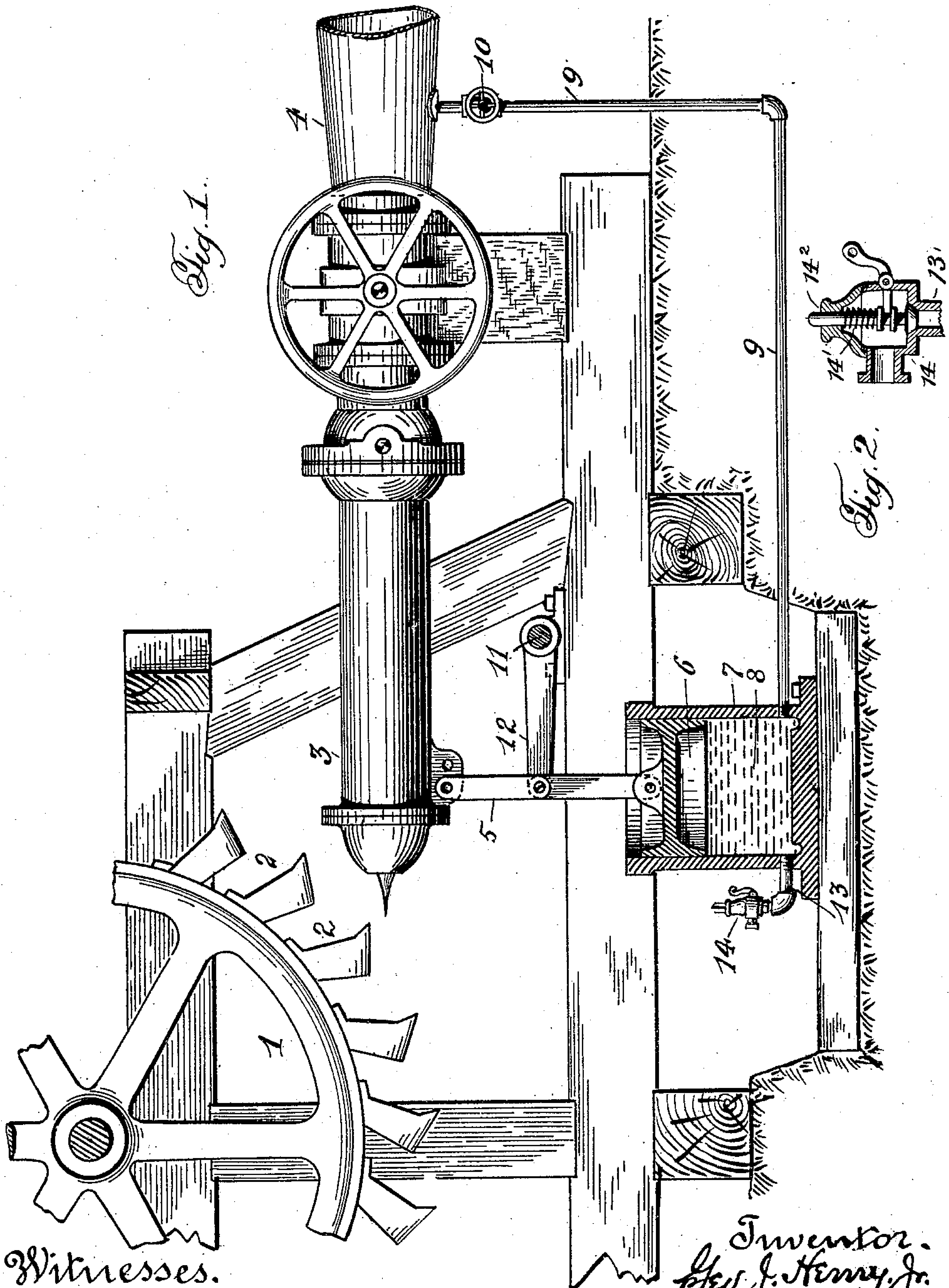
No. 810,756. PATENTED JAN. 23, 1906.

G. J. HENRY, Jr.

HYDRAULIC SUPPORT FOR DEFLECTING NOZZLES.

APPLICATION FILED OCT. 15, 1904.



Witnesses.
F. E. Monteverde
Walter N. Vane.

Inventor.
Geo. J. Henry, Jr.
by N. A. Acker
his atty.

NORRIS PETERS, INC., LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

GEORGE J. HENRY, JR., OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-HALF TO THE PELTON WATER WHEEL COMPANY, OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

HYDRAULIC SUPPORT FOR DEFLECTING NOZZLES.

No. 810,756. Specification of Letters Patent. Patented Jan. 23, 1906.

Application filed October 15, 1904. Serial No. 228,550.

To all whom it may concern:

Be it known that I, GEORGE J. HENRY, JR., a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Hydraulic Supports for Deflecting Nozzles; and I do hereby declare the following to be a full, clear, and exact description of the same.

The present invention is more particularly designed for use in connection with a deflecting nozzle for controlling the discharge of a propelling stream onto the buckets or vanes of an ordinary tangential water-wheel, the object of the invention being to support the outer end of the deflecting nozzle and hold the same in any of its adjusted positions by means of pressure from the main or line pipe supply, thereby dispensing with the heavy adjustable weight ordinarily employed for counterbalancing the weight of the said deflectable nozzle and making the nozzle more sensitive and responsive to the action of the governor mechanism which actuates the same than is possible by the use of such counterbalance-weight.

To comprehend the invention, reference should be had to the accompanying sheet of drawings, wherein, in Figure 1, is illustrated inside elevation an ordinary tangential water-wheel, a deflectable nozzle pivoted to the main pipe-line, the hydraulic cylinder and piston therein, said cylinder and piston being sectioned vertically, connection between the piston and the nozzle, and connection of the piston-stem and an actuating rock-shaft, also communication between the cylinder and the main or line pipe. Fig. 2 is a detail view, partly in section, of the valve 14 hereinafter referred to.

In the drawings the numeral 1 is used to designate an ordinary tangential water-wheel with the bucket 2 applied to the periphery thereof, and 3 a movable nozzle or deflectable device for directing an impelling stream onto or off of the bucket 2 of the wheel 1. This nozzle 3 is pivoted to the end of the main or line pipe 4, which supplies water to the nozzle 3. These parts are of the usual construction and the working thereof well understood to those skilled in the art.

To the outer end portion of the deflectable nozzle 3 is attached the upper end of the jointed piston-stem 5, said stem at its lower end carrying the piston 6. It will be understood that the connection between the piston-stem 5, the deflectable device 3, and the piston 6 is a jointed one in order that the said piston-stem may be free to swing in accordance with the arc described by the movement of the deflectable device 3. This piston works within the stationary pressure-cylinder 7, it being supported therein by the body of liquid 8. In the present case the body of liquid consists of water delivered into the said cylinder 7 under pressure from the main or line pipe 4, communication between the said line-pipe and the cylinder 7 being established by means of the branch supply-pipe 9, the flow of water being regulated by the controlling-valve 10.

The nozzle 3 is operated by the movement of a rock-shaft 11, which rock-shaft is connected to the governor mechanism (not shown) by any suitable form of connection. From the rock-shaft 11 extends a crank-arm 12, which crank-arm forms connection between the said rock-shaft and the piston stem or rod 5, so that as the rock-shaft is moved to raise or lower the crank-arm 12 the piston stem or rod is carried therewith.

To relieve the cylinder 7 of its liquid during the downward movement of the piston 6 upon the nozzle being deflected, rather than force the liquid back into the main or line pipe 4, there is provided an escape or outlet pipe 13, which leads from the lower end of the said cylinder. In this escape or outlet pipe there is arranged any suitable form of an escape or safety valve 14, which valve is unseated or raised from its seat by the pressure of the retained liquid exerted thereon upon the downward movement of the said piston, which pressure exceeds that of the maintained pressure from the main or pipe line 4. The resisting pressure of the valve 14 may be varied by simply increasing or decreasing the tension of the spring 14′, which may be accomplished by adjusting the cap 14^2. As the nozzle 3 is raised or elevated it is held in such adjusted position by the water-pressure admitted into the cylinder 7 back of the piston from the main or line pipe 4.

The described hydraulic support for the deflectable nozzle is extremely sensitive to any variation as to the nozzle's position and

for such reason renders the same of great value where quick adjustment or change of the nozzle is required to direct a greater or less area of the impact-stream onto the buckets of the wheel to meet the requirements of sudden load changes placed onto the wheel.

The diameter of the piston operating in cylinder 7 should be made such that the pressure supplied from the main pipe 4 through the connecting-pipe 9 will exert a pressure to relieve the downward pressure exerted by the nozzle or stream deflectable means. It will be noted that by throttling the pressure in connecting-pipe 9 by valve 10, and so adjusting valve 14 as to permit of a slight discharge, the pressure exerted against the piston in cylinder 7 may be reduced, thus providing an adjusting means to counterbalance the deflectable nozzle.

Having thus described the invention, what is claimed as new, and desired to be protected by Letters Patent, is—

1. The combination with a deflectable nozzle for water-wheels, of hydraulic means for supporting the said nozzle when at rest, and mechanism for controlling the position of the nozzle.

2. The combination with a deflectable nozzle for water-wheels, of a cylinder, a piston working therein, a liquid-support within the cylinder for the piston, of connection between the piston and the nozzle, a rock-shaft, and means for imparting the movement of the rock-shaft to the nozzle in order to adjust the position thereof:

3. The combination with a deflectable nozzle, of a main or line pipe to which the same is pivoted, a pressure-cylinder, of connection between the said cylinder and the main or line pipe, a piston working within the cylinder, connection between the piston and the nozzle, and means for imparting movement to the said nozzle so as to place the stream discharged therefrom in whole or in part onto the buckets of a water-wheel.

4. The combination with a deflectable nozzle, of a main or line pipe to which the same is pivoted, a pressure-cylinder, of means for admitting fluid under pressure thereto, a piston working within the said cylinder, connection between the piston and the nozzle, and means for moving the nozzle so as to direct the stream discharged therefrom in whole or in part onto the buckets of a water-wheel.

5. The combination with a deflectable nozzle, of a main or line pipe to which the same is pivoted, a pressure-cylinder, of connection between said cylinder and the main or line pipe for admitting fluid thereto under pressure, a piston working within the cylinder, a valved outlet for the said cylinder, connection between the piston and the nozzle, and means for adjusting the position of the nozzle so as to direct the stream discharged therefrom in whole or in part onto the buckets of a water-wheel.

6. The combination with a water-wheel, of a main-line supply-pipe, a deflectable device located at the outer end of the supply-pipe for changing the position of the jet issuing therefrom, of hydraulic means for balancing said device, and mechanism for controlling the position of the deflectable device.

7. The combination with a water-wheel, of a main-line supply-pipe, a deflectable device located at the end of the supply-pipe for changing the position of the jet issuing therefrom, and fluid-actuated means for balancing said deflectable device.

8. The combination with a water-wheel, of a main-line supply-pipe, a deflectable nozzle pivoted to the outer end of the supply-pipe, said nozzle being rigid throughout its length, mechanism for varying the position of said nozzle to direct the jet issuing therefrom onto or off the buckets of the water-wheel, and fluid-actuated means for balancing the said nozzle.

In witness whereof I have hereunto set my hand.

GEORGE J. HENRY, JR.

Witnesses:
N. A. ACKER,
D. B. RICHARDS.