No. 785,900. PATENTED MAR. 28, 1905.

J. W. MACFARLANE.

REGULATOR FOR WATER WHEELS.

APPLICATION FILED MAY 27, 1901.

Fig 1

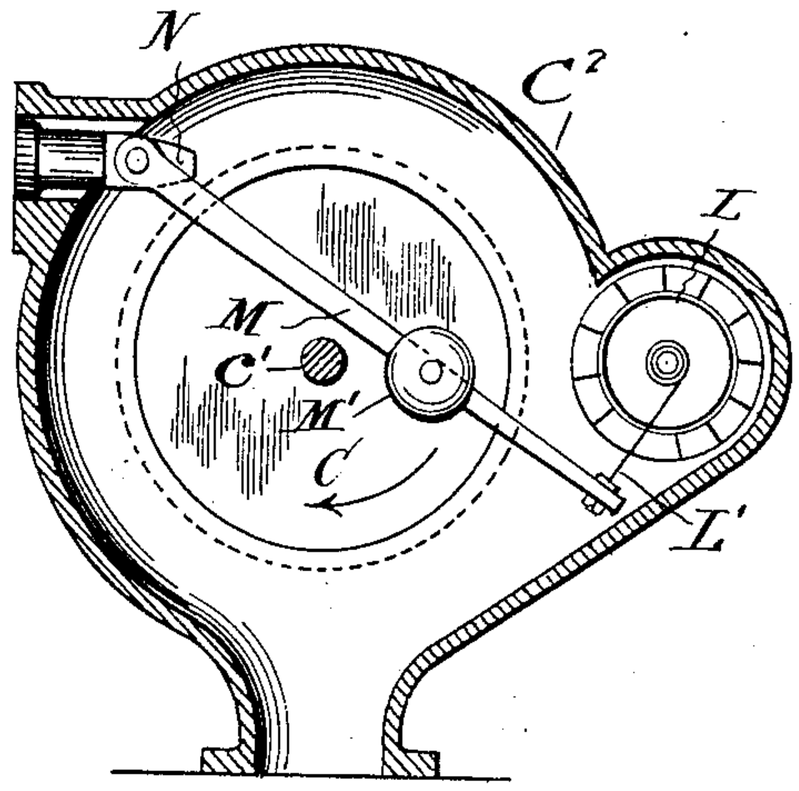


Fig. 2.

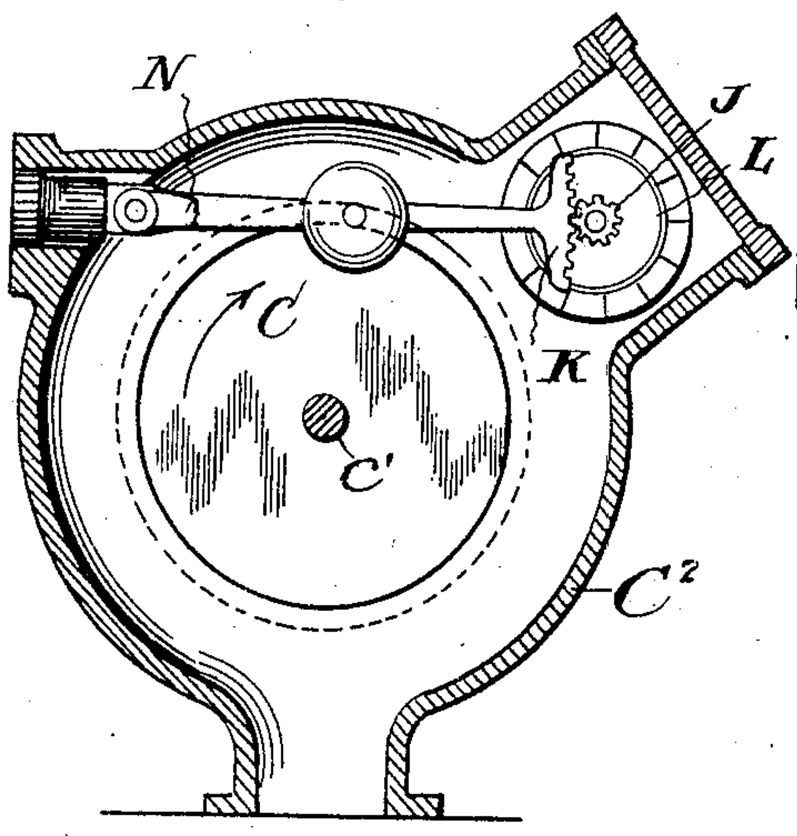
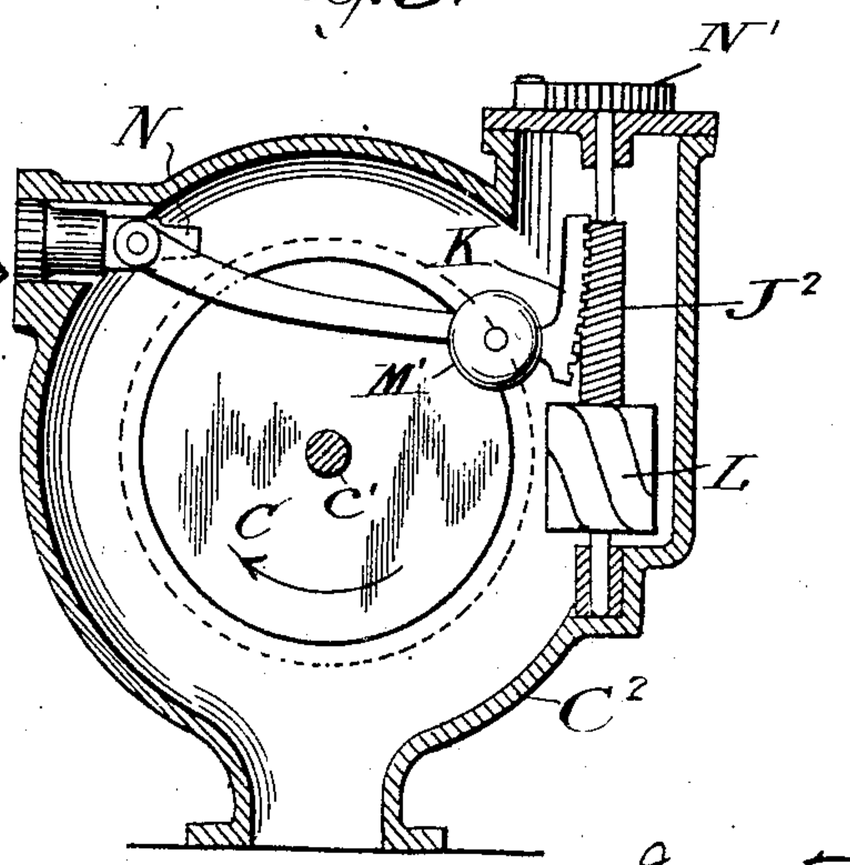


Fig. 3.



Witnesses.
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No. 785,900. Patented March 28, 1905.

UNITED STATES PATENT OFFICE.

JAMES WRIGHT MACFARLANE, OF GLASGOW, SCOTLAND.

REGULATOR FOR WATER-WHEELS.

SPECIFICATION forming part of Letters Patent No. 785,900, dated March 28, 1905.

Application filed May 27, 1901. Serial No. 62,110.

To all whom it may concern:

Be it known that I, JAMES WRIGHT MACFARLANE, a subject of the King of England, residing at Glasgow, Scotland, have invented certain new and useful Improvements in Regulators for Water-Wheels, of which the following is a specification.

This invention relates to speed governors or regulators for fluid-pressure wheels, rotary water-wheel turbines, or the like. In this class of devices, in which the fluid issues from a nozzle or nozzles so as to strike in a direction tangential to the wheel, the fluid in starting strikes the buckets of the wheel and is immediately thrown backward. As the speed of the wheel increases this backward motion of the escaping or spent fluid becomes less, until the correct speed is reached, when the fluid merely drops free of the wheel without backward motion. If, however, the speed of the wheel becomes greater than the correct speed, the escaping fluid has a forward motion in the direction of the rotation of the wheel.

It is the object of my invention to provide an improved means which will take advantage of the variations of the flow of the spent fluid to regulate the speed of the wheel.

The improvement consists of the parts and the combination of parts more fully hereinafter described, and pointed out in the appended claims.

In the drawings, Figure 1 is a section through the casing which usually surrounds the wheel, said wheel being shown by means of a full-line circle and a dotted-line circle, and a view of one form of my invention mounted within the casing. Fig. 2 is a view similar to Fig. 1 of another form of my invention, and Fig. 3 is also a view similar to Fig. 1 of still another form.

The casing C^2 has mounted therein, on a horizontal axis c', a wheel C, which rotates in the direction of the arrow, and an outlet is provided for the casing at its bottom. Upon one side of the wheel C is a nozzle N, which delivers fluid in a direction tangential to the wheel and a line central to the periphery of the wheel. Upon the other side of the wheel is mounted independently of the wheel C an oscillatory device L, which is connected to the nozzle by means of a lever M, connected at one end thereto and at the other end to the nozzle N. When the fluid strikes the oscillatory device L, the end of the lever to which the said oscillatory device is connected is turned, thereby turning the valve of the nozzle N to reduce supply of fluid.

In the construction shown in Fig. 1 the oscillatory device is of the form of a wheel with buckets and is mounted on a horizontal axis parallel with the axis of the wheel C. Attached at one end of the shaft of the wheel or oscillatory device L is a cable L′, the other end of the cable being attached to one end of the lever M. The fluid issuing from the nozzle N when the speed of the wheel C becomes excessive strikes the buckets and oscillates the device L, thereby winding the cable L′ around the shaft of the device L and moving the lever to cut off the supply through the nozzle N. When the wheel C slows up, a means, such as the weight M′, moves the lever in the other direction and opens the nozzle N.

In the construction shown in Fig. 2 the connection between the oscillatory device L and the lever M consists of a gear J on the shaft of the oscillatory device, which gear meshes with a rack K on the end of the lever. The water impinges the upper blades, passing over the wheel L and rotating the wheel clockwise.

In the construction shown in Fig. 3 the oscillatory device is of helicoidal form, is mounted upon a vertical shaft or at right angles to the axis of the wheel C, and carries a worm-gear J^2, which moves with it, and the fluid strikes the helicoidal wheel, which it oscillates to move the lever M through the worm J^2 and the rack K. When the helicoidal wheel is oscillated by the fluid, tension is placed on a convolute coiled spring N′, secured at one end to the shaft of the wheel L and at its other end to the casing of the motor, so that when the spent fluid ceases acting upon the wheel L the spring will assist the weight M′ to open the nozzle N.

It is to be understood that various changes in form, proportion, and minor details may

be made in the constructions herein shown without departing from the spirit of my invention.

I claim—

1. In a device of the class described, the combination with a casing, having an opening in its bottom the rotary wheel, mounted on a horizontal axis therein, and a nozzle located upon one side of the axis of the wheel, delivering fluid tangentially thereto on the top of the wheel and in a line central to the periphery thereof, of an oscillatory device circular in cross-section, provided with blades around its entire periphery, located upon the other side of the axis of the wheel and in alinement with the periphery of the wheel and the nozzle and moved in one direction only by the spent fluid, a lever connected at one end to the nozzle and at the other end with the oscillatory device which raises the same, and a weight carried by the lever for lowering the end of the lever connected with the oscillatory device to open the nozzle.

2. In a device of the class described, the combination with the rotary wheel, and a nozzle located upon one side of the axis of the wheel, of an oscillatory device located upon the other side of the axis of the wheel, a lever connected at one end to the nozzle, a rack provided upon the other end of the lever, a gear moving with the oscillatory device, and meshing with the rack upon the lever to move said lever in one direction to close the nozzle, and automatic mechanical means for moving the lever in the other direction when the spent fluid ceases to play upon the oscillatory device.

3. In a device of the class described, the combination with the rotary wheel, and fluid-delivering means, of an oscillatory helicoidal device in the path of the spent fluid, and connections between the oscillatory helicoidal device and the fluid-delivering means.

4. In a device of the class described, the combination with a casing, a rotary motor and fluid-delivering means, of an oscillatory helicoidal device, a vertical shaft on which the oscillatory device is mounted, a coiled spring secured to the casing, and to the shaft, a worm-gear moving with the oscillatory device, and a lever secured at one end to the fluid-delivering means and provided at its other end with a rack which meshes with the worm-gear.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES WRIGHT MACFARLANE.

Witnesses:
JOHN SIDDLE,
AGNES MACKINTOSH.