

R. JANNEY.
 ROTARY PUMP OR MOTOR.
 APPLICATION FILED MAY 7, 1910.

1,020,285.

Patented Mar. 12, 1912.

3 SHEETS—SHEET 1.

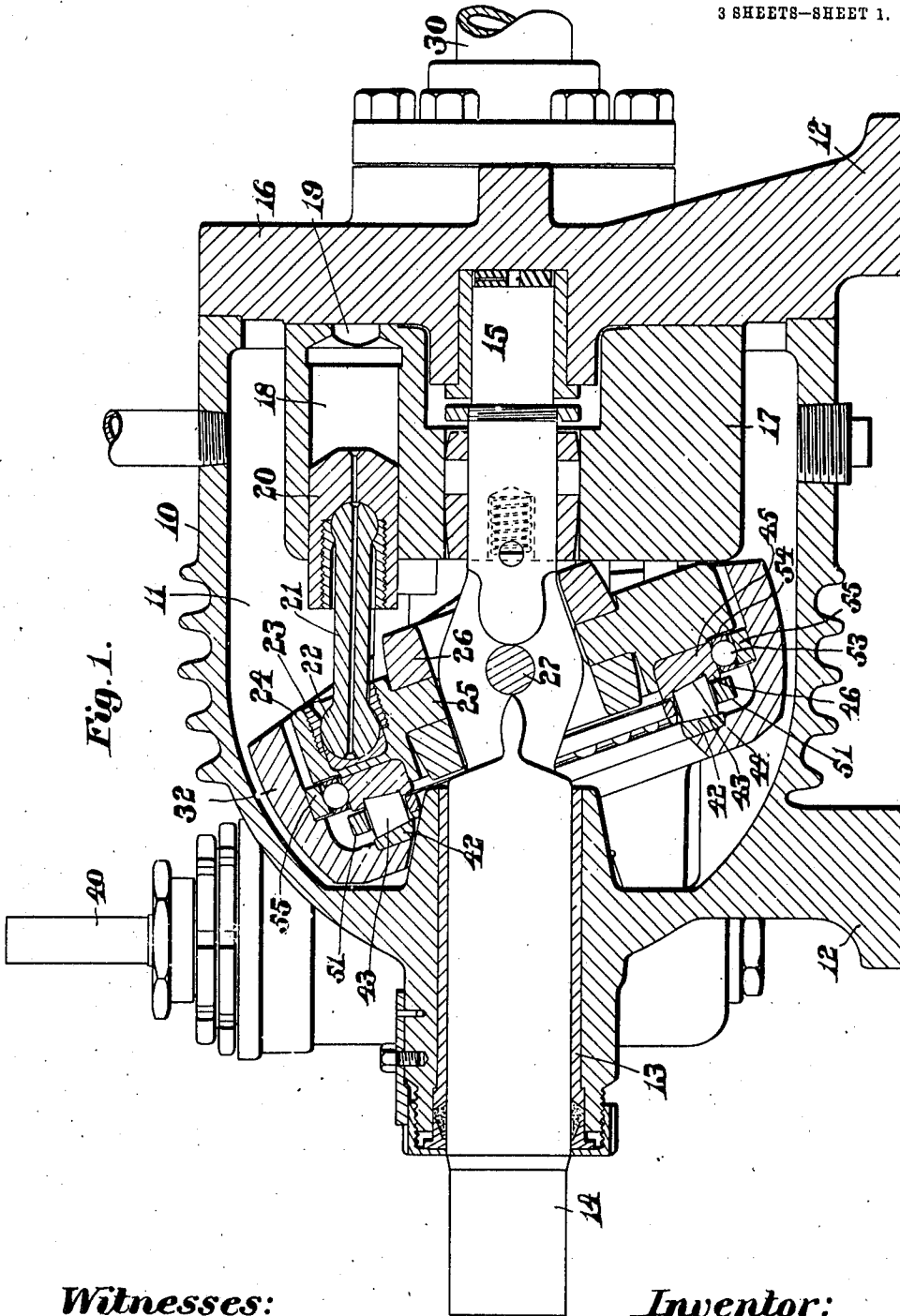


Fig. 1.

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Inventor:
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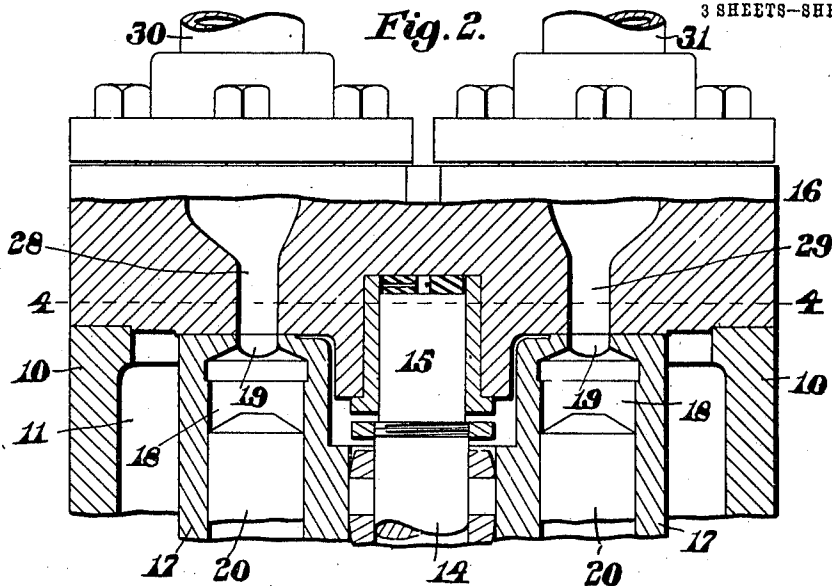


Fig. 3.

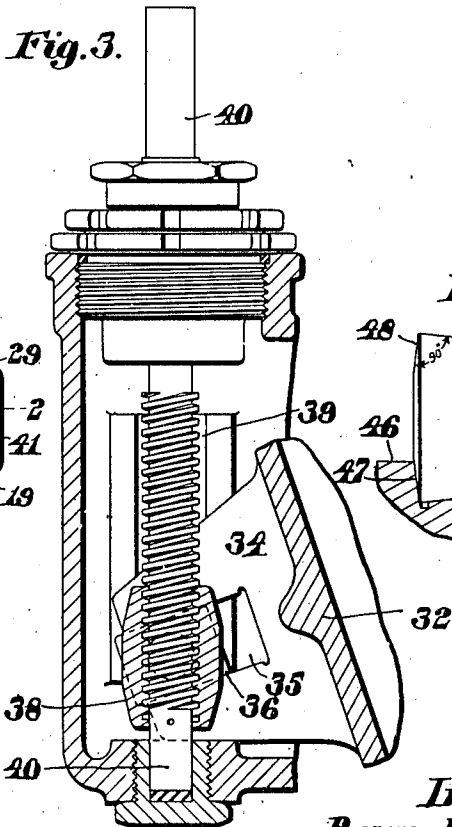
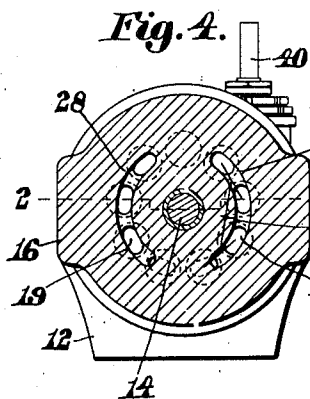
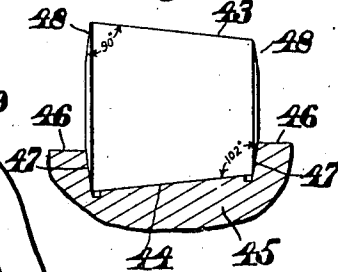


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 6.

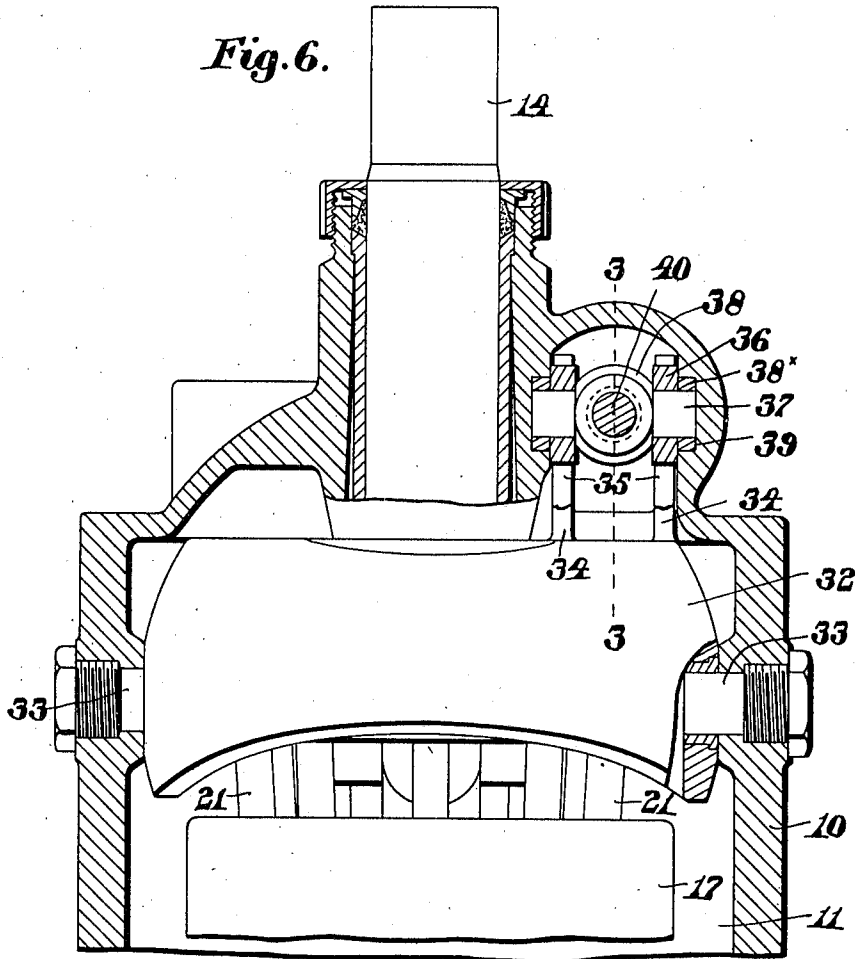


Fig. 7.

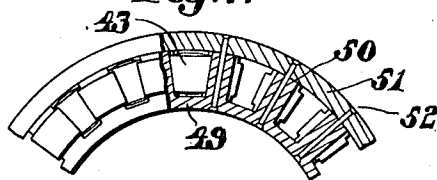
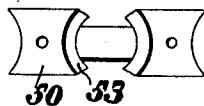


Fig. 8.



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UNITED STATES PATENT OFFICE.

REYNOLD JANNEY, OF NEW YORK, N. Y.

ROTARY PUMP OR MOTOR.

1,020,285.

Specification of Letters Patent.

Patented Mar. 12, 1912.

Application filed May 7, 1910. Serial No. 560,060.

To all whom it may concern:

Be it known that I, REYNOLD JANNEY, a citizen of the United States of America, and a resident of New York, in the county and State of New York, have invented certain new and useful Improvements in Rotary Pumps or Motors, of which the following is a specification.

This invention relates to pumps and particularly to that class of pumps which are used in connection with the variable speed transmission device patented to me June 15, 1909, and numbered 924,787, on which the present application is an improvement.

The invention consists primarily in the provision of two sets of anti-friction members interposed between the revoluble piston driving member and the tilting box or support in which said revoluble member rotates, whereby all end thrusts and radial thrusts are readily provided for in whatever position said rotating member and tilting member may be during the operation of the pump.

The invention further consists in providing the roller path on said rotating member or on said tilting member with one or more annular flanges which form a guide for the conical rollers and insure their travel in a path that is approximately a perfect circle.

The invention further consists in certain novel features of construction and arrangement of parts which will be readily understood by reference to the description of the drawings and to the claims hereinafter given.

Of the drawings: Figure 1 represents a vertical section of a pump embodying the features of the present invention. Fig. 2 represents a partial horizontal section of one end of said device, the cutting plane being on line 2—2 on Fig. 4. Fig. 3 represents a vertical section of the mechanism for tilting the box or support carrying the rotating piston-driving member. Fig. 4 represents a vertical section, the cutting plane being on line 4—4 on Fig. 2. Fig. 5 represents an elevation of one of the conical rollers and showing in section a portion of the flanged roller path. Fig. 6 represents a horizontal section through the casing and showing the tilting box or support and a portion of the cylinder barrel and connecting members in plan. Fig. 7 represents a plan and partial section of a portion of a

roller cage and Fig. 8 represents an elevation of a portion of the inner ring of said cage.

Similar characters designate like parts throughout the several figures of the drawings.

In the drawings, 10 represents a casing having an inner chamber 11 closed at one end and supported by suitable legs 12. The casing 11 is provided at one end with a bearing 13 for a revoluble shaft 14, the opposite end of which is provided with a reduced end 15 having a bearing in the end plate 16 forming a part of the casing 10. Mounted upon and revoluble with the shaft 14 is a cylinder barrel 17 having a plurality of cylinders 18 each provided with a port 19, which ports are of less area than the area of the respective cylinders and are preferably lengthened in the direction of rotation, as indicated in Fig. 4 of the drawings. In each of the cylinders 18 is mounted a piston 20 to which is pivotally attached a connecting rod 21, the opposite end of which is provided with a spherical head 22 mounted in a suitable socket 23 in a ring 24. The ring 24 is provided with diametral trunnions 25 mounted in sockets formed in a ring 26 pivotally connected to the revoluble shaft 14 by a pin 27 at right angles to said trunnions 25.

By this construction the ring 24 is universally connected to the shaft 14 and can readily tilt in either direction during its rotation about the axis of the shaft 14. During this rotation it is obvious that should the ring be tilted to any desired inclination as, for instance, that shown in Fig. 1 of the drawings, the rotation of the shaft 14 will cause the pistons 20 to reciprocate in the cylinders 18 and as the rotation of the rings 24 and the cylinder 17 are coincident the ports 19 will be moved successively into positions opposite the inlet port 28 and then opposite the outlet port 29 in the end plate 16. An inlet pipe 30 communicates with the port 28 and an outlet pipe 31 communicates with the outlet port 29. As the ports 19 are passing the inlet port 28 the pistons 20 will be moving outwardly in the cylinder 18 and drawing fluid into said cylinder which in the travel of the cylinder barrel 17 about the axis of the shaft 14 will be carried into a position opposite the port 29 and by this time the pistons will com-

mence to move toward the ports 19 and the fluid contained within the cylinders 18 will be forced through said ports 19 and 29 into the outlet pipe 31. This operation is all substantially as is clearly set forth and more particularly described in detail in the patent above referred to, to which reference may be had for details of construction not clearly set forth in the specification and drawings forming a part of this application as these features form no part of the present invention.

Within the chamber 11 is pivotally mounted a support or box 32, the pivots for said box being the cylindrical members 33 threaded to the casing 10 and extending into sockets formed in the outer wall of said box 32. This box 32 is provided with two arms 34 each of which is provided with a slot 35, in each of which is adapted to slide a guide block 36 through which extends a trunnion 37 formed upon a nut 38 between said blocks 36, the ends of each of the trunnions 37 extending through another guide block 38* adapted to slide vertically in the groove 39 formed in the casing 10.

A control shaft 40 is threaded to the nut 38 and by turning this shaft the box or support 32 is moved about the pivots 33 to any desired angle, thereby regulating the movement of the pistons in an obvious manner. This construction provides a simple and efficient means for controlling the inclination of the box 32 about the fulcrum pins 33.

A great difficulty which has been found to exist in devices of this class is to provide a means for taking up the end thrust and the radial thrust which the ring 24 is obliged to sustain during its rotation, the main stress being at all times eccentric to the axis of its rotation and varying constantly, depending upon the positions and the number of cylinders in communication with its stationary ports 28 and 29 and subjected to the pressure in said ports. For instance, when the ports 19 are in the positions indicated in Fig. 4 there are four cylinders in communication with each port 28 and 29, and the center of pressure upon the ring 24 will be opposite a point 41, but as the cylinder barrel 10 rotates with the shaft 14 the center of pressure changes its position accordingly, and at the instant a cylinder passes out of or into communication with the stationary port that is under pressure the center of pressure is suddenly shifted to a new position. Moreover, it is obvious that as the fluid is passing into the cylinders 18 through the ports 28 the outward movement of the piston 20 will cause very little stress, if any, to be brought to bear upon the ring 24 but as soon as the ring 24 reaches such a point that owing to its inclination the pistons 20 will be moved

toward the ports 19 to force the fluid from the cylinder 18 all stress will be brought to bear upon said ring and as this stress is at one side of the center of rotation, and as said ring is inclined while the stress is nearly parallel with the axis of the shaft, not only will an end thrust be caused but a radial thrust as well, and it will be of an exceptional and peculiar nature. To provide a means for taking up this end thrust and radial thrust is one of the principal objects of the present invention. To this end the tilting box 32 is provided with a fixed ring 42 having an inclined roller path on which is adapted to travel a plurality of conical rollers 43, said rollers being also provided with another roller path 44 upon a ring 45 carried by the ring 24. This ring 45 is provided with two annular flanges 46, the walls of which are inclined as indicated at 47, these inclined walls being adapted to coincide with the truncated ends 48 of the conical rollers 43. These annular flanges 46 serve to retain the rollers radially within their prescribed path and in some cases, owing to the tendency of the rollers to move outwardly, the outer flange will be sufficient to accomplish this purpose.

The rollers 43 are mounted in a cage formed of a ring 49 having a plurality of radial extensions 50, to the outer ends of which is secured a ring 51 by means of suitable securing members 52. These radial members 50 have their opposed walls concaved as indicated at 53 forming pockets adapted to receive a conical roller 43. When the rollers have been positioned within said pockets and the ring 51 secured to the ends of the radial members 50, the rollers 43 are prevented from becoming accidentally displaced. The concaved walls 53 insure the retention of the rollers 43 in positions with their axes radial to the center of the cage 49—51.

The periphery of the ring 45 is provided with a shallow groove forming a track for a plurality of anti-friction members 53, preferably spherical, said members being mounted in a cage 54. These members 53 travel in the shallow groove in the periphery of the ring 45 and in their travel bear against the inner face of the ring 55 carried by the tilting box 32. These members 53 sustain the radial thrust to which the ring 24 is subjected and retain said ring 45 and its supporting box 32 in coaxial relation to each other.

By means of the construction shown and described, many difficulties which have heretofore existed in devices of this class have been wholly overcome and the thrust to which the device is subjected from many directions is wholly taken care of, and the rollers are retained in a prescribed path coaxial to said ring 45 and its support 32.

It is believed the operation and many advantages of the invention will be fully understood from the foregoing.

Having thus described my invention, I claim:

1. The combination of a stationary member having ports for the passage of fluid; a rotary barrel having cylinders with ports adapted to register with those of said stationary member; pistons in said cylinders; a rotary inclined member connected with said pistons and provided in the face opposite said pistons with an annular grooved path; a support for said rotary inclined member also provided with a roller path; and conical rollers interposed between said paths; and restricted in their end movements by the walls of said grooved path to insure their travel in a perfectly concentric path co-axial with said rotary inclined member and said support.

2. The combination of a stationary member having ports for the passage of fluid; a rotary barrel having cylinders with ports adapted to register with those of said stationary member; pistons in said cylinders; a rotary inclined member connected with said pistons and provided with a roller path directly opposite said pistons; a support for said rotary inclined member also provided with a roller path; conical rollers interposed between said paths; and a flange on one of said roller paths to insure the travel of said rollers in a perfectly concentric path co-axial with said rotary inclined member and said support.

3. The combination of a stationary member having ports for the passage of fluid; a rotary barrel having cylinders with ports adapted to register with those of said stationary member; pistons in said cylinders; a rotary inclined member connected on one face with said pistons and provided on its opposite face with a roller path; a support for said rotary inclined member also provided with a roller path; conical rollers, each having a truncated end, interposed between said paths; and a flange on one of said roller paths having an inclined wall contacting with the truncated ends of said rollers to insure their travel in a perfectly concentric path co-axial with said rotary inclined member and said support.

4. The combination of a stationary member having ports for the passage of fluid; a rotary barrel having cylinders with ports adapted to register with those of said stationary member; pistons in said cylinders; a rotary inclined member connected on one face with said pistons and provided on its opposite face with a roller path; a support for said rotary inclined member also provided with a roller path; conical rollers having truncated ends interposed between said paths; flanges on one of said roller paths

having inclined walls contacting with the truncated ends of said rollers to insure their travel in a perfectly concentric path; and a plurality of additional anti-friction members interposed between the periphery of said rotary member and the walls of the support therefor and retaining them in co-axial alinement.

5. The combination of a stationary member having ports for the passage of fluid; a rotary barrel having cylinders with ports adapted to register with those of said stationary member; pistons in said cylinders; a rotary inclined member connected on one face with said pistons and provided on its opposite face with a roller path; a support for said rotary inclined member also provided with a roller path; conical rollers having truncated ends interposed between said paths; and flanges on the roller paths of said rotating member having inclined walls contacting with the truncated ends of said rollers to insure their travel in a perfectly concentric path co-axial with said rotary inclined member and its support.

6. The combination of a stationary member having ports for the passage of fluid; a rotary barrel having cylinders with ports adapted to register with those of said stationary member; pistons in said cylinders; a rotary inclined member connected with said pistons; a support for said rotary inclined member; a flanged ring carried by said rotary member and provided with a roller path between said flanges; and a plurality of rollers between the flanges of said ring and interposed between said roller path and a similar path on said support, said flanges insuring the travel of said rollers in a path coaxial with said rotary inclined member and its support.

7. The combination of a stationary member having ports for the passage of fluid; a rotary barrel having cylinders with ports adapted to register with those of said stationary member; pistons in said cylinders; a rotary inclined member connected with said pistons; a support for said rotary inclined member; a flanged ring carried by said rotary member and provided with a roller path between said flanges; a plurality of rollers between the flanges of said ring and interposed between said roller path and a similar path on said support; and a plurality of additional anti-friction members between said flanged ring and the inner wall of said support for retaining said ring and support in axial alinement.

8. The combination of a stationary member having ports for the passage of fluid; a rotary barrel having cylinders with ports adapted to register with those of said stationary member; pistons in said cylinders; a revoluble shaft adapted to rotate said barrel; an inclined ring universally connected

to and revoluble with said shaft and connected to said pistons; an annular tilting support for said ring and co-axial therewith; a plurality of revoluble members interposed between the periphery of said ring and the inner wall of said support; a plurality of anti-friction members interposed between the adjacent end faces of said ring member and said ring supporting member; and means on one of said members adapted to retain said anti-friction members in a path co-axial with said members.

9. The combination of a stationary member having ports for the passage of fluid; a rotary barrel having cylinders with ports adapted to register with those of said stationary member; pistons in said cylinders; a revoluble shaft adapted to rotate said barrel; an inclined ring universally connected to and revoluble with said shaft and connected to said pistons having a shallow groove in its periphery; an annular tilting support for said ring and co-axial therewith; a plurality of revoluble members interposed between the periphery of said ring and the inner wall of said support positioned within said groove; a plurality of anti-friction members interposed between the adjacent end faces of said ring member and said ring supporting member; and means on one of said members adapted to retain said

anti-friction members in a path co-axial with said members.

10. The combination of a stationary member having ports for the passage of fluid; a rotary barrel having cylinders with ports adapted to register with those of said stationary member; pistons in said cylinders; a rotary inclined member having an annular grooved path on its opposite face; a plurality of connectors between said inclined member and said pistons; a support for said rotary inclined member having an annular roller path the radius of which is substantially the same as the distance of said pistons from the axis of said rotary barrel; rollers interposed between said paths and restricted to movement in a circular path by the walls of said grooved path; and a plurality of anti-friction members interposed between the periphery of said inclined member and said support and restricted in movement in a circular path concentric to the axis of said inclined member and having a greater radius than that of said roller paths.

Signed by me at New Britain, Conn., this 29th day of April 1910.

REYNOLD JANNEY.

Witnesses:

D. T. HOLMES,
RALPH B. DAY.