W. SNEE.

FLUID ACTUATED MOTOR.

APPLICATION FILED JULY 28, 1909.

970,404.

Patented Sept. 13, 1910.

2 SHEETS—SHEET 1.

Fig. 1

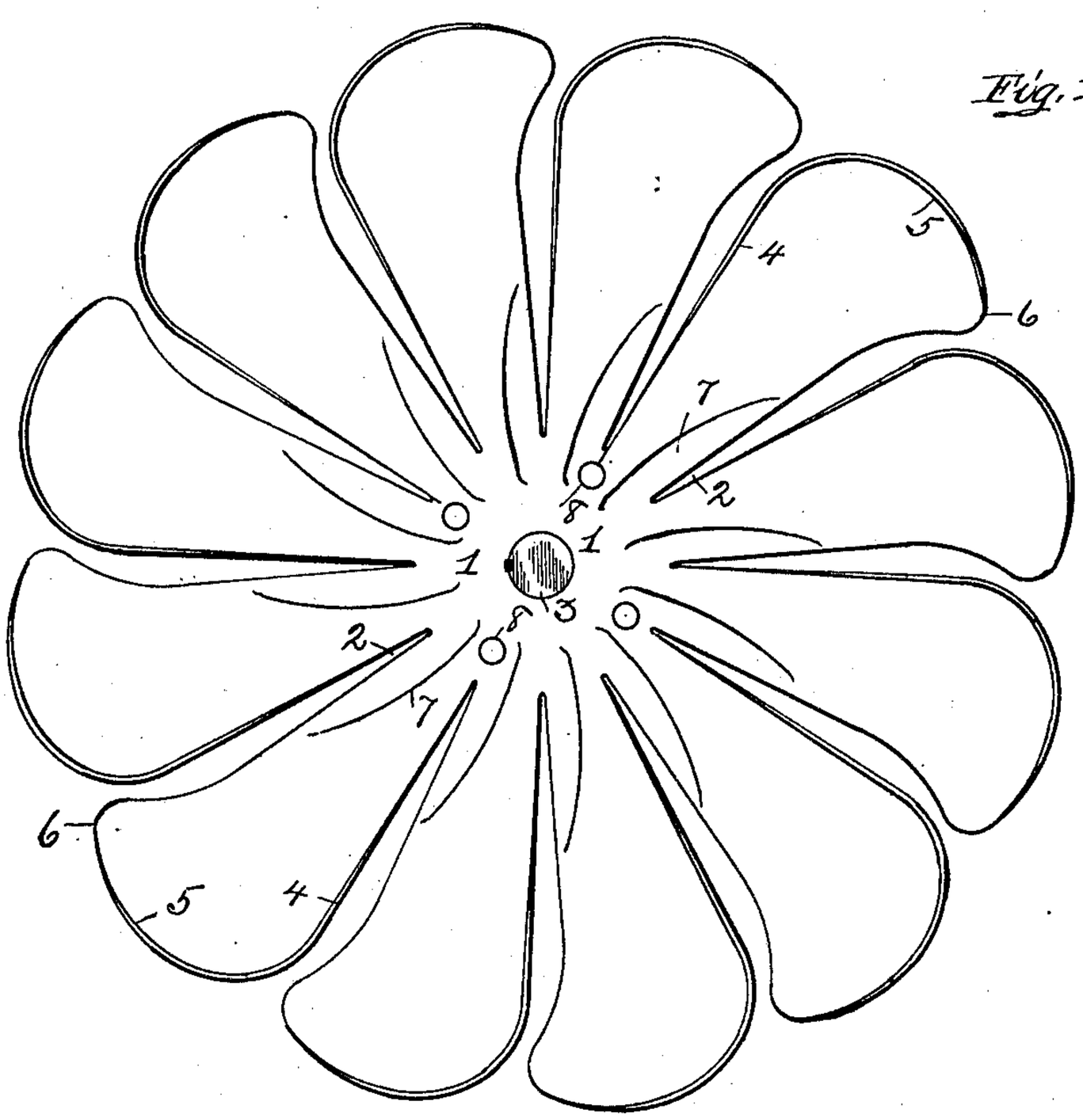
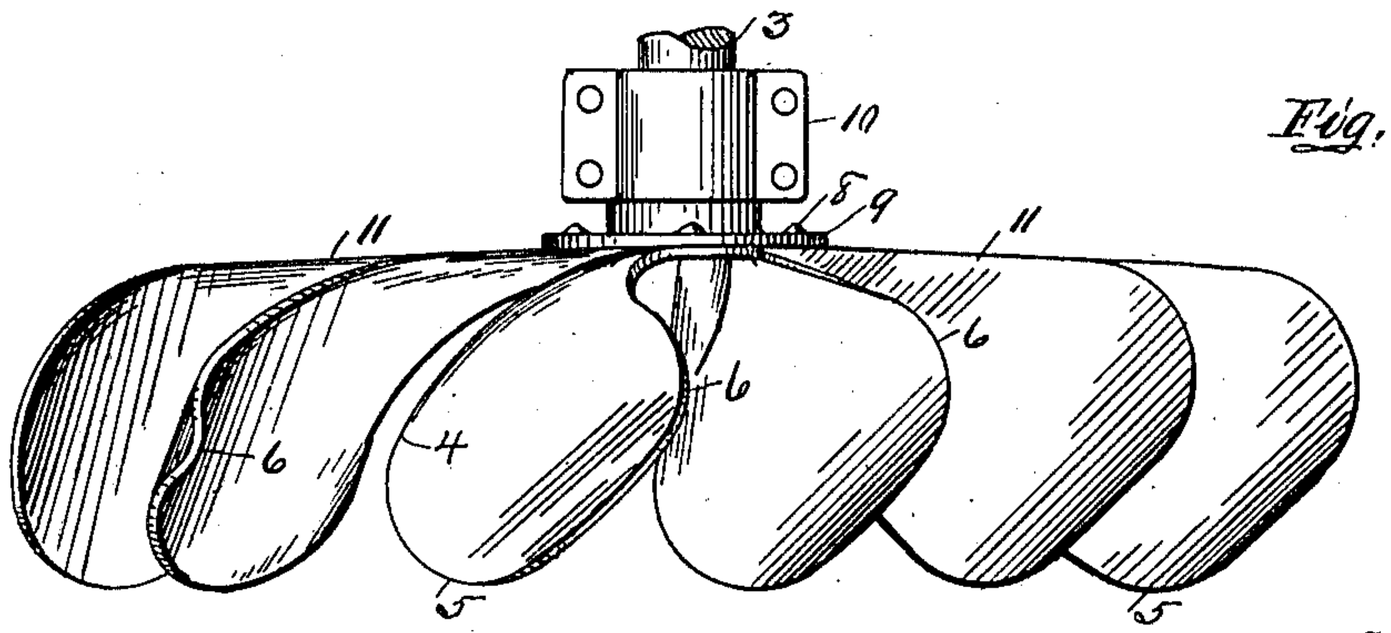


Fig. 2



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2 SHEETS—SHEET 2.

Fig. 4

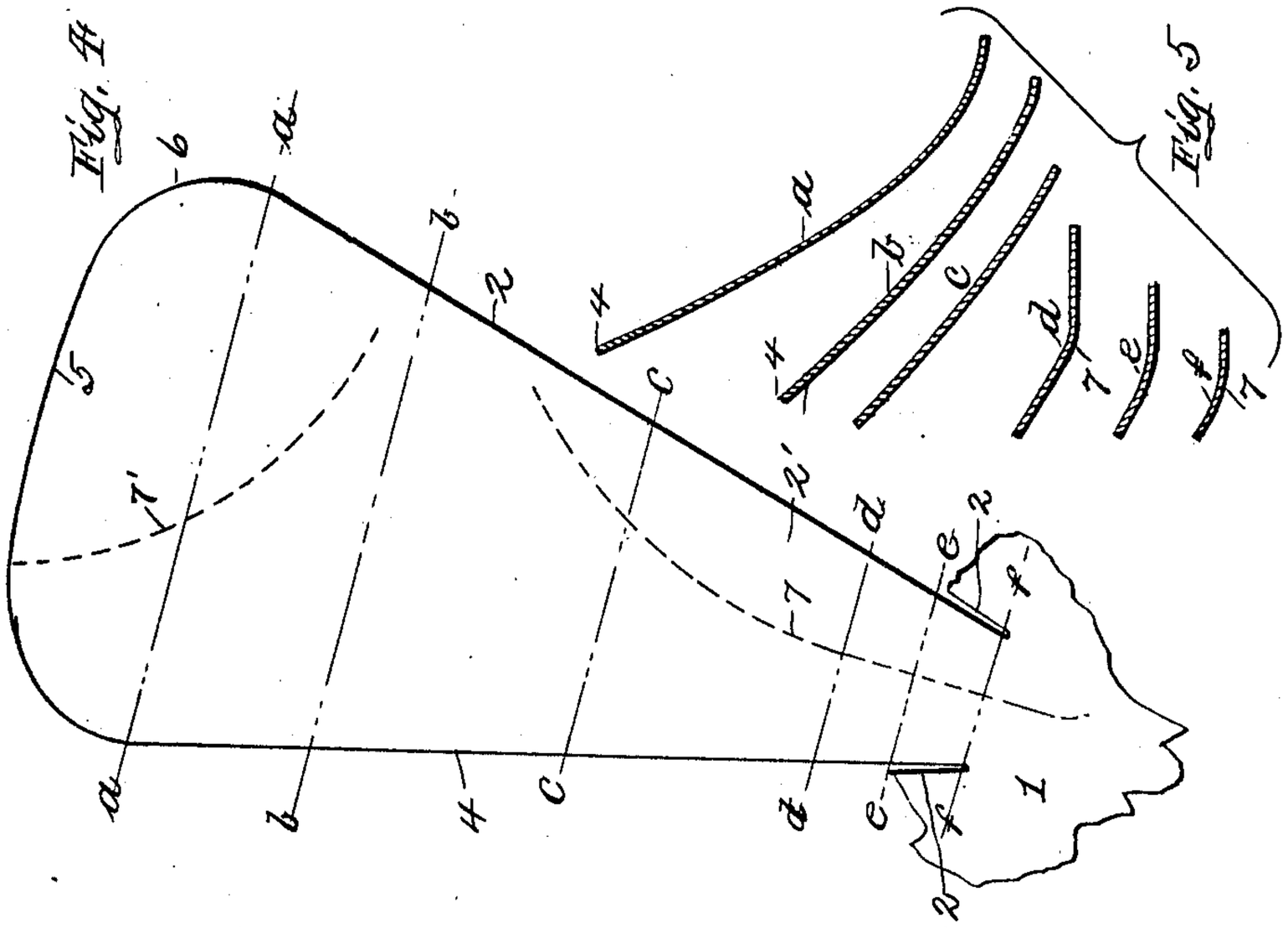
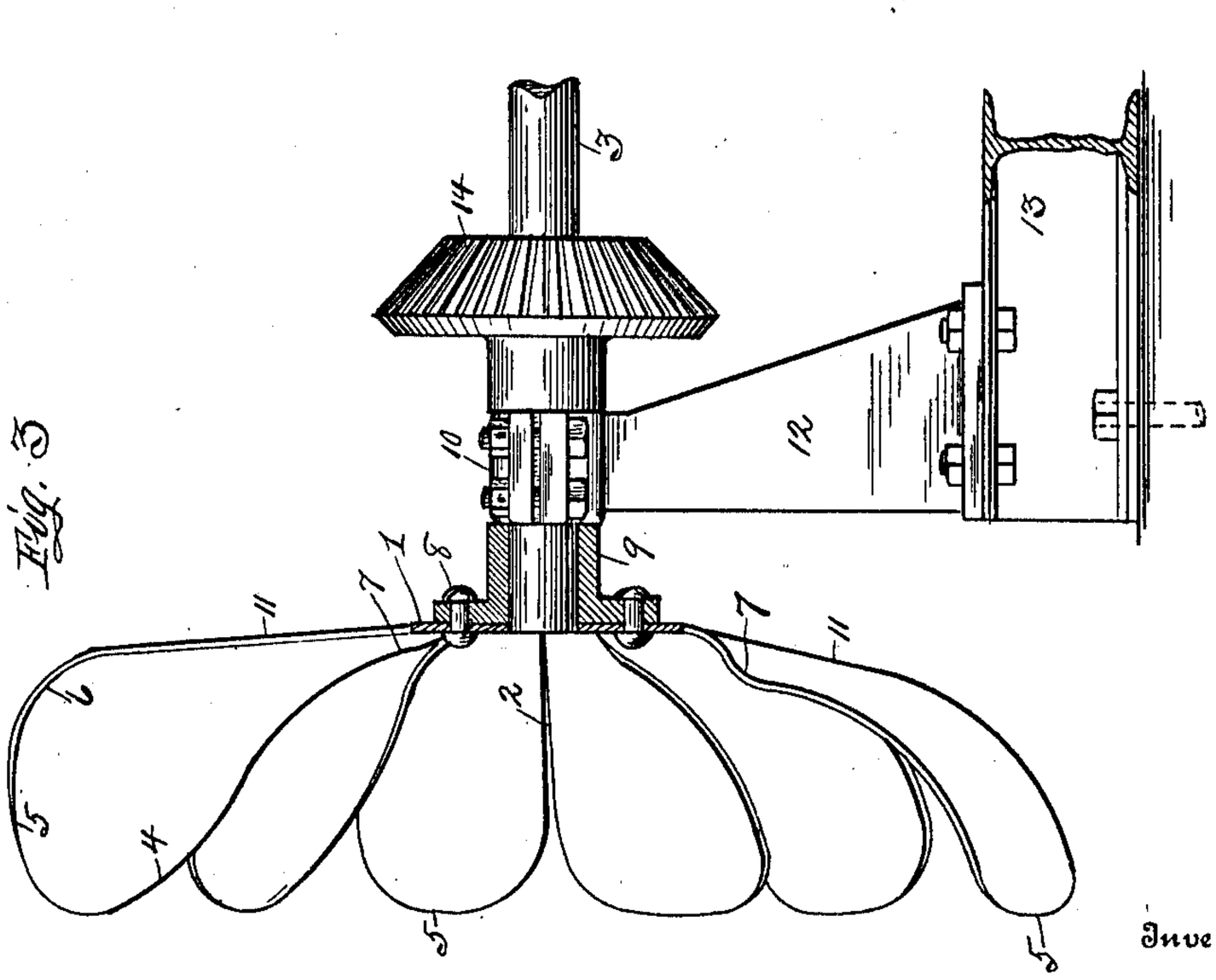


Fig. 5

Fig. 3



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FLUID-ACTUATED MOTOR.

970,404. Specification of Letters Patent. **Patented Sept. 13, 1910.**

Application filed July 28, 1909. Serial No. 510,043.

To all whom it may concern:

Be it known that I, WILLIAM SNEE, a citizen of the United States, residing at West Elizabeth, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Fluid-Actuated Motors; 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 and figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in fluid-actuated power motors. The essential object of the invention being to provide a motor that will operate with great efficiency in the currents of rivers, or other currents when submerged in the waters of the same, or from the undulating movement of the force of sea waves, or from the ebb and flow of the tides of the ocean and all moving bodies of water, and can be operated under a head of water or will prove equally efficient when operated in wind, air or steam currents, or other suitable forces for its operation; whereby power may be taken from said currents or head of water and transmitted by means of suitable apparatus and machinery for its various uses. This I accomplish by means of a vertically-disposed rotatable wheel mounted upon a horizontal or approximately horizontal shaft, said wheel having a series of radially-arranged propelling blades, arranged at regular intervals in the form of a circle, said blades being in the form of a propeller blade and arranged about a center piece to deflect and prevent the air or water currents, if any, from passing through the wheel at this part.

A further object of the invention is to so construct the wheel from a single piece of cast or sheet metal, or from a single piece of wrought metal by means of suitable dies and presses, or from several sections of sheet or cast metal, each of which carrying one or more propeller blades, when together will make and constitute a complete wheel.

A still further object of the invention is to set or form the propeller blades out of the vertical or inclined forward, which in the sheet metal construction, bring the edges of the propeller blades in close radial relation, leaving but little, if any, space by which any currents traveling toward and entering into the wheel can pass through the same without first being, always deflected from the center of the wheel out along the blade, in the direction and toward the periphery of the same, and in fact, by giving the blades the proper forward inclination, the edge of one propeller blade may be projected to overlap the other.

Another object of the invention is to so shape or form the propeller blades as to offer the greatest possible resistance to water, wind or air currents, and the invention further consists in the certain details of construction and combination of parts, as will be fully described hereinafter.

In the accompanying drawings:—Figure 1 is a front elevation of my improved power motor, the same being constructed and arranged in accordance with my invention. Fig. 2 is a plan view of the same. Fig. 3 is a side sectional elevation of the wheel, showing the same mounted upon a horizontal shaft. Fig. 4 is an enlarged face view of one of the propeller blades before bending. Fig. 5 shows a series of transverse sections taken on the various lines indicated on Fig. 4, after bending into form.

In the construction of a power motor in accordance with my invention, I prefer to form and power wheel from sheet metal, either from a single piece, or from several segmental sections, each carrying one or more propeller blades. This latter sectional form would be used in the making of wheels of large diameter, but may be used in the construction of wheel of any diameter.

The blank sheet, to form the wheel, is first cut in circular form of a suitable diameter, then separated on radial lines from the periphery inwardly toward the center, leaving an integral portion 1, to which each of the segmental parts or propeller blades are connected. The angle parts or corners formed at the periphery of each segmental part, are trimmed or rounded to curved lines, and by means of suitable dies, each segmental part is bent forward, and always dished toward the direction from which the wind, air, water or steam currents are directed. Simultaneously with the forming of the above-described dish, and by means of the same dies, each blade or segmental part is

curved in a direction transverse to the length of the same, *i. e.* the radius of the wheel, whereby with the longitudinal curve already mentioned, a dished form is provided. The form and contour of the blade will be readily understood, by reference to Figs. 4 and 5, of the drawings; in which, assuming that the blank segment is in a horizontal position, the left-hand or forward edge 4, is bent upward in an irregular curved line, reaching its greatest height at its outer end and the opposite or rear edge 2, slightly curved inward, as shown at "*a*", Fig. 5. These various sections, *a*—*a*, to *f*—*f*, inclusive, show the various lines of bends of the blade, which taken as a whole, is a twist, forming a centrally-located curved line terminating in an upwardly bent periphery 5.

The transverse curves of the successive portions of the blade are such that a line passing through the lowest points in each curve would take a position indicated by the line 7 in Fig. 4, extending from a point in the shank of the blade near the axis of rotation in a general radial direction to a point in the rear edge of the blade about two thirds, more or less, of the distance from the center to the periphery. A similar line 7′ connecting the lowest points of the curves beyond the said point in the rear edge toward the periphery would extend from that point to a point in the periphery about midway of the width of the blade.

To operate the motor in water currents, or by the action of the waves of the sea, the wheel is fixed by means of rivets 8, to a flanged sleeve 9, said sleeve being rigidly attached to a horizontally placed shaft 3, which is mounted in suitable bearings 10, bolted to a foundation 13 located beneath the surface of the water. The wheel for its proper and most efficient operation must be altogether submerged in the water, thereby placing and distributing practically an even pressure of the water forces equally, over the entire working face of the wheel. The flow of the water striking the torsional acting surface of the propeller blades, revolves the wheel in but one direction, and owing to the peculiar angle of inclination and curvature of said blades, concentrates the greater part of the volume of water between the section lines *a* and *c* or lowest point, indicated on Fig. 4, causing the wheel to revolve and throw the water to the rear and readily relieve itself, due to its rapid rotary motion.

It has been found in actual practice, that, where currents such as those of a river, flowing in parallel lines from one direction, better results as to speed and power may be obtained, by locating the wheel to directly face said currents and to tilt the same slightly forward or backward out of the perpendicular or vertical plane. This is due to the fact that the peculiar shape or contour of the propeller blades will form a pocket, and will offer a greater resistance to the inflowing water until the same is relieved by the rotatable movement of the wheel.

When it is desired to use the motor in air currents, the wheel is mounted upon a revolving stand (not shown) and provided with a "fan-tail" such as are now in common use on all horizontally-operated wind motors, whereby said wheel may always present its front to currents approaching from varying directions.

The water or air currents within a space equal to the diameter of the wheel, in which it is operated, nearly, if not all are deflected outwardly along the blades and discharged at the rear, at or near the periphery of said wheel, thereby obtaining the greatest possible efficiency from the volume included in said diameter. This feature is not found in any of the wind or water-driven power wheels now in use, and aids materially to the power or driving force of the motor.

Various slight modifications and changes may be made in the details of construction without departing from the spirit of the invention. Therefore I do not wish to confine myself to the exact construction, shown and described, but wish to claim all such modified forms as may come properly within the general scope of the invention.

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

1. A fluid-actuated power wheel comprising blades constructed with a compoundly-curved acting surface of which one curve is a radial curvature and the other curve is a curvature transverse to the radial, said curves being so compounded that a line connecting the lowest points of the transverse sections of successive portions will extend from a central point to a point in the rear edge between the center and the periphery and thence to a point in the periphery.

2. A fluid actuated power wheel comprising blades set upon a shaft at an angle transverse to its axis each of said blades constructed with a compoundly curved surface having an element which is a radial curve and an element which is a transverse curve, the lowest point of each blade lying in its rear edge near its periphery, and this point lying in a line connecting the lowest points of the transverse curves, which line rises from said lowest point to the peripheral edge of the blade.

3. A fluid actuated power wheel comprising blades set upon a shaft at an angle transverse to its axis, and inclined against the direction of the actuating fluid and constructed with a compoundly curved surface having an element which is a radial curve and an element which is a transverse curve,

the lowest point of each blade lying in its rear edge near its periphery, and this point lying in a line connecting the lowest points of the transverse curves, which line rises from said lowest point to the peripheral edge of the blade.

4. A fluid actuated power wheel comprising blades set upon a shaft and torsionally twisted, each of said blades being constructed with a compoundly curved surface having an element which is a radial curve and an element which is a transverse curve, the lowest point of each blade lying in its rear edge near its periphery, and this point lying in a line connecting the lowest points of the transverse curves, which line rises from said lowest point to the peripheral edge of the blade.

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

WILLIAM SNEE.

Witnesses:

F. J. KERRIGAN,

JNO. A. SNEE.