

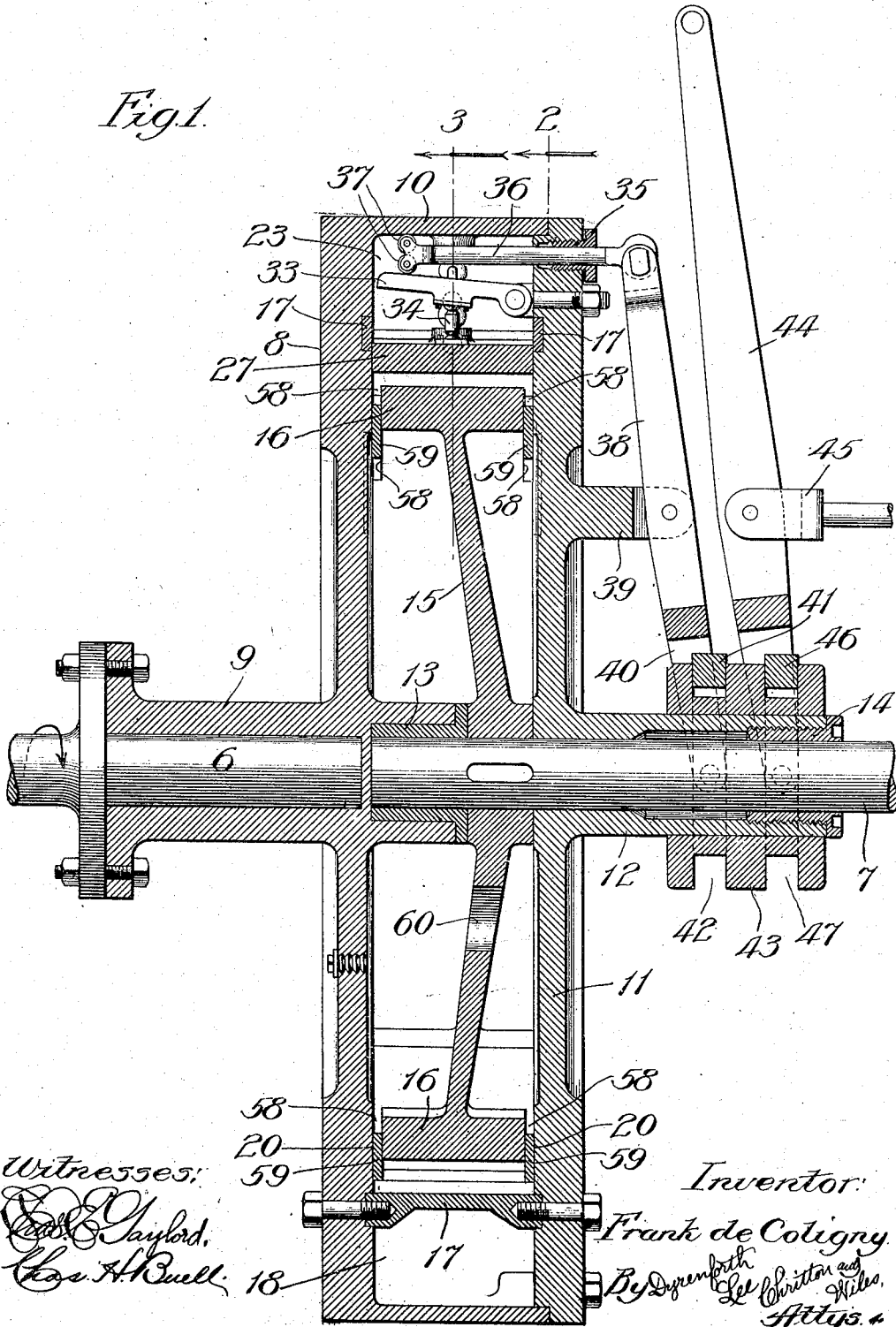
F. DE COLIGNY.
POWER TRANSMITTER.
APPLICATION FILED OCT. 21, 1908.

933,232.

Patented Sept. 7, 1909.

3 SHEETS—SHEET 1.

Fig. 1.

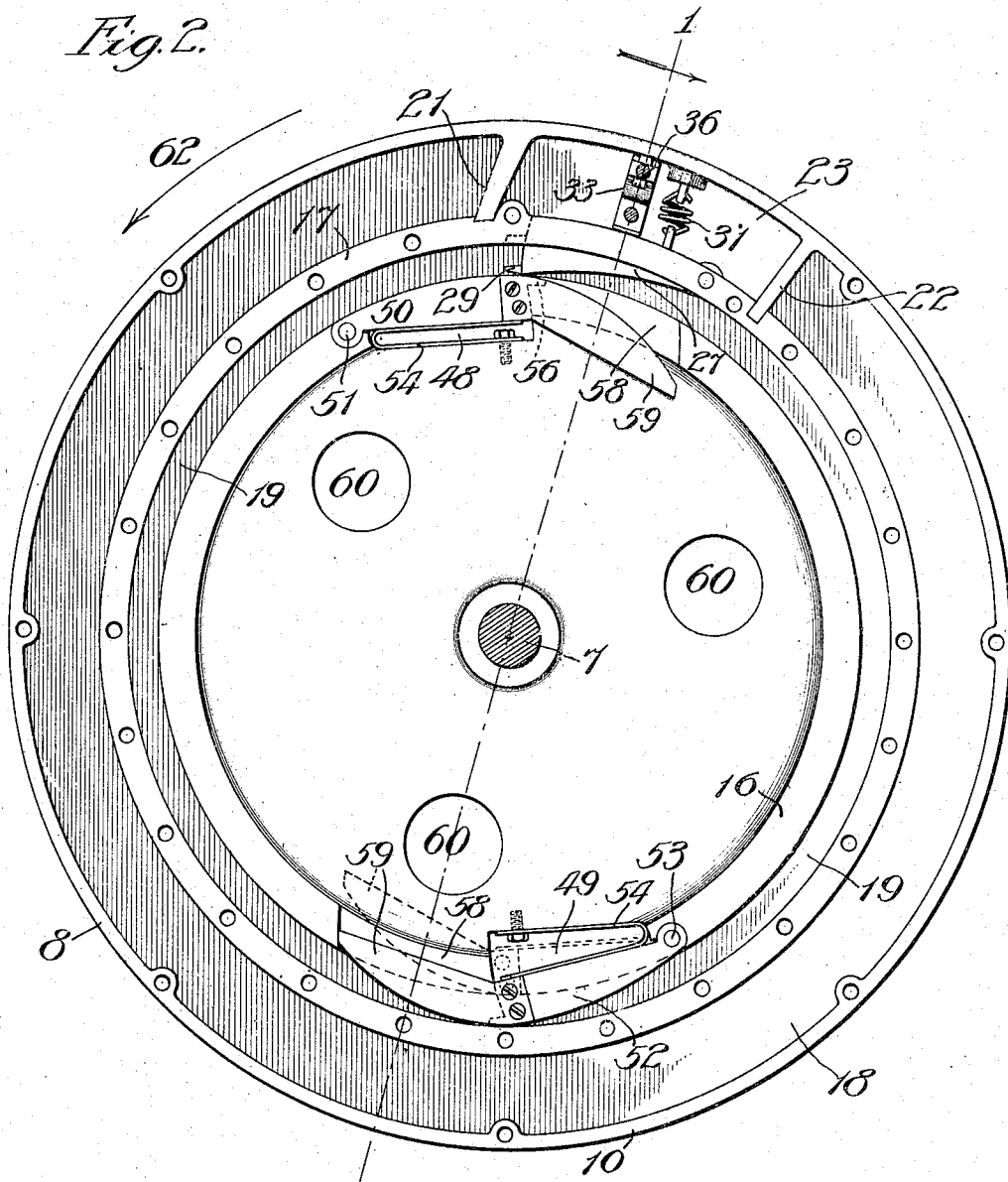


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3 SHEETS—SHEET 2.

Fig. 2.



Witnesses:

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Chas. H. Buell.

Inventor:

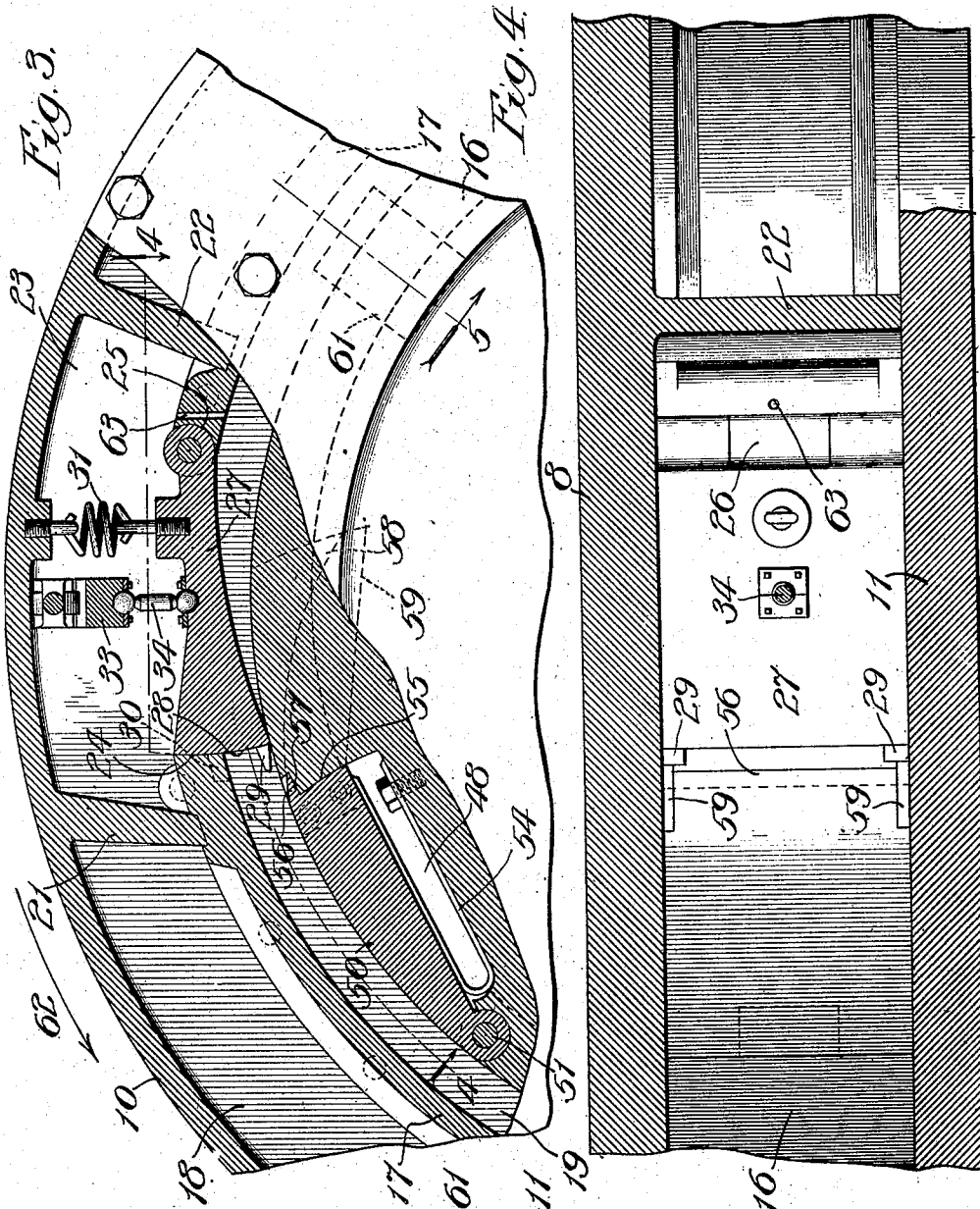
Frank de Coligny,
By Deyoung & Co., Attorneys.

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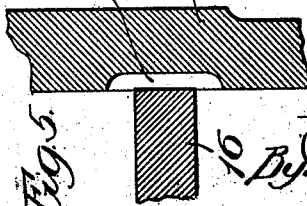
Patented Sept. 7, 1909.

3 SHEETS—SHEET 3.



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Inventor:

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UNITED STATES PATENT OFFICE.

FRANK DE COLIGNY, OF CHICAGO, ILLINOIS, ASSIGNOR TO COLIGNY HYDRAULIC TRANSMISSION CO., A CORPORATION OF MICHIGAN.

POWER-TRANSMITTER.

933,232.

Specification of Letters Patent.

Patented Sept. 7, 1909.

Application filed October 21, 1908. Serial No. 458,892.

To all whom it may concern:

Be it known that I, FRANK DE COLIGNY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Power-Transmitters, of which the following is a specification.

My invention relates to improvements in power and speed transmission-devices of the class wherein the propelling force, of a driving against a driven member, is exerted through an interposed confined body of practically incompressible fluid and wherein the said force is varied by controlling the degree of slip of the said fluid.

This invention is in the nature of an improvement upon the power-transmitter shown and described in Letters Patent No. 870,814, granted to me November 12, 1907. In the said patented construction a by-pass extends around a movable abutment carried by the driving member, the said by-pass being governed by a valve under control from the outside. In the present construction, the by-pass is dispensed with and the degree of slip of the fluid is regulated by the adjustment of the abutment itself, which adjustment is under outside control.

My object is to provide a power-transmitter of the type described with the improvement referred to, as well as other improvements in details, all with a view to simplifying the construction and rendering the operation more perfect.

Referring to the accompanying drawings,—Figure 1 is a broken section of my improved transmitter, the section being taken on line 1 in Fig. 2 and enlarged; Fig. 2, a reduced section taken on line 2 in Fig. 1; Fig. 3, an enlarged broken fragmentary view, partly in side elevation, and partly in section, the section being taken on line 3 in Fig. 1; Fig. 4, a broken partly sectional plan view taken on irregular line 4—4 in Fig. 3; and Fig. 5, a fragmentary section on line 5 in Fig. 3.

6 and 7 are alined shafts, one of which, preferably 6, is the power or driving shaft, and 7, the driven shaft.

8 is one side of a hollow wheel or casing, secured at its hub-portion 9 upon the end of the shaft 6, and forming what I shall refer to as the driving member of the device. The rim 10 of the wheel is integral with the side 8, and removably secured thereto is a side 11

having a hollow hub-portion 12 through which the shaft 7 passes. The shaft 7 extends at its end into and is journaled in a sleeve 13, carried by the side 8, and passes through a stuffing-box 14 in the hub 12. Confined between the inner surface of the side 11 and the bearing 13 is a wheel having a center 15 and rim 16 and forming what I shall refer to as the driven member of the transmitting device. Let into and secured to the sides 8, 11 is an annular partition 17 which divides the space between the rims of the driving and driven members into outer and inner concentric chambers 18 and 19 respectively. The rim 16 of the driven member slides at opposite sides, practically oil-tight, against annular bearing surfaces 20 formed on the sides 8, 11. Extending across the space or chamber 18 in the positions shown are partitions 21 and 22 forming between them a segmental compartment 23. At said compartment the annular wall or partition 17 is cut away to present the concaved end-surfaces 24, 25.

On the end at 25 is a centrally-perforated bearing projection 26 to which is hinged a swinging abutment-valve 27 having an enlarged abrupt and segmental presser-face 28 fitting and sliding oil-tight against the surface 24. At opposite corners of the abutment 27 are cam-projections or contact-surfaces 29 of the relative dimensions illustrated in Figs. 3 and 4; and in the end 24 of the partition 17 are recesses 30. In the compartment 23 is a spring 31 fastening at one end against the rim 10 and at its other end to the swinging abutment-valve 27 and tending normally to draw the latter into the compartment 23 whereby the cam-projections enter the recesses 30 and the inner surface of the swinging abutment-valve extends flush with the inner surface of the partition 17.

Pivoted at 32 in the compartment 23 is a swinging arm or lever 33 and interposed between the said lever and abutment-valve is a stem 34 having a ball-and-socket connection at opposite ends with the lever and abutment-valve respectively. Fitting and sliding through a stuffing-box 35 in the side 11 is a stem 36 carrying rollers 37, 37 bearing respectively against the inner surface of the rim 10 and lever 33. The tendency of the spring 31 is to swing the lever at its free end toward the rim 10 to move the abutment-

valve 27 to its retracted or open position, and the stem 36 with its rollers 37 operate as a spreader which by its inward movement forces the swinging end of the abutment-valve 27 to or toward the rim 16 of the driven member, and which by its outward movement permits the abutment-valve to be retracted by the spring. The stem 36 is connected at its outer end to the end of a lever 38 fulcrumed between its ends in a bracket 39 on the side 11. The opposite end of the lever 38 forms a yoke 40 straddling and pivotally engaging a segmental bearing-block 41 fitting loosely an annular groove 42 in a sliding sleeve 43 mounted on the hub 12. 44 is an operating lever fulcrumed between its ends to a stationary support 45 and pivotally secured at one end to a segmental bearing-block 46 loosely engaging an annular groove 47 in the sliding sleeve 43. Movement of the operating lever 44 slides the sleeve 43 and swings the lever 38 to move the wedge-device for the purpose described.

At diametrically opposite points in the driven member are recesses 48—49 extending through the rim 16 into the web 15 and in open communication with the space surrounded by the rim 16. Working in the recess 48 is a swinging abutment 50 hinged at 51 to the rim; and working in the recess 49 is a swinging abutment 52 hinged to the rim at 53. Springs 54 in the bases of the recesses 48—49 tend normally to swing the abutments 50—52, which are of the same width as the rim 16, outward to cause them, near their abrupt, segmental presser-faces 55, which bear slidably but oil-tight against the ends of the recesses, to close against the inner annular bearing surface formed by the partition 17. On the free ends of the abutments 50—52 are chamfered lips 56 which, when the said abutments are retracted, as indicated in Fig. 3, enter recesses 57 in the rim 16. Extending from the recesses 47—48 in opposite side edges of the rim 16 are shallow recesses 58, and working in the said recesses 58 between the rim and bearing surfaces 20 of the sides 8—11 are cam-plates 59 presenting segmental contact-surfaces set into and fastened to the swinging end-portions of the abutments 50—52. The under surface of the lip 56 on each abutment exceeds in area the outer surfaces of the cam-plate, or plates, 59 carried by the abutment, and acts as a pressure equalizer, as hereinafter explained. Each abutment may, if desired, have but one cam-plate 59 instead of two, though two are preferred.

The entire space in the driving wheel surrounded by the annular wall or partition 17 is nearly filled with an incompressible fluid which may be, and preferably is, a suitable oil. In the web 15 of the driven-member are openings 60 and in the bearing surfaces 20 just back of the abutment-valve 27 are recesses 61. The openings 60 give open communication between opposite sides of the wheel-center and the recesses 61 afford communication between the central chamber portion, surrounded by the rim 16, and the annular space 19 directly behind the abutment valve 27.

In operation, when the abutment-valve 27 is opened by the spring 31 to cause its inner surface to coincide with the inner surface of the partition 17, the turning of the driving member will present no obstruction to the oil and the driven member will remain unmoved. If the spreader formed, as aforesaid, by the stem 36 and rollers 37 is moved to the position indicated in the figures, the abutment-valve 27 is swung against the surface of the rim 16 to close practically oil-tight across the space 19, whereby the turning of the drive-member in the direction of the arrow 62 causes it to bear against the body of oil confined between it and the extended, or closed, swinging abutment carried by the driven member which, when the parts are in the relative positions indicated, would be the abutment 52 which is closed practically oil-tight against the inner annular bearing surface of the partition 17. This would cause the driving member to rotate the driven member at a rate of speed equal to that of the driving member. The adjustment of the swinging abutment-valve 27 away from the surface of the rim 16 to partly close it will open a passage through which the confined oil may slip at a rate governed by the size of the opened passage, thereby proportionately reducing or relieving the pressure upon the body of oil and causing a proportionate reduction of the speed of the driven member. The abutment-valve 27 remains in its adjusted position and when partly open, to permit limited slip of the liquid and thereby cause the speed of the driving member to exceed that of the driven member, the cam projections 29 on the abutment-valve engage the cam-plates 59 causing the latter to be moved inward in the recesses 58 and open the abutment to which they are attached against the resistance of the spring 54 to permit the abutment-valve 27 to ride over it.

In practice, when the cams first engage to effect initial opening movement of an abutment, the pressure of the liquid against the outer surface of the abutment will have the effect of opening it wide and thus maintain the same slip of the liquid at all times.

The space or chamber bounded by the rim 16 operates as an oil-reservoir and, in the turning of the driven member, the tendency will be to maintain the annular chamber 19 always completely filled with liquid, by centrifugal force, through the recesses 61 behind the abutment-valve. The construction dispenses with valves other than the adjust-

able abutment-valve; and by means of the adjusting mechanism described, the degree of slip of the confined body of liquid and consequently the power-transmission may be quickly and accurately changed as desired. The lever 44 may be operated manually, or it may be operated from a speed-governor in a common manner; and the construction may easily be arranged to cause what I have termed the driving member to be the driven member, and vice versa. Owing to the fact that the abutments and abutment-valve swing upon pivots, in the manner set forth, they offer practically no frictional-resistance against movement under the binding-pressure of the liquid. When the abutment-valve is fully opened, causing the greatest relative speed between the members, the abutments have no opening and closing movement, which is a great advantage.

When the abutment-valve is only partly closed to permit the desired degree of slip of the liquid, and consequently the desired difference in relative speed of the members, the engagement of the abutment-valve cams, or contact-surfaces, 29 with the cams, or contact-surfaces 59, carried by the abutment 50, 52, as they pass each other will cause merely initial opening movement of the abutments, this action of the cams being supplemented by the pressure of the liquid upon the abutments to complete opening of the same, against the resistance of the springs 54 and centrifugal force. Thus, as there is never more than momentary contact against the cam-plates, the wear upon the cams will be reduced to a minimum. The pressure of the liquid against the abutment, while passing the abutment-valve, will tend to prevent any such undue obstruction of the channel, beneath the partly open abutment-valve, as to interfere with the liquid slip and thus with the regularity of the relative movement of the driven member. As, owing partly to the recesses 61, the liquid pressure upon the abutments is relieved when they pass the forward end of the abutment-valve, they close along the under surface of the latter under the pressure of their springs and the pressure of the liquid against the under sides of the projecting lips 56. The outer surfaces of the lips 56 are chamfered as stated to fit oil-tight against the surface of the wall 17, and the area of the under side of each lip is equal to, or, and preferably, slightly exceeds the area of the outer surfaces of the cam plates 59. The lips thus operate as pressure equalizers to at least balance the oil-pressure against the cam plates. To prevent oil from packing in the compartment 23 and thus interfere with the movement of the abutment-valve, a small passage 63 extends therefrom to the space 19 behind said valve.

While I prefer to construct my improvements throughout as shown and described,

they may, obviously, be variously modified in the matter of details of construction without departing from the spirit of my invention as defined by the claims.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a power-transmitter of the character described, the combination of independently rotatable outer and inner wheels comprising the driving and driven members and forming between them an annular liquid-holding space, a swinging abutment carried by one of the wheels and closing normally liquid-tight across said space, an abutment forming a valve, carried by the other wheel and adjustable from the outside to varying extents of closure across said space, and means interposed between the wheels in said space for causing the liquid pressure to produce wide opening movement of one of said abutments as it approaches the other, for the purpose set forth.

2. In a power-transmitter of the character described, the combination of independently rotatable outer and inner wheels comprising the driving and driven members and forming between them an annular liquid-holding space, abutments carried by said wheels and movable to open and close across said space, the abutment on one wheel being supported to yield under radial pressure against it of liquid in said space, and means operating as the abutments approach each other to start opening movement of said yielding abutment whereby the liquid pressure acts to complete its opening movement, for the purpose set forth.

3. In a power-transmitter of the character described, the combination of independently rotatable outer and inner wheels comprising the driving and driven members and forming between them an annular liquid-holding space, a swinging abutment carried by one of the wheels, closing normally across said space and supported to yield under radial pressure against it of liquid in said space, an abutment, forming a valve, carried by the other wheel and adjustable from the outside to varying extents of closure across said space, and means carried by the abutments themselves for starting opening movement of said swinging abutment as it approaches the abutment-valve, whereby the liquid pressure acts to complete said opening movement.

4. In a power-transmitter of the character described, the combination of independently rotatable outer and inner wheels comprising the driving and driven members and forming between them an annular liquid-holding space, a swinging abutment pivoted at one end to one of the wheels and formed at its opposite swinging end with an abrupt presser-face at which it closes normally across said space, a swinging valve pivoted

at one end to the other wheel and formed at its opposite swinging end with an abrupt presser-face, the valve being adjustable from the outside to move it at its said abrupt face to varying extents of closure across said space, the abutment and valve being provided with mutually engageable abutment-deflecting contact-surfaces independent of their presser-faces.

5. In a power-transmitter of the character described, the combination of independently rotatable outer and inner wheels comprising the driving and driven members and forming between them an annular liquid-holding space, a swinging abutment pivoted at one end to one of the wheels and formed at its opposite swinging end with an abrupt presser-face at which it closes normally across said space, a valve on the other wheel having an abrupt presser-face and adjustable from the outside to varying extents of closure across said space, the abutment and valve being provided with mutually engageable abutment-deflecting contact-surfaces independent of their presser-faces.

6. In a power-transmitter of the character described, the combination of independently rotatable outer and inner wheels comprising the driving and driven members and forming between them an annular liquid-holding space, swinging abutments carried by one of the wheels and closing normally liquid-tight across said space, an abutment-valve carried by the other wheel and adjustable from the outside to varying extents of closure across said space, means for producing opening movement of the abutments as they approach but before they reach the abutment-valve, and liquid-supplying means for said space behind said abutment-valve, for the purpose set forth.

7. In a power-transmitter of the character described, the combination of independently rotatable outer and inner wheels comprising the driving and driven members and forming between them an annular liquid-holding space, swinging abutments carried by one of the wheels and closing normally across said space, a valve carried by the other wheel and adjustable from the outside to varying extents of closure across said space, and projecting cams carried by the abutments operating by contact with the valve to effect initial movement of the abutments as they approach but before they reach the valve, whereby the liquid pressure acts to complete their opening movements.

8. In a power-transmitter of the character described, the combination of independently rotatable outer and inner wheels comprising the driving and driven members and forming between them an annular liquid-holding space, a swinging abutment pivoted at one end to one of the wheels and formed at its opposite swinging end with an abrupt presser

face at which it closes normally across said space, a valve on the other wheel having an abrupt presser-face and adjustable from the outside to varying extents of closure across said space, and a valve-engaging cam and a pressure-equalizer therefor both projecting from the presser-face of the swinging abutment, for the purpose set forth.

9. In a power-transmitter of the character described, the combination of independently rotatable outer and inner wheels comprising the driving and driven members and forming between them an annular liquid-holding space, a swinging abutment pivoted at one end to one of the wheels and formed at its opposite swinging end with an abrupt presser-face at which it closes normally across said space, a valve on the other wheel having an abrupt presser-face and adjustable from the outside to varying extents of closure across said space, a pair of valve-engaging cams and a pressure-equalizer therefor both projecting from the presser-face of the swinging abutment, and cam-projections on the presser-face of the valve, for the purpose set forth.

10. In a power-transmitter of the character described, the combination of hollow independently rotatable outer and inner wheels comprising the driving and driven members and forming between them an annular liquid-holding space, the inner wheel forming a liquid-reservoir, a swinging abutment carried by one of the wheels and closing normally liquid-tight across said space, an abutment forming a valve carried by the other wheel and adjustable from the outside to varying extents of closure across said space, means interposed between the wheels in said space for causing the liquid pressure to produce wide opening movement of one of said abutments as it approaches the other, and a passage extending from the interior of the inner wheel to said space through which liquid is supplied to the space by centrifugal force.

11. In a power-transmitter of the character described, the combination of independently rotatable outer and inner wheels comprising the driving and driven members and forming between them an annular liquid-holding space, abutments carried by one of the wheels and closing normally liquid-tight across said space, a single swinging abutment-valve carried by the other wheel, spreader-mechanism, operatively engaging the abutment-valve, adjustable from the outside to close the abutment-valve to varying extents across said space, and means for producing opening movement of the abutments as they approach but before they reach the abutment valve, for the purpose set forth.

12. In a power-transmitter of the character

ter described, the combination of independently rotatable outer and inner wheels comprising the driving and driven members and forming between them an annular liquid-holding space, abutments carried by one of the wheels and closing normally liquid-tight across said space, a swinging abutment-valve carried by the other wheel, a spring tending normally to open said abutment-valve, and spreader-mechanism operatively engaging said abutment-valve and adjustable from the outside to close the abutment-valve to varying extents across said space, for the purpose set forth.

FRANK DE COLIGNY.

In presence of—

J. G. ANDERSON,

R. A. SCHAEFER.