

S. L. BERRY.
 REGULATING GATE FOR WATER WHEELS.
 APPLICATION FILED MAY 13, 1911.

1,025,240.

Patented May 7, 1912.

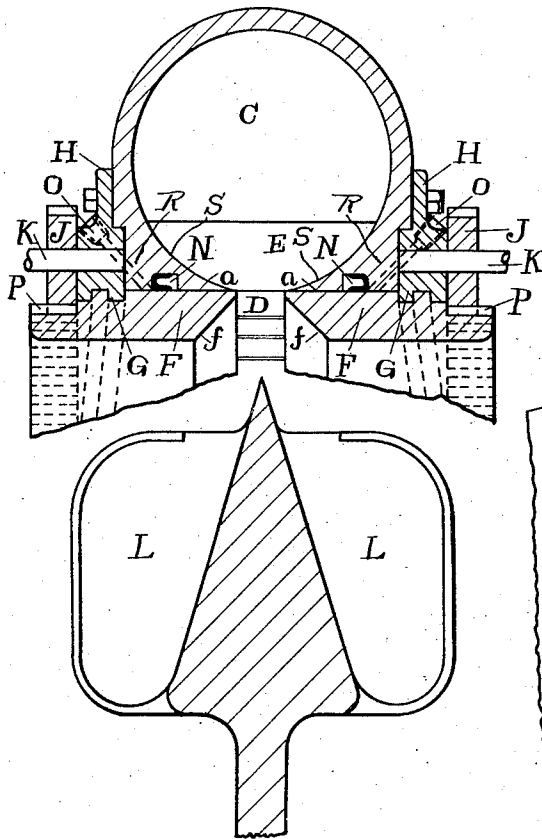


Fig. 2.

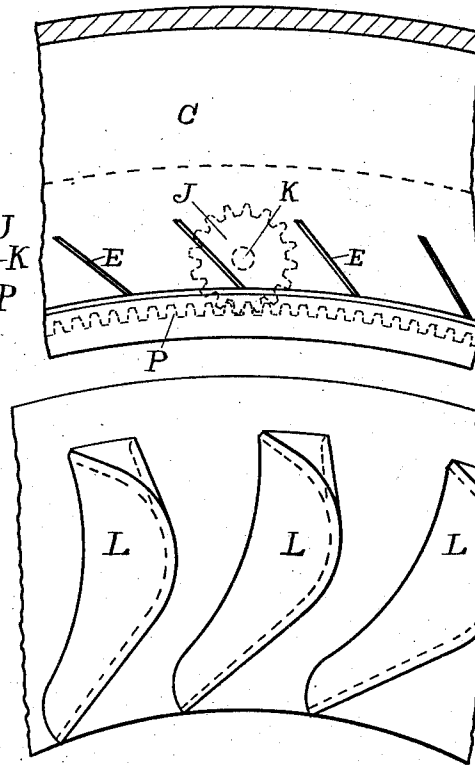


Fig. 3.

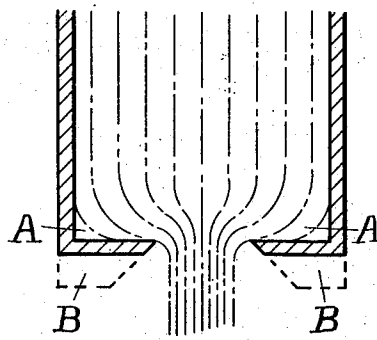


Fig. 1.

WITNESSES
Anna Berry
John Faulder

INVENTOR
Seneca Lucien Berry

UNITED STATES PATENT OFFICE.

SENECA LUCIEN BERRY, OF SUNNYVALE, CALIFORNIA.

REGULATING-GATE FOR WATER-WHEELS.

1,025,240.

Specification of Letters Patent.

Patented May 7, 1912.

Application filed May 13, 1911. Serial No. 627,034.

To all whom it may concern:

Be it known that I, SENECA LUCIEN BERRY, a citizen of the United States, residing at Sunnyvale, in the county of Santa Clara, State of California, have invented certain new and useful Improvements in Regulating-Gates for Water-Wheels, of which the following is a specification.

My invention relates to that class of regulating gates for water wheels in which the area of discharge is made to increase and decrease in order to control the quantity of water flowing therefrom, and the object of my improvement is to provide a mechanism of high efficiency, few parts and having its sliding surfaces removed from the controlled fluid and therefore capable of being lubricated. This object is attained by the construction shown in the accompanying drawing, in which—

Figure 1 is a diagram showing the type of orifice from which my improved regulating gate has been developed; Fig. 2 a cross section and Fig. 3 a longitudinal section showing the gate and its relation to the wheel or runner.

Similar letters refer to similar parts throughout the several views.

Fig. 1, shows the form of the jet which issues from an orifice in a plate which has the outer metal cut away to produce a more or less sharp edge. This type of orifice and the resultant jet are fully treated in all complete works on hydraulics, and it is shown that the amount of contraction of the jet depends upon the shape and proportions of the parts of the vessel and orifice. It is well known that replacing the water in the corners at A A with metal produces a less contraction of the jet, and that thickening the plate as shown by dotted lines at B B, when done in a manner to permit free access of atmospheric pressure, produces no effect upon the jet. It will be seen that the water does not touch any part of the mechanism after it leaves the inner edge. It also follows, from the principles controlling flowing water, that, if the corners A A are not filled with metal, there will be greater static pressure and therefore greater tendency to leak at those points than nearer the discharge opening where the water has more nearly attained its full spouting velocity.

My improved regulating gate is a modification or extension of my contractible nozzle

for which I filed an application for a patent on Jan. 31, 1911, Serial Number 605,829, the modification consisting of such an arrangement of parts as to allow the application of water around the entire circumference of a water wheel, or to such part of the circumference as may be desired.

In Figs. 2 and 3, my improved gate is shown as applied to the water wheel described in my application for a patent, Serial Number 462,882, filed Nov. 16, 1908, but I do not limit it to that particular wheel, but claim that it is applicable to other water wheels as well.

Referring to Figs. 2 and 3, C is a conduit through which water is supplied to the orifice D, being directed and guided by the vanes E E, while the circular plates F F, having their inner edges *f f* beveled outwardly, form the adjustable parts of the gate. It is the movement of these plates F F to and from each other, either singly or together, which controls the quantity of water flowing to the wheel, and thereby regulates the amount of power to be developed. Of several means of effecting this movement, I have selected for illustration a combination of screw threads G G, connecting the movable plates F F to the fixed rings H H, with gear teeth P P on the movable plates F F and fixed pinions J J operated by the shafts K K. A rotary motion of the shafts K K imparts a rotary motion to the plates F F, which, by means of the screw threads G G, cause the said plates F F to advance or recede as determined by the direction of the motion and the character of the screw threads. After issuing from the orifice D the water enters the buckets L L of the water wheel or runner and imparts motion to it.

As the prime object of this improvement is to prevent, as far as possible, the tendency to leak along the contact surfaces between the conduit C and the movable plates F F, I fill in the corners R R of the conduit on the side next to the wheel, carrying the discharge surfaces S S close to the edges of the movable plates F F when these are spread to their maximum distance, and having the said discharge surfaces terminate at an abrupt angle to the flow line of the jet. By abrupt angle is meant one which forces the water flowing over the discharge surfaces S S to make an abrupt turn to con-

form to the jet flow line, as shown by the outer threads of water in Fig. 1, which show a turn of 90 degrees, while in Fig. 2 it is somewhat less. It is this change in direction of the outer threads of water which forces the jet to flow clear of the outer parts of the nozzle plates F F. I prefer the curved discharge surfaces shown in Fig. 2, but a limited modification of this shape has no more effect than to change the shape of the jet. The more nearly the terminating angle approaches a right angle the less will be the tendency to leak, but practical considerations make it necessary to depart somewhat from this angle and to provide other means of overcoming the slight tendency to leakage.

With the orifice D opened to its widest extent there is only a slight tendency to leak along the surfaces *a a* between the movable plates F F and the conduit C, since the water has attained, practically, its full spouting velocity. As, however, the orifice is closed more and more and its edges recede from the terminating edges of the conduit C, this tendency increases, and, to prevent leakage, packing rings N N are provided. Lubrication is effected by means of passages reaching the wearing surfaces from the outside, a simple form being shown at O O.

It is evident that, by partially closing the exit from the conduit C, water may be applied to any part of the circumference of the water wheel, and that, under such conditions, the circular plates F F may be made less than full rings by suitable variations in the operating mechanism.

Having thus described my invention, what I claim and desire to secure by Letters-Patent, is:

1. In a regulating gate for water wheels, the combination of a circumferential water conduit having its discharge surfaces disposed at an abrupt angle to the flow line of the jet, with movable circumferential plates

having their inner edges beveled outwardly, substantially as described.

2. In a regulating gate for water wheels, the combination of a water conduit having its discharge surfaces disposed at an abrupt angle to the flow line of the jet, guide vanes, movable circumferential plates having their inner edges beveled outwardly, and packing placed between said movable plates and said conduit, substantially as described.

3. In a regulating gate for water wheels, the combination of a water conduit having its discharge surfaces disposed at an abrupt angle to the flow line of the jet, movable circumferential plates having their inner edges beveled outwardly, and means for operating said movable plates singly or together, substantially as described.

4. In a regulating gate for water wheels, the combination of a water conduit having its discharge surfaces disposed at an abrupt angle to the flow line of the jet, movable circumferential plates having their inner edges beveled outwardly, and means for lubricating the contact faces of said conduit and said movable plates, substantially as described.

5. In a regulating gate for water wheels, the combination of a water conduit having its discharge surfaces disposed at an abrupt angle to the flow line of the jet, movable circumferential plates having their inner edges beveled outwardly, packing placed between said conduit and said movable plates, means for operating said movable plates singly or together, and means for lubricating the contact surfaces of said conduit and said movable plates, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

SENECA LUCIEN BERRY.

Witnesses:

ANNA BERRY,
JOHN FAULDS.