A. VONAESCH.

GATE CASE WITH BALANCED GATES FOR WATER TURBINES.

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1,017,716. Patented Feb. 20, 1912.

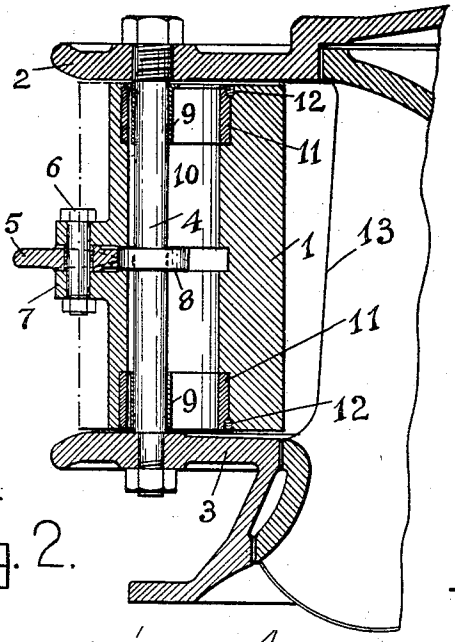

Fig. 2.

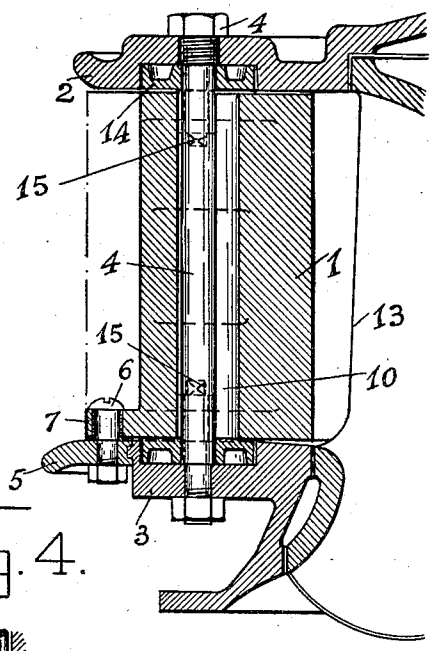

Fig. 4.

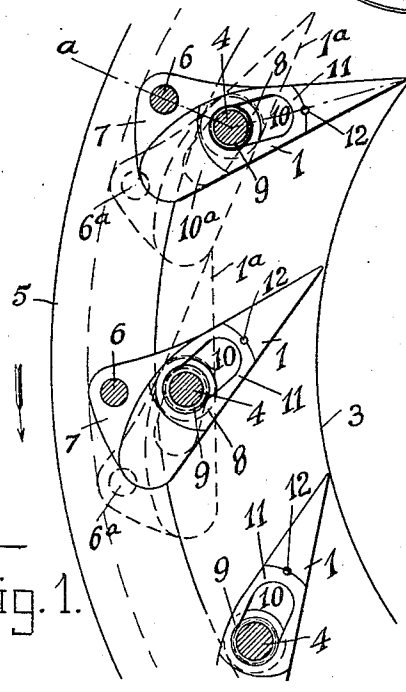

Fig. 1.

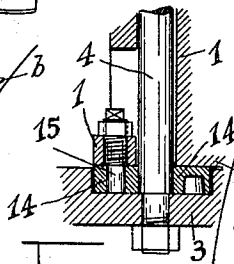

Fig. 5.

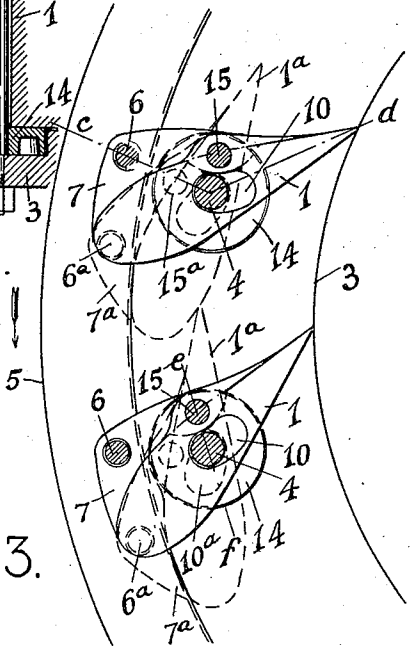

Fig. 3.

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GATE-CASE WITH BALANCED GATES FOR WATER-TURBINES.

1,017,716. Specification of Letters Patent. Patented Feb. 20, 1912.

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To all whom it may concern:

Be it known that I, ARNOLD VONAESCH, a citizen of Switzerland, residing at Owen Sound, in the county of Grey and Province of Ontario, Canada, have invented a new and useful Gate-Case with Balanced Gates for Water-Turbines, of which the following is a specificatiotn.

My invention relates to improvements in gate cases for water turbines having two annular plates, pillars separating said plates and guide buckets or commonly called gates pivoted between the plates. These gates being connected to a ring by means of pins, and provision made for turning said ring and thereby turning the gates around their pivots or shafts, thus regulating the flow of water discharging into the turbine runner. The water flowing between the gates into the runner exerts certain pressures upon the different sides of the gates, the position of the resultant of the pressures being dependent upon the opening between the gates, and it has been found by experiments and in practice that to have the gates balanced, or in other words, to have the pressure resultant pass through the center of the shaft the latter should be nearer the discharge end of the gate at closed position, and nearer the outside end at the open position.

The object of my improvement is to so alter the relative position of gate and shaft during the act of opening and shutting that the gate will be balanced as nearly as practically possible in all the different positions from the open to the closed gate, thus reducing to a minimum the power required to control the gate movement, and also accidents due to runaways and the bursting of pipes and penstocks. I attain these objects by the mechanisms illustrated in the accompanying drawing, in which—

Figure 1, is a plan of a part of the gate case, the top plate or cover being removed, the full lines showing the gates when open and the dotted lines when closed; Fig. 2, is a vertical section through the gate case and part of the turbine runner, the section through the former being on line *a b*, Fig. 1. Figs. 3 and 4 are views similar to Figs. 1 and 2 showing a modification of the mechanism, the section through the gate case in Fig. 4 being on line *c d* Fig. 3, and Fig. 5 is a section through a part of the gate case on the line *e f*, Fig. 3.

Similar letters refer to similar parts throughout the several views.

The gate or guide bucket 1 is pivoted between the annular plate or cover 2 and bottom plate 3, shaft or pivot 4 serving at the same time as a pillar, holding plates 2 and 3 apart. The gates 1 are connected together for the purpose of opening or shutting by means of gate ring 5, a pin 6 being put through lug 7 of gate 1 and through the gate ring. Roller 8, Figs. 1 and 2 constitutes a guide for gate ring 5. By turning gate ring 5 in the direction of the arrow the gates will gradually be turned and at the same time shifted from open position 1 into the closed position 1^a, thus shutting off the water discharging into the turbine runner 13. To reduce friction and wear to a minimum sleeves 9 are provided which will turn around shaft 4 and roll on either side of slot 10 while the gate is being opened or shut and said slot 10 is bushed by a brass bushing 11, held in place by a set screw or pin 12.

It follows from the preceding that by moving gate ring 5 in the opposite direction of the arrow the gate movements will be inversed.

Referring to the modification in Figs. 3, 4 and 5, instead of having the gate 1 slide in slot 10, Figs. 1 and 2, a link motion may be applied, disk 14 forming said link. Shaft 4 serving again as separating pillar for plates 2 and 3 passes also through disk 14, having a sliding fit, while the gate proper is connected to said disk by means of pin 15, as slot 10 insures free movement of gate 1 with regard to shaft 4 it follows that by turning gate ring in the direction of the arrow, gate pin 6 being secured to gate ring 5 and passing through lug 7 of gate 1 will cause the latter to turn around pin 15 and pin 15 passing through disk 14 will turn disk 14 around shaft 4, thus causing again the gate to be turned and shifted from the extreme open position 1, shown in full lines Fig. 3, to the closed position 1^a, shown in dotted lines in the same Fig. 3.

From the above description it is evident that by applying either of the two mechanisms, the gates can be opened or shut and

at the same time their position with regard to the shaft or pivot altered, as above mentioned and while I prefer the two mechanisms shown, I do not wish to be limited to the same.

I am aware that other devices have been invented for balancing the gate, but they have all a stationary shaft around which the gate turns, having a true circular motion, and I am not aware of any similar gate having combined turning and sliding motions.

I claim:

1. In a gate case for turbines, a gate, a pivot for said gate, and means for swinging said gate around its pivot and simultaneously shifting the pivoted point with respect to the gate.

2. In a gate case for turbines, a post, a gate pivoted thereon in such position that the pressures on the gate on each side of the post are equal during open gate position, and means for shifting the gate on said post whereby the pressures on the gate on each side of the post are maintained equal during closed or partially closed position.

3. In a gate case for turbines, a slotted gate, a post pivotally supporting the gate passing through said slot, a gate ring, and a pin pivotally connecting the gate and gate ring.

4. In a gate case for turbines, a cover plate and a bottom plate, a gate having a slot therethrough located between said plates, a post holding said plates apart passing through the slot of said gate, and a gate ring pivoted to the gate.

5. In a gate case for turbines, a cover plate and a bottom plate, a gate having a slot therethrough located between said plates, a post holding said plates apart passing through the slot of said gate, and means connected to the gate arranged to revolve the gate around the post and simultaneously move the gate longitudinally with respect to the post.

6. In a gate case for turbines, a cover plate and a bottom plate, a post holding said plates apart, a gate pivotally mounted on said post between the plates, and means for rotating the gate around the post to a closed position and simultaneously sliding the gate whereby the point of pivotal suspension is brought nearer the point of the gate.

7. In a gate case for turbines, a cover plate and a bottom plate, a post holding said plates apart, a gate having a longitudinal slot therein through which the post passes, and means connected to the gate arranged to revolve the gate around the post to a closed position, and simultaneously slide the gate longitudinally whereby the point of the gate is brought nearer to the post.

8. In a gate case for turbines, a cover plate and a bottom plate, a post holding said plates apart, a gate having a longitudinal slot therein through which the post passes, a bushing in said slot, a revoluble sleeve on the post within said bushing, a lug at the outer end of said gate, a gate ring, and a pivotal connection between the gate ring and gate lug.

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