the operator while standing on the ground, up through the apertures r ; the rope guiding sheaves s , mounted upon the saddle x , the stationary sleeve w^2 , secured to the front end of the saddle and embracing the main shaft of the wind wheel, the hood and sheave v , w , secured upon the front end of said stationary sleeve, the sleeve u , sliding upon the stationary sleeve, and having the pin t , and a slot straddling the hood w , and the angularly bent arms or hooks F^7 , the sliding head F^3 , F^5 , having the arms F^4 , and the annular groove F^6 , engaging the hooks F^7 , the rods G' , levers or arms G^2 , secured upon the rock shafts G^3 , and connected as shown with the sliding head F^3 ; said rock shafts forming radial arms in the wind wheel and having their inner ends journaled in the hub and having the sails secured upon their outer ends, the said ropes p , and q , being connected one of

them directly to the pin t , and the other connected thereto after being passed over the sheave v , in the hood w , substantially as shown and described and for the purpose set forth.

5 3. In the sliding head of a wind mill the combination of the solid portion F^3 , with the detachable portion F^5 , bolted to the said solid portion and split in two, longitudinally, so as to be separated from the solid part of the
10 sliding head and removed one-half from each side of the shaft substantially as shown and described.

4. In a wind wheel for wind mills or wind motors, the combination with a horizontal
15 revoluble shaft, a hub as F' , secured thereon, the ring G^4 , concentrically secured to the hub by slanting braces as shown, a series of radially arranged rock-shafts as G^3 , having their

inner ends journaled in the sides of the hub and also being journaled in the ring G^4 , which 20 they extend beyond and have their outer ends provided with rigidly secured sails, said sails being made of a single flat and substantially square piece of sheet metal and slightly grooved at its front side diagonally so as to 25 guide the dead wind from the sail over one of its inner corners toward the center of the wheel, substantially as and for the purpose set forth.

In testimony whereof I affix my signature 30 in presence of two witnesses.

HENRY H. VELIE.

Witnesses:

J. W. SERREY,
M. C. VELIE.