No. 715,985. Patented Dec. 16, 1902.

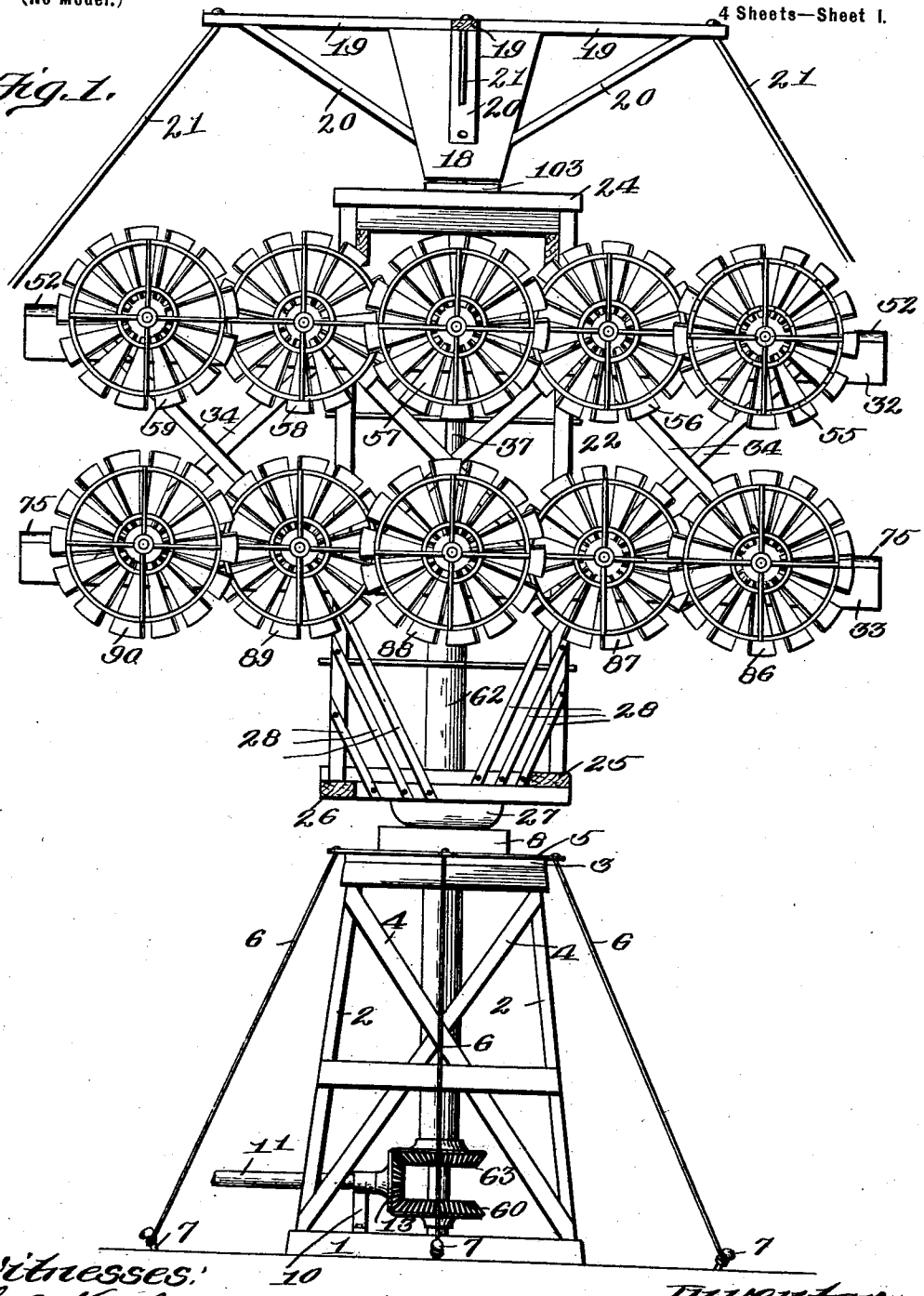
J. M. COCHRAN.

WIND MOTOR.

(Application filed May 14, 1902.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



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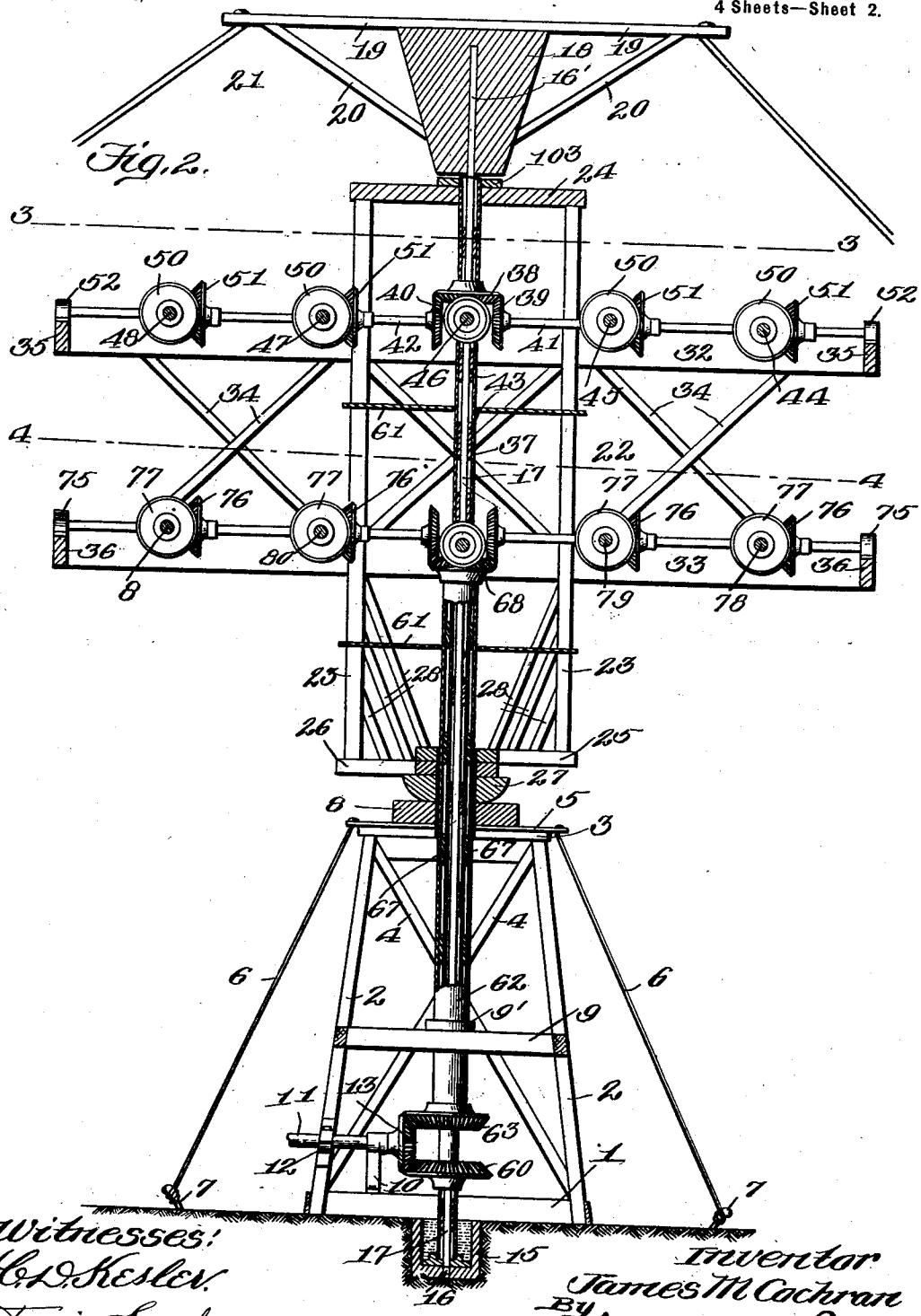
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(No Model.) 4 Sheets—Sheet 2.

Fig. 2.



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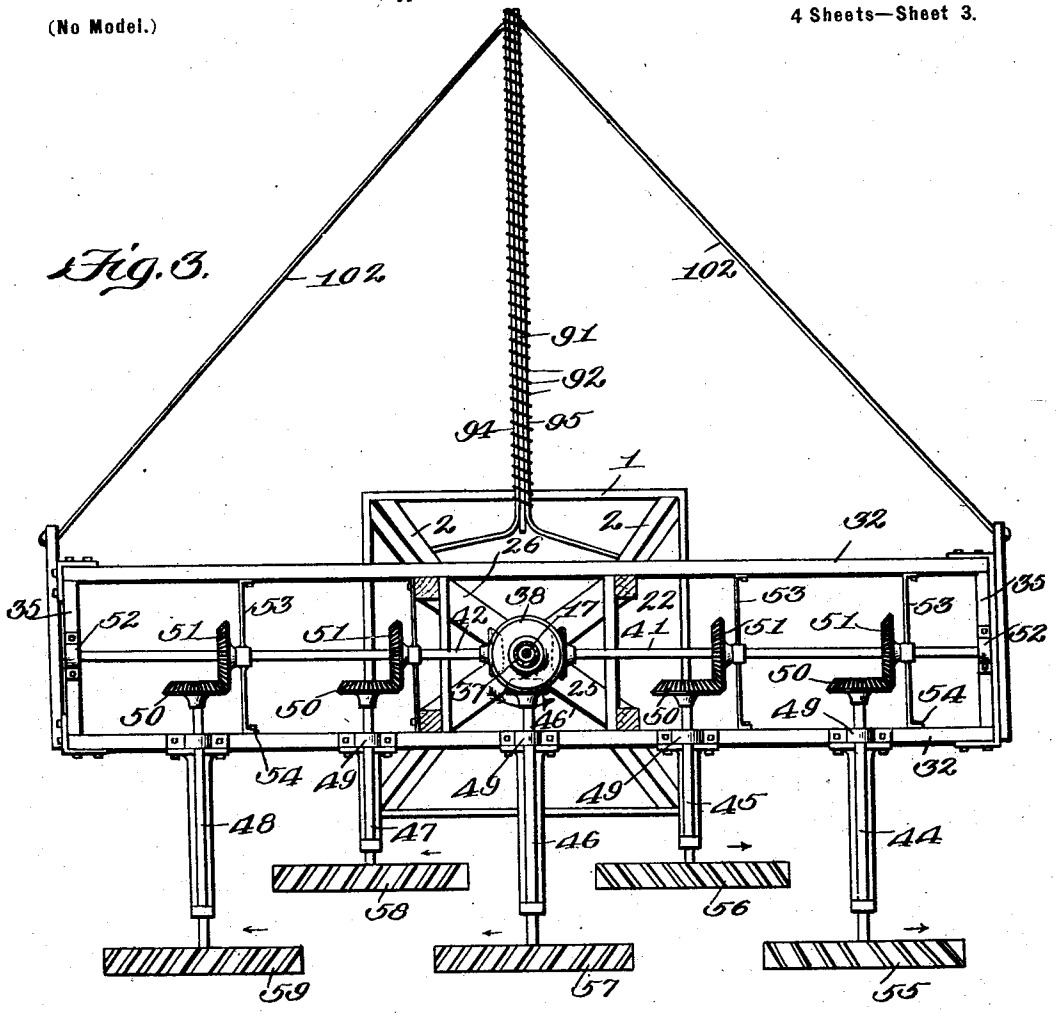
J. M. COCHRAN.

WIND MOTOR.

(Application filed May 14, 1902.)

(No Model.) 4 Sheets—Sheet 3.

Fig. 3.



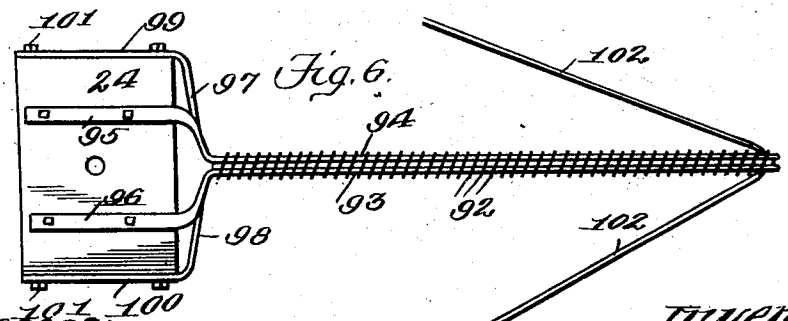


Fig. 6.

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WIND MOTOR.

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(No Model.) 4 Sheets—Sheet 4.

Fig. 4.

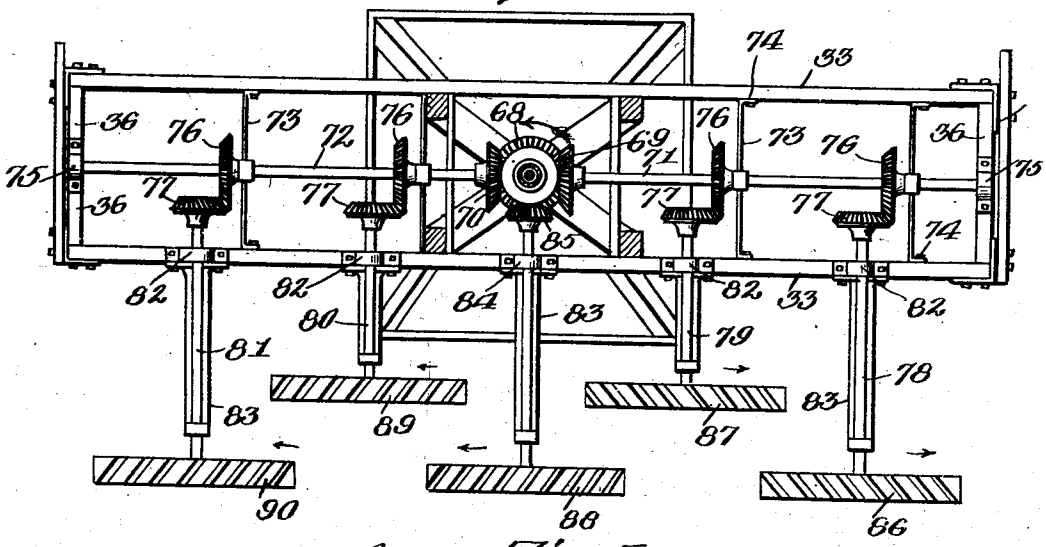
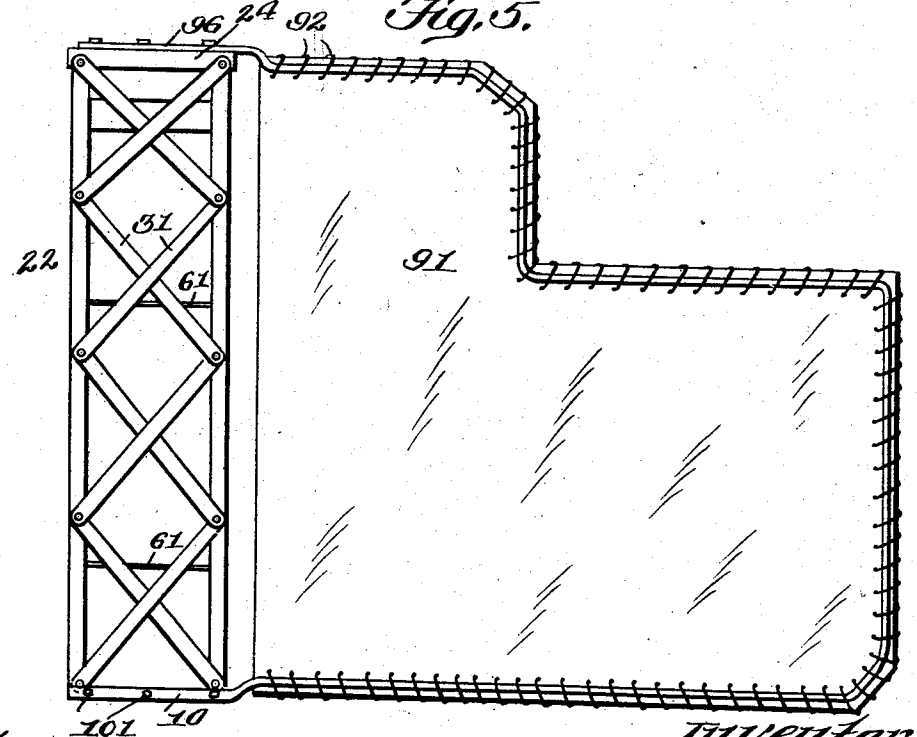


Fig. 5.



Witnesses,
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UNITED STATES PATENT OFFICE.

JAMES M. COCHRAN, OF GOBER, TEXAS.

WIND-MOTOR.

SPECIFICATION forming part of Letters Patent No. 715,985, dated December 16, 1902.

Application filed May 14, 1902. Serial No. 107,305. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. COCHRAN, a citizen of the United States, residing at Gober, in the county of Fannin and State of Texas, have invented new and useful Improvements in Wind-Motors, of which the following is a specification.

This invention relates to certain new and useful improvements in wind-motors; and the object thereof is to provide a new and improved wind-motor which is simple and durable in its construction, very effective and powerful in operation, and constructed in such a manner as to transmit the force of a series of wind-wheels to a common shaft for driving pumps or other machines; and to this end the invention consists of the novel combination and arrangement of parts hereinafter more specifically described, illustrated in the accompanying drawings, and particularly pointed out in the claims hereunto appended.

In describing the invention in detail reference is had to the accompanying drawings, forming a part of this specification, wherein like numerals of reference indicate corresponding parts throughout the several views.

Figure 1 is an elevation of my improved wind-motor. Fig. 2 is a vertical sectional elevation thereof. Fig. 3 is a horizontal section on the line 3 3 of Fig. 2. Fig. 4 is a horizontal section on the line 4 4 of Fig. 2. Fig. 5 is an elevation of the derrick-frame, showing the tailpiece or vane connected thereto. Fig. 6 is a top plan view of the derrick-frame and the tailpiece or vane.

Referring to the drawings by reference-numerals, 1 denotes the base of the supporting-frame, the latter consisting of the said base 1 and the inclined standards 2, preferably four in number (only two shown) and which are connected together at their upper end by the top platform 3. The standards 2 may be connected together and braced by the cross-pieces 4, although any form of brace-rods or cross-pieces may be employed, if desired. Mounted upon the platform 3, as well as being secured thereto, is a plate 5, which projects over the platform and is provided with openings to receive the upper end of the guy-ropes 6. The upper ends of these ropes 6 are secured to the plate 5 in any suitable manner, and the ropes extend to the ground and are secured thereto by means of the pegs 7. By the employment of the guy-ropes 6 the supporting-frame is securely held at all times in an upright position. Mounted upon the plate 5 is a bolster-block 8, the function of which will be hereinafter set forth. Secured between the standards 2 a suitable distance from the base 1 is a support 9, the function of which will be hereinafter set forth. The base 1 and support 9 are each provided with a centrally-arranged opening, the purpose of which will be hereinafter described.

The reference-numeral 10 denotes a bearing-standard for the machine-shaft 11, the latter extending into the supporting-frame in a horizontal manner, supported also in the bearings 12 and provided with a bevel-gear 13, which when motion is imparted thereto rotates the machine-shaft, operating thereby the pump or other suitable machine.

Arranged below the base 1 of the supporting-frame is a receptacle or tank 15, which has its bottom formed with a squared recess to receive the squared lower end 16 of the stationary derrick-rod 17, the latter extending from end to end of the wind-motor and having its upper end squared, as at 16′, and carrying thereon the cap 18, provided with the outwardly-extending arms 19, which are supported by the inclined braces 20, secured in any suitable manner to the cap 18. To the arms 19 are connected the upper end of the guy-ropes 21, while the lower ends of these ropes are secured to the ground in any suitable manner, and these ropes are adapted to retain the upper portion of the wind-motor in an upright position.

The reference-numeral 22 denotes the derrick-frame, which is constructed of four or more vertical standards 23, secured at their upper ends to the top plate 24 and at their lower ends connected to diagonally-extending cross-sills 25 26, arranged one above the other, and which are provided with a centrally-arranged opening, for the purpose hereinafter described. The cross-sill 26 has secured to its lower face a circular bearing 27, which operates upon the bolster 8 and is formed with a centrally-arranged opening registering with he opening of the cross-sill 26.

The reference-numeral 28 denotes a series of vertically-extending inclined brace-rods,

which are connected at their lower ends to the cross-sills 25 and 26 and at their upper ends secured to the standards 23. The sides of the derrick-frame 22 have connected thereto a series of diagonally-extending brace-rods 31, which cross each other at their center, as shown in Fig. 5. These rods impart strength and rigidity to the frame for the reason that they are secured in any suitable manner to the standards 23. The derrick-frame 22 has secured thereto an upper and lower pair of horizontally-extending supporting-rods 32 33. One rod of each pair is secured to the front and the other rod to the rear of the frame. Each pair of rods is connected together as well as braced apart by means of the diagonally-extending stay-rods 34, which are also arranged in pairs. The rods 32 are connected together at their outer ends by means of the cross-pieces 35, and the rods 33 are connected together at their outer ends by means of the cross-rods 36. Each pair of supporting-rods 32 33 is adapted to support the wind-wheels and gearing for operating the power-shaft, to be hereinafter described.

Mounted upon the derrick-rods 17 and extending to the lower edge of the squared upper end of said rod 17 is the inner power-shaft 37, which is preferably constructed of a hollow pipe and carries near its upper end the bevel-gear 38, adapted to mesh with the bevel-gears 39 40, carried on the inner end of the shafts 41 42, respectively. Secured to the derrick-rod 17 is a series of thimbles 43, suitably spaced apart, which form bearings for the inner power-shaft 37.

The reference-numerals 44, 45, 46, 47, and 48 denote a series of spindles which are supported on the rods 32 by means of the bearings 49, and each of the said spindles, with the exception of the spindle 46, carries on its inner end a bevel-gear 50, adapted to mesh with the bevel-gears 51, mounted upon the shafts 41 42. The spindle 46 carries a gear 46′, which meshes directly with the gear 38. The shafts 41 42 are supported at their outer ends by means of the bearings 52, carried by the cross-rod 35, and further supported by the bearing-braces 53, arranged between the rods 32, as well as being secured thereto, as at 54.

The reference-numeral 55 denotes a wind-wheel of any preferred form of construction and which is suitably secured to the spindles 45. The wheel 55 has its blades set at an angle, as shown, so as to rotate the same in the direction of the arrow.

The reference-numeral 56 denotes a wind-wheel arranged and operating in the same manner as the wheel 55.

The reference-numerals 57, 58, and 59 denote wind-wheels which are secured to the spindles 46, 47, and 48, respectively; but the blades of the said wind-wheels are set at a different angle from that, as shown by the wind-wheels 55 56, so as to cause the operation of the gear 38 in connection with the wheels 55 56 in the direction as indicated by the arrow. I have shown five wind-wheels carried by the rods 32, and three of the wheels are arranged in advance of the others; but it is evident that as many wheels can be employed having their blades set at such an angle so that the proper meshing of the gears will be obtained to drive the gear 38 in a direction as indicated by the arrow and revolve the inner power-shaft 37, which carries on its lower end a gear 60, meshing with the gear 13 on the machine power-shaft. By this arrangement half of the power of my improved wind-motor is applied through the medium of the inner power-shaft to the machine-shaft.

The reference-numeral 61 denotes bearing-plates secured within the derrick-frame 22 to prevent the inner power-shaft from wabbling.

The reference-numeral 62 denotes the outer power-shaft, which surrounds a portion of the inner power-shaft 37 and extends partly in the lower portion of the derrick-frame and also extends through the bar 9, as well as being supported by the collar 9′, carried by the outer power-shaft and engaging the said bar. The outer power-shaft carries a gear-wheel 63, adapted to mesh with the gear 13 on the machine-shaft 11. Interposed between the inner and outer power-shafts is a series of bearing-thimbles 67, the latter suitably secured to the inner power-shaft.

The reference-numeral 68 denotes a bevel-gear connected to the upper end of the outer power-shaft 62. The latter is adapted to rotate in an opposite direction to that of the inner shaft 37. The gear 68, which rotates in the direction of the arrow, Fig. 4, is adapted to mesh with the gears 69 70, carried by the shaft 71 72, respectively. The latter are arranged between the rods 32 and are supported by the bearing-braces 73, secured to the inner face of the rods 33, as at 74, and are also supported at their outer ends by the bearings 75, mounted upon the cross-rods 36. The shafts 71 72 carry the bevel-gears 76, which are adapted to mesh with the bevel-gears 77 on the inner ends of the spindles 78, 79, 80, and 81. These spindles are supported in the bearings 82, carried by one of the rods 33.

The reference-numeral 83 denotes a spindle supported in the bearing 84, carried by one of the rods 33, and is provided on its inner end with a gear 85, meshing directly with the gear 68.

The reference-numeral 86 denotes a wind-wheel of any preferred form of construction and is secured to the spindle 78. The wheel 86 has its blade set at an angle, as shown, so as to rotate the same in the direction of the arrow.

The reference-numeral 87 denotes a wind-wheel arranged and operating in the same manner as the wheel 86.

The reference-numerals 88 89 90 denote wind-wheels, which are secured to the spindles 83, 80, and 81, respectively; but the blades thereof are set at a different angle from that

as shown by the wind-wheels 86 87, so as to cause the operation of the gear 68, in connection with the wheels 86 87, in the direction as indicated by the arrow, Fig. 4. I have shown five wheels carried by the rods 33, and three of which are arranged in advance of the other two; but it is evident that as many wheels can be employed with their blades set at such an angle so that the proper meshing of the gears will be obtained to drive the gear 68 in the direction as indicated by the arrow in Fig. 4 and revolve the outer shaft 62 in a direction opposite to that of the inner power-shaft 37 and imparting thereby motion to the machine-shaft 11, in connection with the inner power-shaft. By gearing the lower end of the outer shaft 62 in the manner set forth and although the outer shaft revolves in an opposite direction to that of the inner shaft the machine-shaft will always be rotated in one direction. The outer shaft takes up the other half of the power of the wind-motor and transmits it to the machine-shaft 11, similar to that of the inner power-shaft 37. If desirable, instead of providing the wind-motor with two series of wind-wheels four can be employed; but two of the series should be connected to the inner power-shaft in the manner set forth and two should be connected to the outer power-shaft. This could be obtained by increasing the height of the two shafts and supplying additional gearing. Although such a construction is not shown, it is obvious that the same can be done. If desirable, the bars 32 33 could be dispensed with and one or more wheels employed for each of the power-shafts—that is to say, one or more near the upper end of the derrick-frame for the inner power-shaft and one or more near the lower end of the derrick-frame for the outer power-shaft, the gears upon the spindles carrying the wind-wheels gearing directly with the gears 38 68 of the inner and outer power-shafts, respectively. The wind-wheels are connected to their spindles, so that they are both rotated together.

The reference-numeral 91 denotes a tail-piece or vane which is constructed of any suitable material, preferably sheet metal, and it is connected at its edges by means of the cord or wire 92 to a reinforcing-frame consisting of a pair of rods 93 94 of suitable material bent to conform to the shape of the tail-piece. The upper ends of the rods 93 94 extend upon and are secured to the top plate 24 of the derrick-frame, as at 95 96. The lower ends of the rods 93 94 are bent at an angle, as at 97 98, and then bent to embrace the sides of the derrick-frame 22, as at 99 100, and suitably secured to the derrick-frame by means of the bolts 101. The tail-piece or vane 91 is also braced and secured to the rods 33 by means of the stay-rods 102, connected at their outer ends to the tail-piece 91 and at their inner ends to the said rods. This manner of constructing and securing the tail-piece in position rigidly connects the same to the derrick-frame, so that when the wind strikes the tail-piece the derrick-frame will suitably revolve upon the bearing-piece 27 and around the outer and inner shafts and derrick-rod, owing to the fact that the power-shafts extend through the top of the base-frame, bolster, bearing-piece, and cross-pieces 25 26 of the derrick-frame, while the derrick-rod extends entirely through the frame and has its upper end, which engages in the cap 18, squared to prevent its turning. Arranged between the lower end of the cap and derrick-frame is a suitable washer 103. Suitable lubricating material or water is placed in the tank 15 to prevent the lower end of the inner shaft 37 from becoming heated.

The operation of the device is as follows: The wind revolving the wheels 55, 56, 57, 58, and 69 rotates the spindles 44, 45, 46, 47, and 48, the spindles 44, 45, 47, and 48 transmitting motion by means of the meshing of the gears 50 with the gears 51 on the shafts 41 42, the latter rotating the gears 39 and 40, which meshing with the gear 38 will impart motion to the inner power-shaft 37. The gear 46′ upon the spindle 46 when it is rotated by the wheel 57 will assist in imparting motion to the gear 38 upon the inner power-shaft 37. The latter when rotated will cause the operation of the machine-shaft 11, owing to the meshing of the gear 60, carried by the shaft 37, with the gear 13, carried by the shaft 11. Consequently the power obtained from the upper series of wind-wheels will be transmitted through the medium of the gearing therefor and shaft 37 to the machine-shaft 11. Simultaneously with the operation of the upper series of wind-wheels the lower series thereof will also be revolved by the wind. The operation of this lower series is as follows: The wheels 86, 87, 88, 89, and 90 when revolved by the wind will cause the operation of the spindles 78, 79, 80, 81, and 83, the spindles 78, 79, 80, and 81, transmitting motion by means of the meshing of the gears 77, carried on the end of the spindles, with the gears 76, carried by the shafts 71 72. The rotation of the shafts 71 72 will impart motion to the gears 69 70, which meshing, with the gear 68 upon the outer power-shaft will cause the same to revolve in an opposite direction to that of the inner power-shaft. The wind-wheel 88, revolving the spindle 83, will also assist in imparting motion to the gear 68, owing to the gear 85, carried on the inner end of the spindle 83, meshing with the gear 68. The lower series of wind-wheels are geared to the outer power-shaft 62, so that it will rotate in an opposite direction to that of the inner power-shaft 37. When motion is imparted to the outer power-shaft 62, the gear-wheel 63, carried on the lower end thereof, meshing with the gear 13 upon the main shaft 11, will transmit the power obtained from the lower series of wind-wheels to the machine-shaft, thereby operating the same. The outer power-shaft is geared to the machine-

shaft in such a manner as to cause the same to rotate in the same direction as is given it by the gearing carried by the inner power-shaft. The inner and outer shafts are employed, so as to obtain the power from both sets of wind-wheels, and these shafts are made to revolve in opposite directions, so as to balance the torsion or twist of the power-shafts, so troublesome in all wind-motors. The guy-ropes 6 for the supporting-frame are adapted, as before stated, to retain it in an upright position, and the guy-ropes 21, secured with the cap, are, as before stated, employed to retain the upper portion of the wind-motor in an upright position. The cap is mounted upon the derrick-rod a suitable distance from the derrick-frame, so that it will not interfere in any manner with the operation, or rather the rotating, of the said frame caused by the tailpiece or vane 91. The cross pieces or braces 34 between the rods 22 33 are employed to suitably keep them apart, as well as to prevent the collapsing thereof, and, furthermore, supporting them, as well as the wind-wheels. The derrick-frame is braced in the manner as set forth to withstand the force of the wind, and it is thought the many advantages of my improved wind-motor for obtaining power from a series of wind-wheels and transferring the power to a common shaft for operating pumps or other machines can be readily understood from the foregoing description, taken in connection with the accompanying drawings, and it will be noted that various changes may be made in the details of construction without departing from the general spirit of my invention.

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

1. In a wind-motor, a supporting-frame, a plate secured to the top of said supporting-frame, a rotatable derrick-frame mounted upon said plate, a stationary derrick-rod extending through said frames, a cap mounted upon the said rod, means connected to the derrick-frame for retaining the derrick-rod centrally thereof, a series of guy-ropes connected to said cap for retaining the said rod and derrick-frame in a vertical position, a series of guy-ropes connected with the said plate for retaining the supporting-frame in a vertical position, a power-shaft arranged within the derrick and supporting frame, bearings carried by the said rod for said shaft, and a series of wind-wheels supported by the derrick-frame and connected with said shaft for rotating it when said wheels are operated.

2. In a wind-motor, suitable frames, means for retaining the frames in an upright position, an inner power-shaft arranged in the frames, an outer power-shaft arranged in the frames, bearings carried by the inner shaft for said outer shaft, a rod extending through the inner shaft, bearings carried by said rod for said inner shaft, means carried by one of the frames for rotating one of the said shafts, and means carried by one of the frames for rotating the other of said shafts in an opposite direction to that of the first-mentioned shaft.

3. In a wind-motor, a supporting-frame, a rotatable derrick-frame mounted thereon, a tailpiece connected with said derrick-frame for rotating the same, means for retaining the frames in an upright position, shafts arranged in the said frames, bearings carried by the inner shaft for the said outer shaft, bearings for the inner shaft suitably supported therein, and means carried by the derrick-frame and engaging with the shafts for suitably operating them.

4. In a wind-motor, an inner and an outer power-shaft, bearings carried by the inner shaft for the outer shaft, bearings for the inner shaft suitably supported therein, separate means for operating the said shafts in opposite directions, and means for suitably supporting the said operating means.

5. In a wind-motor, a derrick-frame, means for supporting said frame, an inner and an outer power-shaft arranged in said frame, bearings carried by the inner shaft for the outer shaft, bearings for the inner shaft suitably supported therein, and means for suitably operating the said shafts.

6. In a wind-motor, a derrick-frame, means for suitably supporting said frame, a tailpiece connected to said frame for rotating the same, an inner and an outer power-shaft arranged in the said frame, bearings carried by the inner shaft for the outer shaft, bearings for the inner shaft suitably supported therein, and means carried by the said frame for suitably operating said power-shafts.

7. In a wind-motor, a supporting-frame, a derrick-frame carried thereby, a derrick-rod extending through the said frames, means for securing the derrick-rod in an upright position, an inner power-shaft surrounding said derrick-rod, an outer power-shaft surrounding said inner shaft, bearings interposed between said derrick-rod and said inner shaft, bearings interposed between said inner shaft and said outer shaft, and means carried by the derrick-frame for suitably operating the said shafts.

8. In a wind-motor, a supporting-frame, a derrick-frame carried thereby, a derrick-rod extending through the said frames, means for securing the derrick-rod in an upright position, an inner power-shaft surrounding said derrick-rod, an outer power-shaft surrounding said inner shaft, bearings interposed between said derrick-rod and said inner shaft, bearings interposed between said inner shaft and said outer shaft, means carried by the derrick-frame for suitably operating the said shafts, means carried by the inner shaft for transmitting motion to the machine-shaft, and means carried by the outer shaft for transmitting motion to the machine-shaft.

9. In a wind-motor, a supporting-frame, means for retaining the said frame in an upright position, a derrick-frame suitably mounted upon said supporting-frame, a derrick-rod extending through the said frames, means connected with the derrick-rod for retaining the derrick-frame in an upright position, a pair of shafts arranged in the said frames, means arranged in the derrick-frame to prevent the wabbling of the said shafts, bearings for the said shafts, and means supported by the derrick-frame for suitably operating the said shafts.

10. In a wind-motor, a supporting-frame, means for retaining the said frame in an upright position, a derrick-frame suitably mounted upon said supporting-frame, a derrick-rod extending through the said frames, means connected with the derrick-rod for retaining the derrick-frame in an upright position, a pair of shafts arranged in the said frames, means arranged in the derrick-frame to prevent the wabbling of the said shafts, bearings for the said shafts, a series of wind-wheels carried by the derrick-frame for operating one of the said shafts, a series of wind-wheels carried by the derrick-frame for operating the other of said shafts, and a tailpiece connected to the derrick-frame for rotating the same.

11. In a wind-motor, a supporting-frame, means for retaining the said frame in an upright position, a derrick-frame suitably mounted upon said supporting-frame, a derrick-rod extending through the said frames, means connected with the derrick-rod for retaining the derrick-frame in an upright position, a pair of shafts arranged in the said frame, means arranged in the derrick-frame to prevent the wabbling of the said shafts, bearings for the said shafts, a series of wind-wheels carried by the derrick-frame for operating one of the said shafts, a series of wind-wheels carried by the derrick-frame for operating the other of said shafts, a tailpiece connected to the derrick-frame for rotating the same, and a series of brace-rods for the said derrick-frame.

12. In a wind-motor, a supporting-frame, a derrick-frame suitably mounted thereon, an inner and an outer shaft arranged in the said frame, bearings carried by the inner shaft for the outer shaft, bearings for the inner shaft suitably supported therein, means for retaining the supporting-frame in an upright position, means for retaining the derrick-frame in an upright position, means carried by the derrick-frame for suitably operating the said shafts, a tailpiece, a frame connected to said tailpiece and adapted to be secured to said derrick-frame for retaining the said tailpiece in position, and a pair of stay-rods for the said tailpiece.

13. In a wind-motor, a supporting-frame, a derrick-frame mounted thereon, cross-braces secured to said derrick-frame, wind-wheels supporting-bars secured to the derrick-frame, cross-braces attached to said supporting-bars, an inner and an outer shaft extending through said supporting and derrick frames, wind-wheels carrried by said supporting-bars, means connected with said wheels for suitably operating said shafts, a tailpiece attached to the derrick-frame, means for retaining said derrick-frame in an upright position, means for retaining said supporting-frame in an upright position, bearings for the outer shaft carried by the inner shaft and bearings for the inner shaft suitably supported therein.

14. In a wind-motor, an inner and an outer power-shaft, means for supporting said shafts, bearings carried by the inner shaft for the outer shaft, a rod extending through said inner shaft, bearings carried by the said rod for said inner shaft, and wind-wheels suitably connected with the said shafts for operating them.

15. In a wind-motor, a derrick-frame, a supporting-frame therefor, a hollow power-shaft arranged in said frames, a derrick-rod carrying said shaft and extending through the said frames, and bearings secured to said rod throughout its length for said shaft.

16. In a wind-motor, a derrick-frame, a centrally-arranged derrick-rod extending therethrough, a power-shaft mounted upon the derrick-rod, bearings connected to said rod throughout its length to said shaft, and means adapted to engage with and operate the said power-shaft.

17. In a wind-motor, an outer hollow power-shaft, an inner hollow power-shaft, a centrally-arranged derrick-rod extending through the inner shaft, and means for retaining said shafts and rod in an upright position.

18. In a wind-motor, a derrick-frame, a supporting means for said derrick-frame, an outer hollow power-shaft, an inner hollow power-shaft, a centrally-arranged derrick-rod extending through said inner shaft, and means for retaining said rod, shafts and derrick-frame in an upright position.

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

JAMES M. COCHRAN.

Witnesses:
L. W. JAMES,
T. B. DUKE.