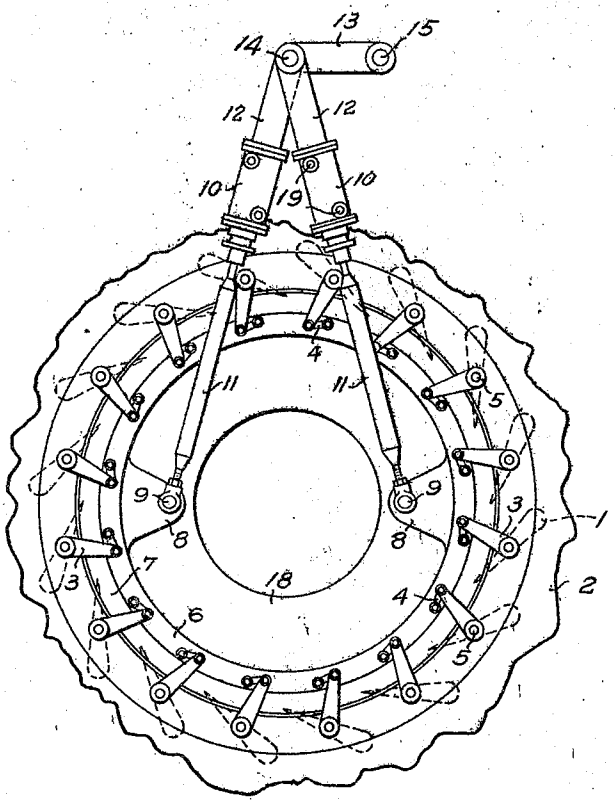
Aug. 30, 1932. J. J. RING 1,873,980

TURBINE GATE MECHANISM

Filed Aug. 2, 1930



Inventor
J. J. Ring
by G. P. Delbrin
Attorney

Patented Aug. 30, 1932 1,873,980

UNITED STATES PATENT OFFICE

JOSEPH J. RING, OF WAUWATOSA, WISCONSIN, ASSIGNOR TO ALLIS-CHALMERS MANUFACTURING COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF DELAWARE

TURBINE GATE MECHANISM

Application filed August 2, 1930. Serial No. 472,522.

This invention relates in general to improvements in the construction and operation of hydraulic machines and relates more specifically to an improvement in the mounting of the cylinders of a pressure operated mechanism for simultaneously adjusting an annular series of pivotally supported inlet guide vanes of hydraulic turbines or the like.

An object of the invention is to provide an arrangement of a pair of pressure cylinder operated turbine gate mechanism whereby the employment of a pit ring as the supporting means for said cylinder is dispensed with. This and other advantages of the present improvement will appear from the following description.

A clear conception of an embodiment of the invention may be had by referring to the drawing accompanying and forming a part of this specification in which like reference characters designate the same or similar parts in the various views.

Fig. 1 is a plan view of one form of turbine gate operating mechanism.

In the plan view shown in Fig. 1 the invention is illustrated as applied to the ordinary conventional setting of turbine with the shifting ring inside the guide vane circle. It will of course be apparent that as far as this invention is concerned that the shifting ring may equally well be at the outside of the guide vane circle. In this structure a speed ring 2 surrounds and supports a cover plate 18 provided with a bearing 7 for a common shifting ring 6 for simultaneously adjusting an annular series of pivotally supported guide vanes 1.

The adjustable guide vanes 1 are supported upon pivots 5 which are journaled in the cover plate 18 and in the lower casing portion, not shown, in a well known manner. The upper extremities of the pivots 5 are connected with the shifting ring 6 through arms 3 and links 4. Shifting ring 6 is provided with diametrically opposite inwardly projecting lugs 8. A pair of fluid pressure regulators or cylinders 10 have their pivotally carried reciprocating piston rods 11 pivotally connected to the lugs 8 on the shifting ring 6. Fluid under pressure may be admitted to and discharged from the chambers within the cylinders 10 at opposite ends of their pistons, not shown, through suitable fluid admission and exhaust pipes 19. The fluid operates on opposite faces of the pistons in the cylinders 10 at any given instant so that one rod 11 moves inwardly and the other rod moves outwardly in the operation of the cylinders.

The new and novel support for the cylinders 10 of the disclosed arrangement of turbine gate operating mechanism which forms the basis of this application will now be described. The support comprises a bracket arm 12 rigidly connected with the free end of each cylinder 10 and which extends generally longitudinally of the cylinder. These arms are of equal lengths and pivoted at their outer ends on a common pivot pin 14 carried at one end of a link member 13 of suitable dimensions and strength. The other end of link member 13 is pivoted to a shaft 15 fixed rigidly to the foundation for the turbine preferably by means of a suitable plate, not shown.

With the operating mechanism of this invention there is a small resultant side or lateral thrust produced by the action of rods 11, against the bearing 7, supporting the shifting ring 6. This side thrust is measured by the vector sum of the forces acting in rods 11. This thrust, if the forces acting in rods 11 are equal, will be the only effective force operating on the pin 14 which joins the arms 12 and will act in the direction of the link member 13 as positioned in Fig. 1. This force is counteracted by tension in the link member 13 pivoted to the fixed shaft 15 which therefore has this amount of force to withstand in order to prevent displacement of the gate operating mechanism. It will be apparent that the value of the thrust will depend upon the angle included between the rods and since a relatively small acute angle is contemplated the thrust will be always very much less than the equal forces in rods 11 and therefore only a limited force is necessary to be carried by the foundation member which supports shaft 15 and the usual pit ring may be dispensed with if other conditions warrant this.

It will thus be seen that applicant's invention eliminates the necessity of using a pit ring to take up the reaction resulting from the operation of the inlet guide vanes, which rings are usually quite heavy and of extensive dimensions and therefore expensive and increases the overall dimensions of the turbine unit, all of which are objectionable features. These objectionable features of the prior pressure cylinder mountings are entirely eliminated by the present invention, since the shaft 15 of the mounting need be only of a limited size and strength to transmit the relatively small value of transverse or side thrust, described above.

It should be understood that it is not desired to limit the invention to the exact details of construction and operation herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

It is claimed and desired to secure by Letters Patent:

1. In a hydraulic turbine gate operating mechanism, a shifting ring, a pair of fluid pressure cylinders having their piston rods pivotally connected to said ring and means for mounting the free end of said cylinders to permit of angular movement and lineal displacement of said cylinders in a predetermined plane.

2. In a hydraulic turbine gate operating mechanism, a shifting ring operatively connected to an annular series of pivotally mounted guide vanes, a pair of fluid pressure cylinders having their rods pivotally connected to said ring and means for mounting the free end of said cylinders so that they make an acute angle with each other, said means also permitting angular movement and lineal displacement of said cylinders.

3. In a hydraulic machine, flow control means, a shifting ring operatively connected to said flow control means, a pair of fluid pressure cylinders having their rods pivotally connected to said ring and means for mounting the free end of said cylinders so that they make an acute angle with each other, said means also permitting angular and lineal displacement of said cylinders.

4. In a hydraulic turbine gate operating mechanism, flow control means, a shifting ring connected to said flow control means, a fixed support, a pair of fluid pressure cylinders having their rods pivotally connected to said ring, a link member pivotally carried by said fixed support and means for pivotally supporting the free ends of said cylinders from said link member.

5. The combination in a hydraulic machine, of a ring adapted for rotary movement, a pair of fluid pressure cylinders each having a piston rod connected to said ring, said cylinders being closely adjacent each other, and means for supporting said cylinders to permit of angular movement and lineal displacement of said cylinders.

6. In a hydraulic turbine gate operating mechanism, a shifting ring operatively connected to an annular series of pivotally mounted guide vanes, a link member, a pivot for said link member, and a pair of fluid pressure cylinders having their rods pivotally connected to said ring and the free end of said cylinders being pivoted on said link member.

In testimony whereof, the signature of the inventor is affixed hereto.

JOSEPH J. RING.