(No Model.)

4 Sheets—Sheet 1.

G. LANGER.

TURBINE MOTOR.

No. 600,007. Patented Mar. 1, 1898.

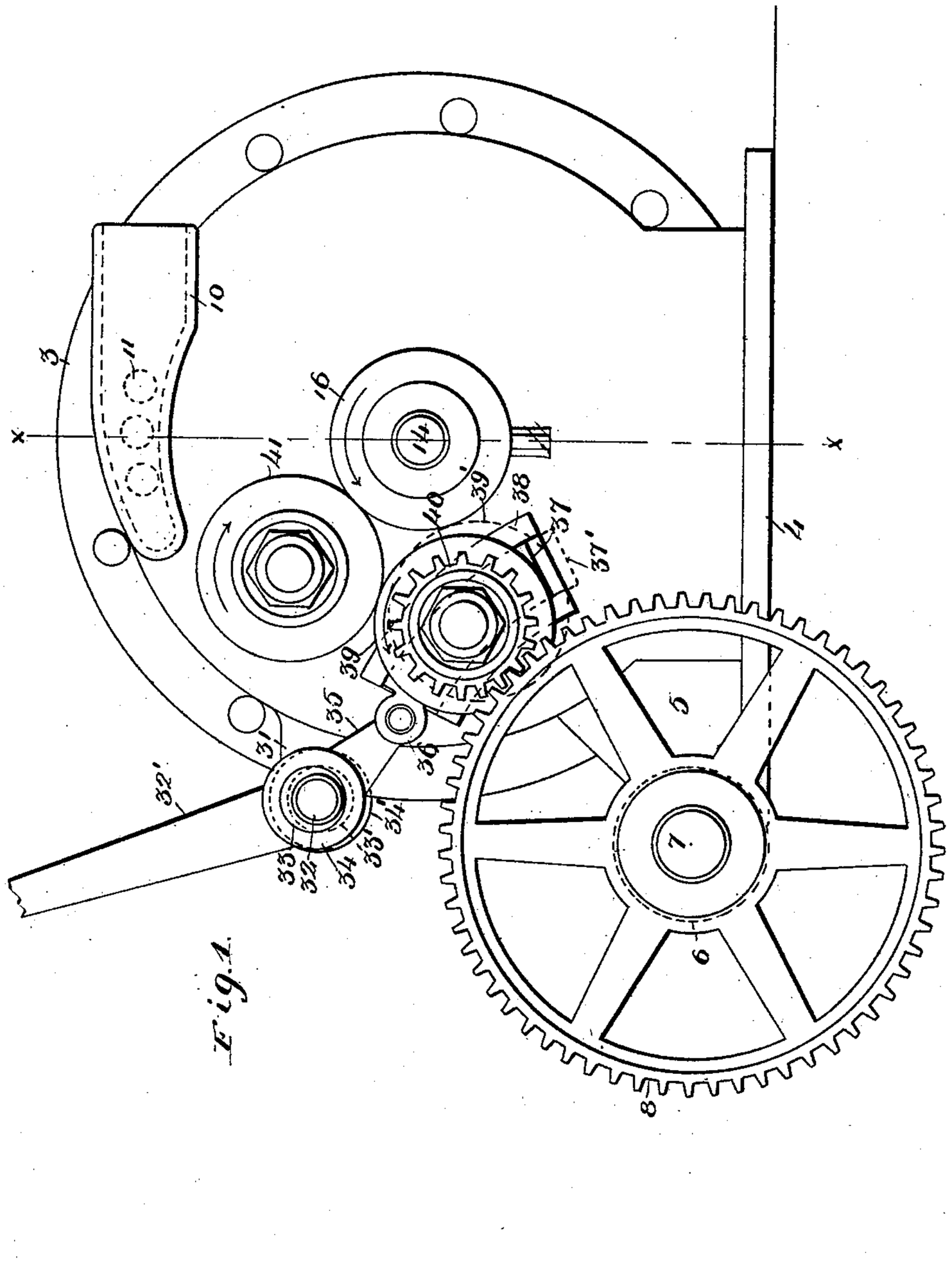

Fig. 4.

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(No Model.)

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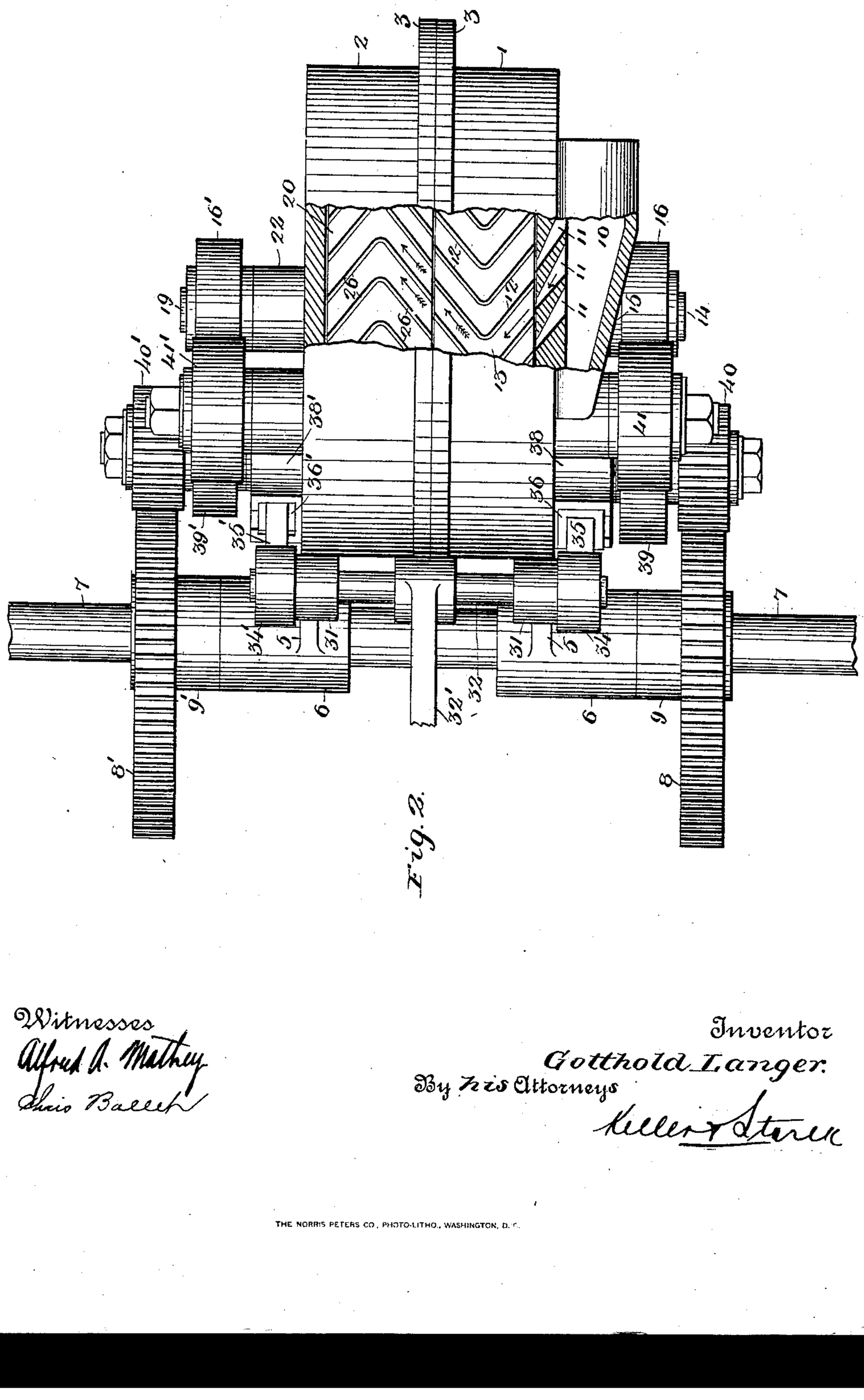

Fig. 2.

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Fig. 4.

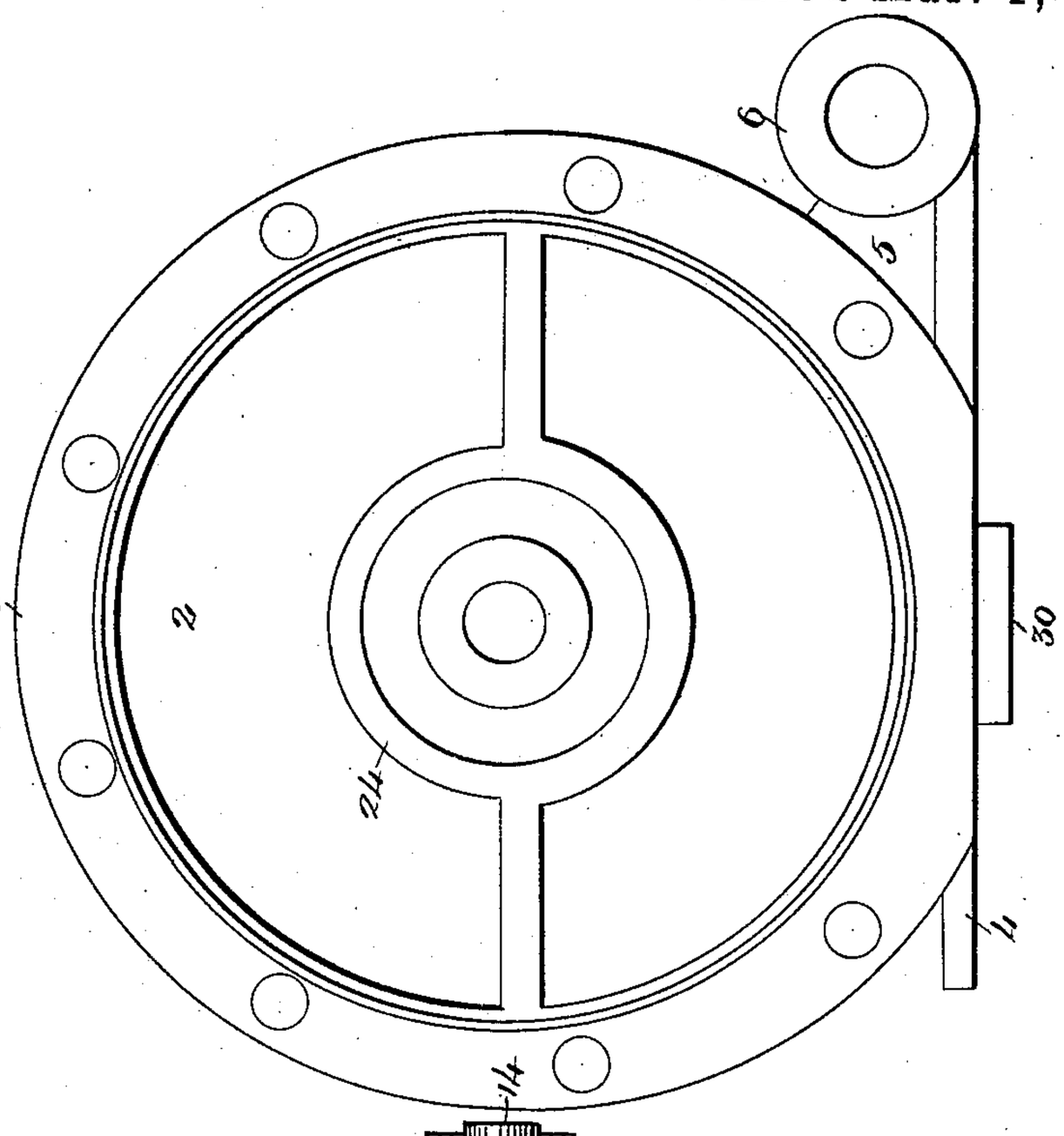
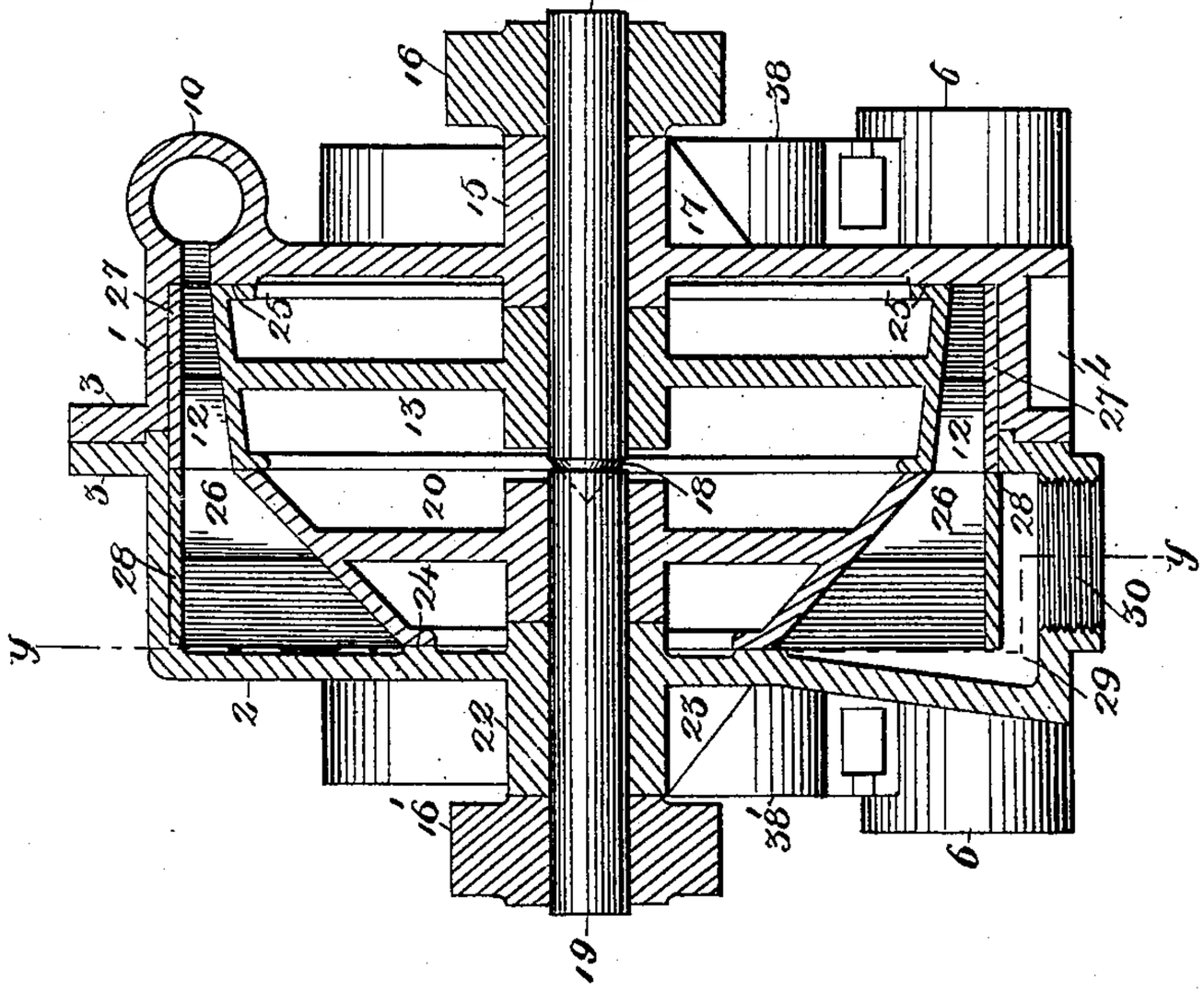


Fig. 3.



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(No Model.) 4 Sheets—Sheet 4.

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TURBINE MOTOR.

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Fig. 6.

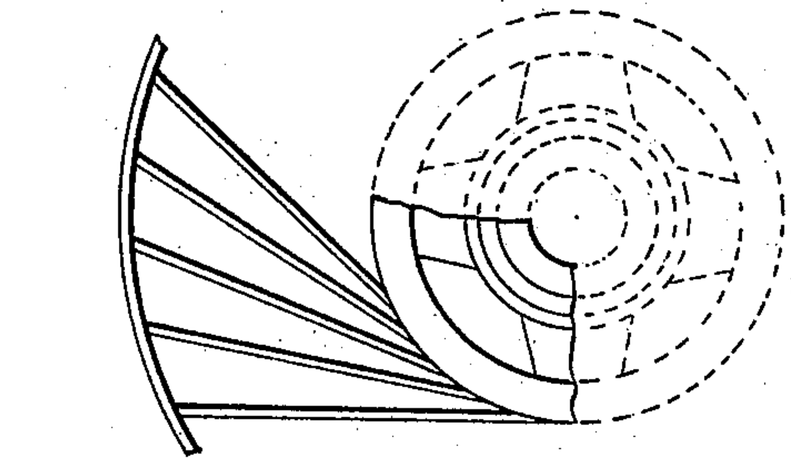
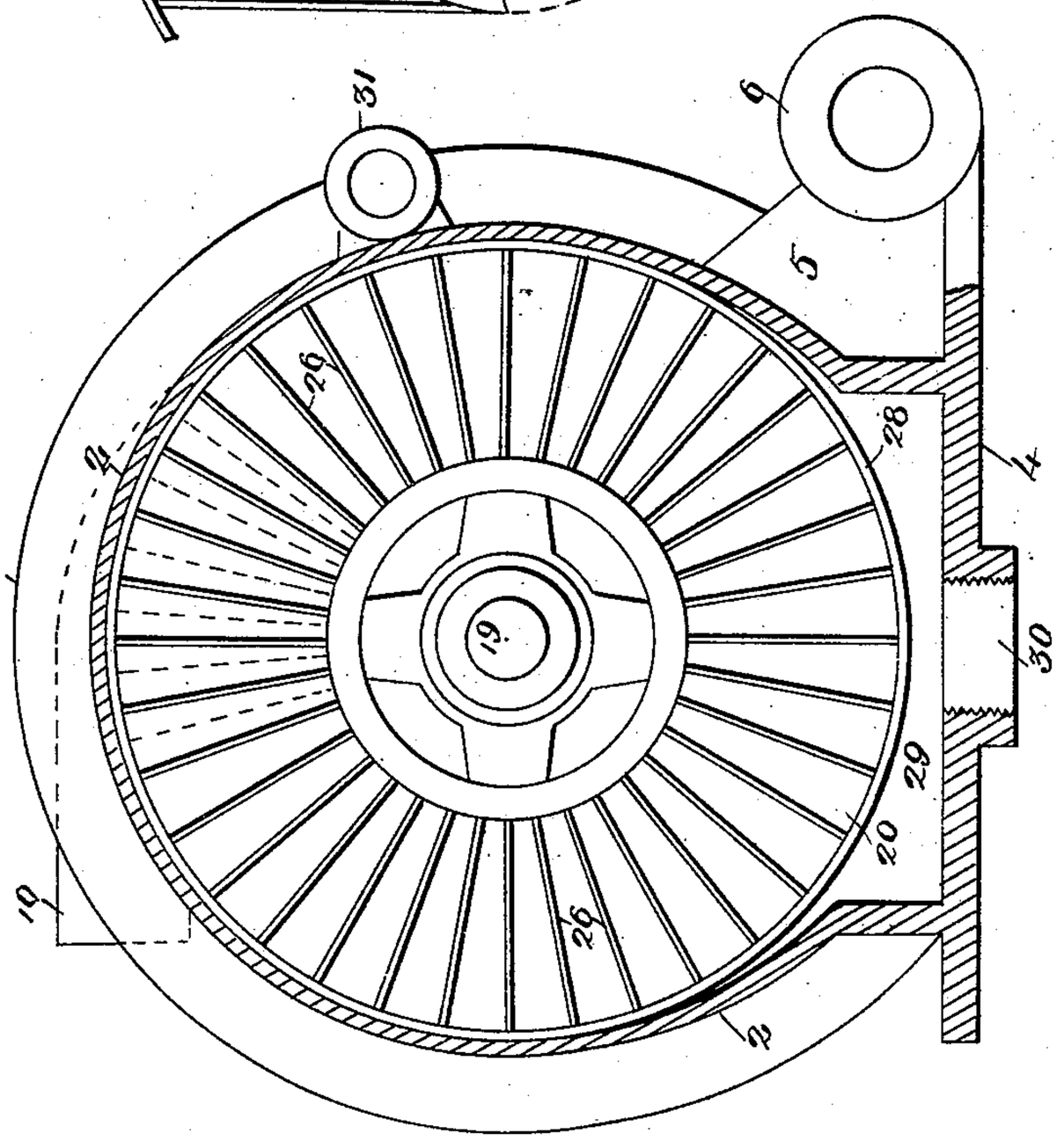


Fig. 5.



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UNITED STATES PATENT OFFICE.

GOTTHOLD LANGER, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-HALF TO PAUL FLUCKS AND JOSEPH B. NIERMANN, OF SAME PLACE.

TURBINE MOTOR.

SPECIFICATION forming part of Letters Patent No. 600,007, dated March 1, 1898.

Application filed February 15, 1897. Serial No. 623,491. (No model.)

To all whom it may concern:

Be it known that I, GOTTHOLD LANGER, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Turbine Motors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part thereof.

My invention has relation to improvements in turbine motors; and it consists in the novel arrangement and combination of parts more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is an elevation of one side of the motor. Fig. 2 is a top plan view with part of the casing broken away. Fig. 3 is a section on line *x x* of Fig. 1. Fig. 4 is an inner elevation of the section of the casing within which the low-pressure wheel is confined. Fig. 5 is a section on line *y y* of Fig. 3, and Fig. 6 is a similar section of a modification.

The object of my invention is to produce a turbine motor which will develop a maximum amount of efficiency, the construction covering the employment of two turbines mounted side by side, the exhaust from one simultaneously driving the other in a direction opposite to its own motion, special provision being made for causing the simultaneous contrary rotation of the two wheels to impel a single drive-shaft in one direction or the other at the pleasure of the operator. By the present device the maximum driving capacity of the propelling medium, be the same steam, gas, or air, is utilized, thereby attaining results superior to the many prevailing types of turbines as now constructed. The axes of rotation of the two juxtaposed turbines are disposed in the same straight line, and the wheels are confined within the same casing, thereby at the same time attaining a compactness of structure. It will be apparent from a detailed description of the invention that the same principle may be employed for actuating more than two wheels, if desirable, without departing from the spirit of my invention.

In detail the invention may be described as follows:

Referring to the drawings, 1 2 represent the respective sections or halves of a casing within which the turbines or wheels are mounted, the sections being united by suitable bolts or rivets passed through alining openings of the coupling-flanges 3 of the respective casings. Cast or formed integral with the casing is a basal plate 4, which may be secured to any suitable foundation, and projecting from the rear of the casing are brackets 5, with which are formed integrally the tubular bearings 6 for the support of the main drive-shaft 7 of the machine, the said shaft having secured thereto on opposite sides of the casing, respectively, the driving gear-wheels 8 8′, whose tubular hub portions 9 9′ bear against the said bearings. (See Fig. 2.) Formed integral with the outer face of the section 1, adjacent to the upper peripheral surface thereof, is a chamber or pipe connection 10, serving as an inlet for the steam, gas, or air or other fluid, from which chamber lead a series of inclined inwardly-tapering ports 11, formed in the face or wall of said section, the said ports being adapted to deliver the driving fluid against the bases of the V-shaped blades 12, disposed centrally about the periphery of the cone-shaped main driving-turbine 13, mounted in the casing and secured to a shaft 14, supported in the tubular bearing 15, formed along the outer wall of the section 1, the outer projecting end of said shaft carrying a friction-disk 16. The bearing 15 is reinforced by a rib 17. The blades open in a direction parallel to the plane of rotation of the wheel, the bases of the several blades facing the inclined ports 11. (See Fig. 2.) The inner end of the shaft 14 is provided with a conical bearing or tip 18, which rests in a corresponding conical depression formed at the inner end of the adjacent alining shaft 19, supporting the adjacent or low-pressure turbine wheel 20. The outer end of the shaft 19 carries a friction-disk 16′, similar to the disk 16, the shaft 19 being similarly supported in the tubular bearing 22 of the outer wall of section 2, likewise reinforced by a rib 23. The turbine 20 is essentially of the form of a truncated cone, whose larger end or base bears against the smaller end of the truncated-cone-shaped turbine 13 and whose smaller end or base bears against an annular ring or bearing-surface 24, formed along the inner surface of the outer

wall of the section 2, and as the larger base of the main turbine bears against an annular ring or bearing-surface 25, formed along the inner surface of the outer wall of the section 1, there is little or no lost play among the several parts. The conical periphery of the wheel 20 is more tapering than the corresponding surface of the main turbine 13, whereby the superficial area of the V-shaped blades 26, disposed along the periphery of the wheel 20, is increased approximately in the ratio at which the expansive force of the driving fluid has dropped by the time it has exhausted from the main turbine. The blades 26 are disposed reversely to the blades 12, but with the interior angle thereof equal to the corresponding angle of the blades 12, whereby the adjacent walls of the blades will be parallel. (See Fig. 2.) In this way the exhaust from the blades 12, which is tangential to the periphery of the wheel or in a plane parallel to the axis of rotation thereof, will exert its force directly and without interruption against the base of the V-shaped blades of the low-pressure wheel, the exhaust following the adjacent parallel walls of the blades, as seen by the feathered arrows in Fig. 2.

The outer edges of the blades of the respective wheels are surmounted by embracing bands 27 28, shrunk over the same, said bands revolving snugly along the inner peripheral surfaces of the respective sections of the casing. The low-pressure wheel exhausts laterally into a chamber 29, formed by the outwardly-deflected lower portion of the outer wall of the section 2 (see Fig. 3) and by extending the peripheral wall of said casing slightly below the peripheral band 28 of said wheel, the exhaust fluid finding its way out through the exhaust port or pipe connection 30. As the turbines thus revolve in opposite directions at the same time, it becomes necessary that some provision be made for converting their combined motions into a single motion so far as the direction of rotation of the main drive-shaft is concerned. This is accomplished as follows:

Mounted in suitable bearings 31, carried at the rear of the upper portion of the casing, is a rock-shaft 32, controlled by a medially-disposed lever 32′, the opposite outer ends of the rock-shaft being respectively provided with eccentric disks 33 33′, the eccentricities of the two disks being directed in diametrically opposite directions. Embracing, respectively, each eccentric disk is an eccentric ring 34 34′, to which is secured an arm 35 35′, respectively. The free end of the arm 35 (and of course also that of the arm 35′, the same construction being duplicated on each side of the machine) is pivotally secured to the looped upper end 36 of a curved sliding disk-supporting block 37, said block being guided and confined within a curved guideway or housing 38, said block serving as a bearing for the spindle or shaft of a friction-disk 39, with which is formed integrally a pinion 40, adapted to mesh with the teeth of the driving gear-wheel 8. Mounted in proximity to the friction-disk 16 is an idle friction-disk 41, with which for one position of the block 37 (that is to say, for one position of the rock-shaft 32, by which the sliding blocks are controlled) the friction-disk 39, supported by the block, is adapted to engage, for it is apparent that for one position of the rock-shaft 32 the eccentric 33 on one side will force (through its connecting-arm 35) the block 37 in its guideway to a position so as to bring the disk 39 and disk 41 into engagement on one side of the machine, and the eccentric 33′ on the opposite end of the rock-shaft will bring into engagement the corresponding disk 39′ with the disk 16′ on the opposite side of the machine. (See Fig. 1, where the dotted disk 39′ is in engagement with the disk 16′, occupying the same position in this figure as the disk 16, and hence not visible.) It is to be understood, of course, that the parts 34, 35, 36, 37, 38, 39, 40, and 41 have their counterparts 34′, 35′, 36′, 37′, 38′, 39′, 40′, and 41′ on the opposite side of the machine. By thus bringing into coöperation (by the tilting or rocking action of the shaft 32) the disks 39 and 41 on one side and 39′ and 16′ on the opposite side of the machine, or, vice versa, 39 and 16 on the one side and 39′ and 41′ on the opposite side, depending, of course, on the position to which the shaft 32 has been rocked, it is apparent that the pinions 40 40′ will be turned simultaneously in one and the same direction, and hence impart the same direction to the gear-wheels 8 8′, mounted on the drive-shaft 7. The reason of thus gearing or connecting the driving gear-wheel 8 to the disk 16 on one side and the gear-wheel 8′ to the disk 41′ on the opposite side, or, vice versa, 8 to 41 on one side and 8′ to 16′ on the opposite side, is because of the fact that the two turbines are revolving simultaneously in opposite directions, and the idlers 41 41′ serve in turn to correct this difference of direction on one side or the other, and thus impart simultaneously motion in one direction to the gear-wheels 8 8′ thus located on opposite sides of the machine. Thus the shaft 7 will always be driven in proper direction.

Although as a rule the blades are disposed radially from the peripheries of the wheels, the same may be disposed tangentially, as seen in Fig. 6, without departing from the spirit of my invention.

Having described my invention, what I claim is—

1. In a motor, a suitable casing, two adjacently-located turbines or wheels mounted therein, and adapted to rotate simultaneously in opposite directions, a shaft for each turbine having a bearing in the adjacent end wall of the casing, an exhaust-port leading from the casing, a friction-disk carried by the outer end of each shaft, an idle friction-disk mounted on the wall of the casing and coöperating with the friction-disk carried by the project-

ing end of each turbine-shaft, a main drive-shaft, a driving gear-wheel carried by the main shaft on each side of the casing, a suitable guideway carried by each wall of the casing in proximity to the outer projecting end of each shaft, a disk-supporting block adapted to be moved in said guideway, suitable mechanism for shifting the blocks on opposite sides of the machine simultaneously in opposite directions, whereby the disk carried by the block on one side is brought into engagement with the terminal friction-disk of the shaft of one turbine, and the disk carried by the block on the opposite side of the machine is brought into engagement with the idle friction-disk coöperating with the outer terminal friction-disk carried by the projecting end of the shaft of the second turbine or vice versa, and whereby the disks thus carried by the blocks revolve simultaneously in the same direction, and a pinion carried by each disk mounted on the sliding block for coupling with the gear-wheels carried by the main drive-shaft, whereby rotation is imparted to the latter, substantially as set forth.

2. In a motor, a suitable casing, two adjacently-mounted turbines or wheels mounted within the same and adapted to rotate simultaneously in opposite directions, a suitable rock-shaft mounted in connection with the casing, bearings for said rock-shaft, an eccentric disk carried at each end of the rock-shaft, the said eccentrics tending in opposite directions, an eccentric ring loosely embracing each eccentric disk, an arm forming a part of each disk, a block pivotally secured to the free end of each arm, a guideway for each block carried along the end walls of the casing, means for rocking the rock-shaft and simultaneously moving the blocks in opposite directions, a shaft for each turbine, a gear carried by each block, and suitable intermediate gearing between the gear carried by each block and the shaft of the turbine, for imparting rotation in the same direction to the gears carried by each block, substantially as set forth.

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

GOTTHOLD LANGER.

Witnesses:
ALFRED A. MATHEY,
EMIL STAREK.