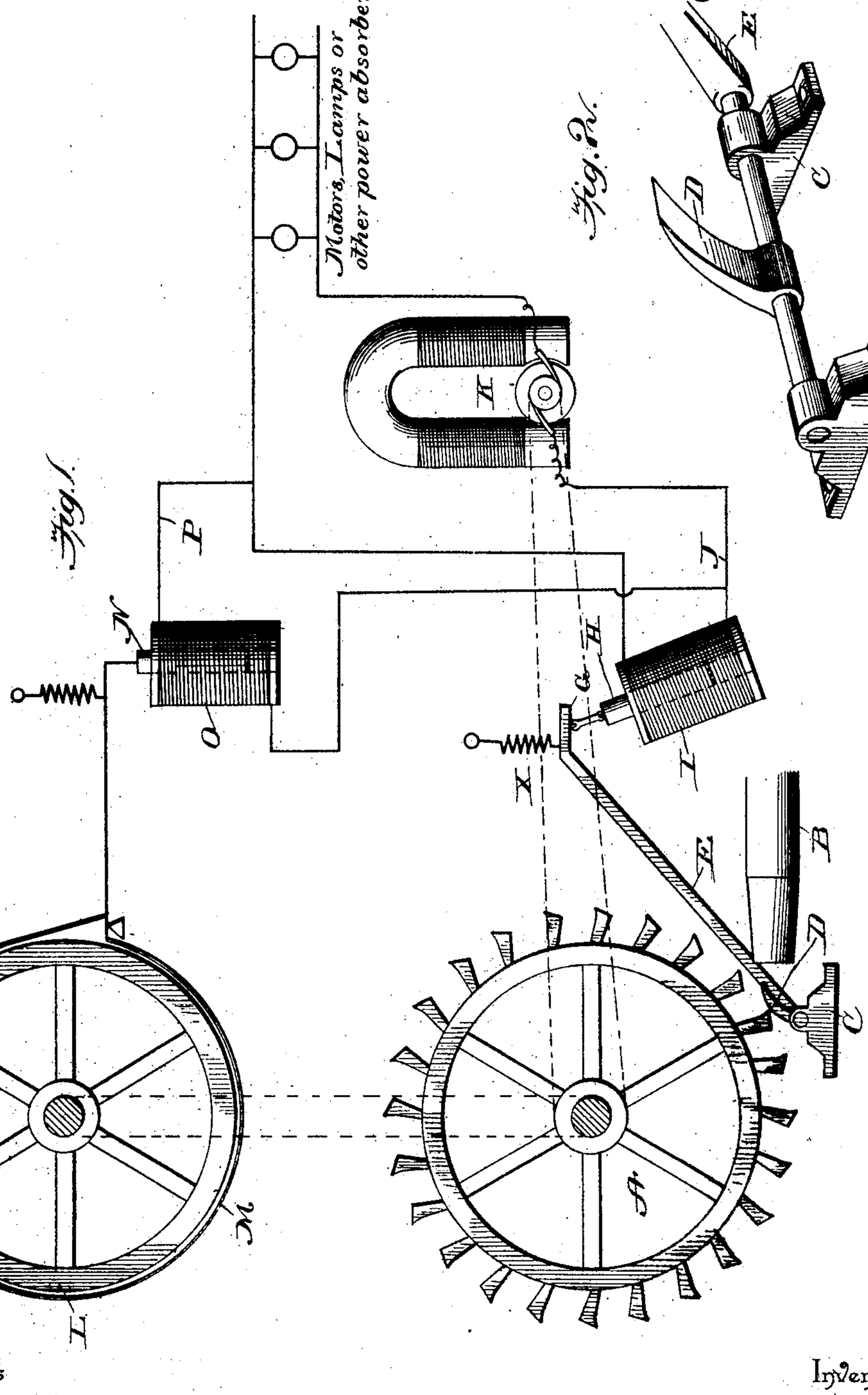
(No Model.)

E. R. HOLCOMB.

ELECTRIC WATER WHEEL REGULATOR.

No. 502,624. Patented Aug. 1, 1893.



Witnesses

John D. Shaw.
D. P. Wolhaupter.

Inventor

Eugene R. Holcomb.

By his Attorneys,

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

EUGENE R. HOLCOMB, OF PORTLAND, OREGON.

ELECTRIC WATER-WHEEL REGULATOR.

SPECIFICATION forming part of Letters Patent No. 502,624, dated August 1, 1893.

Application filed January 21, 1893. Serial No. 459,180. (No model.)

To all whom it may concern:

Be it known that I, EUGENE R. HOLCOMB, a citizen of the United States, residing at Portland, in the county of Multnomah and State of Oregon, have invented a new and useful Electric Water-Wheel Regulator, of which the following is a specification.

This invention relates to electric water wheel regulators; and it has for its object to provide certain improvements in devices of this character which shall provide simple and efficient means for regulating the speed of water wheels, to the amount of current or electric energy required from the dynamo driven thereby.

To this end the primary object of the invention is to provide an improved apparatus, whereby means shall not only be provided for regulating the speed of the prime motor, but in connection therewith to regulate the speed of the armature rotation in accordance with the requirements of the external circuit, and to maintain a uniform or nearly uniform current strength while the circuit resistance may change.

With these and other objects in view which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a side elevation of a water wheel and a diagrammatic view of the speed and current regulating devices connected therewith. Fig. 2 is a detail in perspective of the stream splitter.

Referring to the accompanying drawings, A represents an ordinary bucket water wheel, below and at one side of which is arranged the usual stream nozzle B, for jetting a stream of water tangentially into the buckets of said wheel, in order to transmit motion thereto.

Mounted in suitable bearings C, in front of the nozzle B, are the journals of the transverse stream deflector or splitter D. The transverse stream deflector D, is curved and is designed to have its upper end projected into the line of water, in order to split the stream and regulate the quantity fed to the water wheel. Secured to one end of the stream splitter, or at least to one of the journals thereof, is the lever E, to the free end of which is attached the connecting arm G, which is also connected to the movable core H, of the series solenoid I, which is arranged in series with the external circuit J, of the generator or dynamo K. When the solenoid I, is inactive, or only partly so, so as to just sustain its core against the supporting spring x, the stream splitter is then in such a position as to cut off the water entirely from the wheel, or to allow only a minimum quantity to be fed thereto. The said series solenoid must be made active to increase the amount of water fed to the wheel, and therefore when the maximum load is on the dynamo and the same is generating the largest current, the series solenoid draws in its core so as to carry the stream splitter out of the water, to allow the wheel to get the maximum amount of water.

Now it is of course understood that the dynamo is driven from the water wheel by suitable connections and it will be apparent that the shaft of the water wheel also drives the brake wheel L, shown in diagram in the drawings. The brake wheel L, is encircled by an ordinary band brake M, the lever arm of which is connected to the movable core N, of the shunt solenoid O. The shunt solenoid O, is on the shunt circuit P, which is shunted from the external circuit J, and the resistance of said shunt circuit is determined, so that the same will only be positively active to control its magnet or solenoid, when a predetermined voltage is reached or exceeded on the external circuit. It is of course understood that motors or other power absorbing devices are on the external circuit.

Now it is thought that the operation of the herein-described device will be apparent to those skilled in the art. In starting the dynamo, the water is turned on by the usual gate mechanism, so that motion is communicated to the water wheel. As the water wheel revolves and the armature of the dynamo is driven thereby to proper speed, the current on the external circuit is at a minimum while the voltage thereof will be normal, and not sufficient to render the shunt circuit active. As the current increases on the external circuit, to supply the motors, lamps and other power absorbing devices, the series magnet or solen-

oid I, is strengthened, so that the core thereof is drawn in thereby lowering the stream splitter lever E, and thus throwing the splitter farther out of the water, so as to allow more water to be given to the wheel and thereby maintain constant speed of the same. The revolution of the dynamo armature is also increased, and the voltage increased up to a satisfactory working degree in order to properly supply the external circuit. This condition continues so long as the proper voltage is maintained, but if the voltage increases beyond a certain point, the shunt circuit becomes sufficiently active, so as to operate the band brake through the medium of its magnet or solenoid, and thereby check the speed of the water wheel and the dynamo, until the voltage is reduced to normal, or in other words until the voltage and speed balance.

It will be seen that the shunt circuit is particularly valuable when the load is suddenly taken off of the dynamo and thereby suddenly reduces the current and increases the voltage, as in railway and motor work. When this takes place, inasmuch as the load is suddenly relieved from the dynamo, there is a tendency to "race," owing to the momentum. This tendency is checked, owing to the shunt coming into play at this point, until stability in speed and voltage is re-established.

It is of course understood that the foregoing operation is true with respect to constant potential systems, but on constant current systems the function of the shunt is reversed, though the same principle is still involved. In this case, the solenoid for controlling the brake is arranged in the external circuit, while the shunt is connected to the stream splitter or deflector. Now supposing that the external circuit is an arc circuit with a minimum number of lamps burning. The voltage is low and the shunt circuit controlling the stream splitter or deflector would actuate the latter so that only a minimum amount of water is fed to the wheel. As the lamps and the voltage are increased, so would the shunt circuit become stronger until the maximum load was on the dynamo. Now if the lamps are suddenly thrown out, or the line short circuited, the current would necessarily tend to increase, thereby bringing the series magnet into play, which is active when the current is increased, so that the brake would be brought into play and thereby check the speed.

Changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

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

1. The combination with a water wheel; of stream regulating devices for said wheel, brake mechanism for the wheel, an electric generator driven from said water wheel, an external working circuit supplied by the generator, a solenoid arranged in said external circuit and having its movable core connected with said stream regulating devices, an auxiliary circuit shunted from said external circuit, and a solenoid arranged in the shunt circuit and connected with said brake mechanism, substantially as set forth.

2. The combination with a water wheel and the stream nozzle therefor; of a curved stream deflector or splitter arranged in front of the nozzle and having a lever connected to one end thereof, a dynamo driven by said water wheel, the external working circuit, a solenoid in series with the circuit, a connecting arm connecting said lever with the movable core of the solenoid, and an automatic electrically controlled speed checking device, substantially as set forth.

3. In an electrical regulator for water wheels and dynamos driven thereby, the combination with the water wheel, the stream nozzle therefor, and a band brake connected with the driving shaft of the water wheel; of a movable stream deflector or splitter arranged in front of said nozzle, the dynamo driven by said water wheel, the external working circuit, for lamps, motors &c., an auxiliary circuit shunted from said external circuit and having a predetermined resistance, and separate solenoids arranged in said external and shunt circuits and having their movable cores connected with the stream deflector or splitter and said band brake, respectively, substantially as set forth.

4. The combination with a prime motor carrying a brake wheel, and an electrical generator driven by said prime motor; of a band brake arranged over said brake wheel, and a solenoid arranged in the generator circuit and having its core connected with said band brake, substantially as set forth.

5. In an electrical regulator for water wheels and dynamos driven thereby, the combination with the water wheel and the dynamo driven thereby; of a stream regulator for said water wheel, a band brake for the water wheel shaft, the external working circuit, a shunt circuit arranged on the external circuit, and solenoids arranged in the external and shunt circuits, one of which is connected to the stream regulator and the other of which is connected to said band brake, respectively, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

EUGENE R. HOLCOMB.

Witnesses:
JAMES K. ROMIG,
O. O. KINCAID.