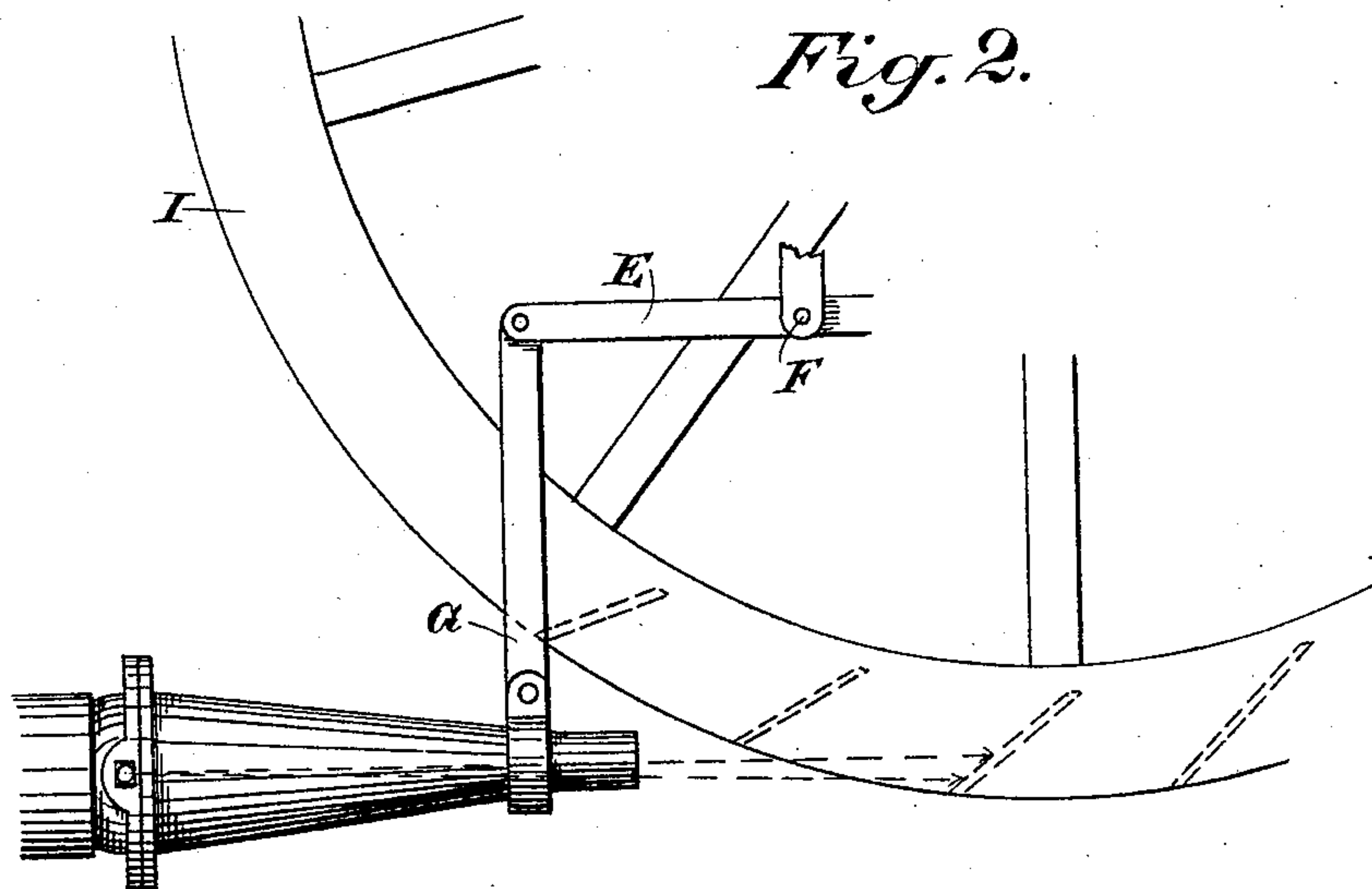
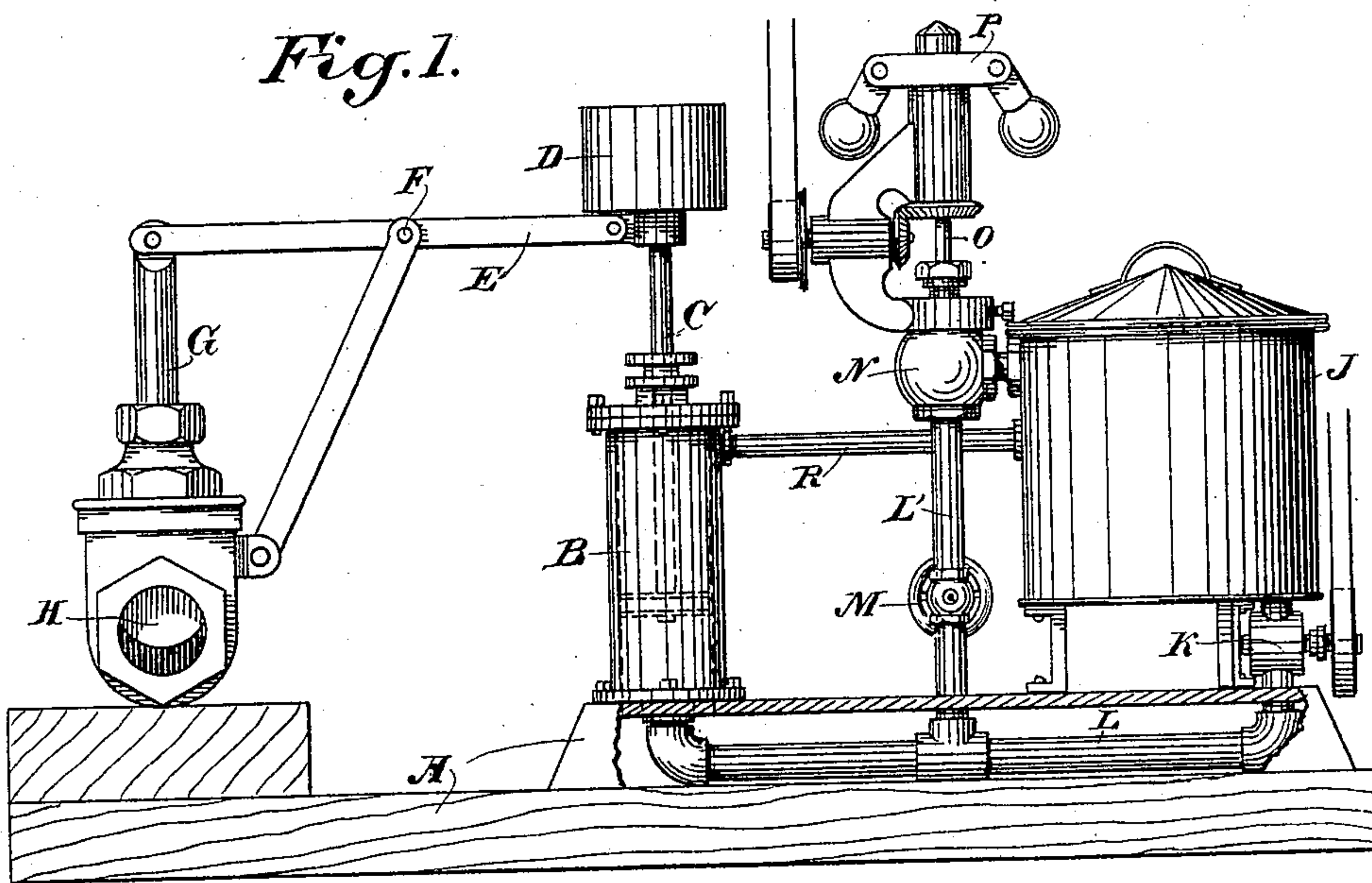


(No Model.)

S. J. TUTTHILL.  
GOVERNOR.

No. 589,378.

Patented Aug. 31, 1897.



Witnesses,  
J. H. Morse  
J. F. Alscheck

Inventor,  
Stephen J. Tutthill  
By Devey & Co.  
Attys



# UNITED STATES PATENT OFFICE.

STEPHEN J. TUTTHILL, OF OAKLAND, CALIFORNIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE TUTTHILL WATER WHEEL COMPANY, OF SAN FRANCISCO, CALIFORNIA.

## GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 589,378, dated August 31, 1897.

Application filed January 5, 1897. Serial No. 618,014. (No model.)

*To all whom it may concern:*

Be it known that I, STEPHEN J. TUTTHILL, a citizen of the United States, residing at Oakland, county of Alameda, State of California, have invented an Improvement in Governors; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to a governor which is especially applicable for the control of momentum or high-speed water-wheels.

It consists of certain details of construction whereby an automatically-operating mechanism is provided, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a side elevation and partial section of my apparatus. Fig. 2 shows the application of my device directly to a nozzle.

Upon a base A is fixed a vertical cylinder B, having a piston fitting and movable therein, and a piston-rod C, upon the upper end of which is carried a weight D of any suitable dimensions. Connected with this piston-rod is a lever-arm E, fulcrumed as shown at F, and having the opposite end connected with the stem G of a gate or valve H, through which water is supplied to drive a wheel I, or it may be connected with a deflecting or variable nozzle, so as to divert or contract the jet more or less.

J is a tank adapted to contain water, and K is a pump of any suitable or desired form or description by which water may be forced from the tank J into the pipe L.

In the present case I have shown a rotary pump, which is driven by a suitable belt connection from the main power-shaft of the wheel. The pipe L extends to and opens into the lower part of the cylinder B, and it has a branch L', provided with a gate or valve M and a balance-valve at N. This balance-valve is actuated so as to be opened or closed by the vertical movement of the stem O of the governor P, which in the present case is shown as being of the usual rotary form, with balls or weights adapted to swing outward when the speed is increased, and thus to close the valve, or to close inwardly toward the stem when the speed is decreased to allow the valve to open. This governor is also driven by a

belt connection from the main shaft. An overflow-pipe R connects the upper part of the cylinder B with the tank J.

The operation of the apparatus will then be as follows: The parts being all assembled and suitably connected the water is admitted through the main valve or gate H and the wheel I is set in motion and the speed thereof increased until it reaches its normal speed. The pump K and the governor are both set in motion at the same time. The pump forces water through the pipes L L' and the valves M and N, so that it circulates back into the tank J and keeps up a constant circulation. If the speed of the wheel is unduly increased, more water will be forced into the pipes L and L' than can be returned through the valves to the tank J, and the surplus will be forced into the cylinder B below its piston, thus acting thereon and forcing the piston and its rod slowly upward, raising the weight D, and through the fulcrumed lever E and stem G the gate or nozzle will be moved, and the supply of water to the wheel will be partially shut off. If the wheel drops below the speed desired, or when an additional load is put upon it, the governor P will act to open the valve N, so as to allow a larger proportion of the water to pass through the pipes L and L' and back into the tank, and the supply to the cylinder being reduced the weight D will gradually force the piston in the cylinder down and, acting at the same time upon the lever E, will again open the valve H or move the nozzle to supply more water to the wheel. Thus the raising and lowering of the piston, which is effected by the change of speed, together with a slight adjustment of the valve, (shown at M,) will serve to regulate the speed of the wheel automatically and as perfectly as can be desired.

The liquid in the tank J is used continuously and circulated by the pump K in a steady stream with constant and positive pressure through the connecting-pipes L L' and the controlling-valve.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A water-wheel-governing mechanism,



consisting of means for increasing or decreasing the amount of water discharged upon the wheel, a cylinder with a reciprocating piston, and intermediate mechanism through which  
5 the movement of the piston actuates the water-supply device, a divided pipe, one branch of which connects with the bottom of the cylinder, and the other branch forms communication between the bottom and the top  
10 of a water-containing tank with a pump by which circulation therethrough is maintained, and valve mechanism in a branch of said circulating-pipe to increase or decrease the area of the discharge-passage, whereby the reduction of said passage forces a portion of the  
15 water into the cylinder to actuate the wheel-controlling mechanism, and a governor driven from the wheel-shaft, and connected with the valve in the circulating-pipe, to increase or  
20 decrease the flow therein as the speed of the wheel varies.

2. A water-wheel-governing mechanism consisting of a tank having one pipe connecting the lower part of the tank with a pump,

and the other connecting with the upper part 25 of the tank whereby constant circulation is effected, a valve interposed within the length of the pipe, a governor whereby said valve is opened or closed by the varying speed of the governor, a vertically-disposed cylinder hav- 30 ing a piston and weighted piston-rod, a pipe connecting with the circulating-pipe of the tank, opening into the bottom of the cylinder whereby an increased speed will raise the piston and weight by surplus pressure of 35 water, and a gate controlling the supply-pipe of the water-wheel, connected with the rising and falling weight so as to be closed or opened by its movements and a fulcrumed lever-arm connecting the stem of the gate with the pis- 40 ton-rod.

In witness whereof I have hereunto set my hand.

STEPHEN J. TUTTHILL.

Witnesses:

E. B. NORTON,  
W. O. BADGLEY.