(No Model.) 2 Sheets—Sheet 1.

E. H. AMET.

ELECTRIC GOVERNOR FOR WATER WHEELS.

No. 328,556. Patented Oct. 20, 1885.

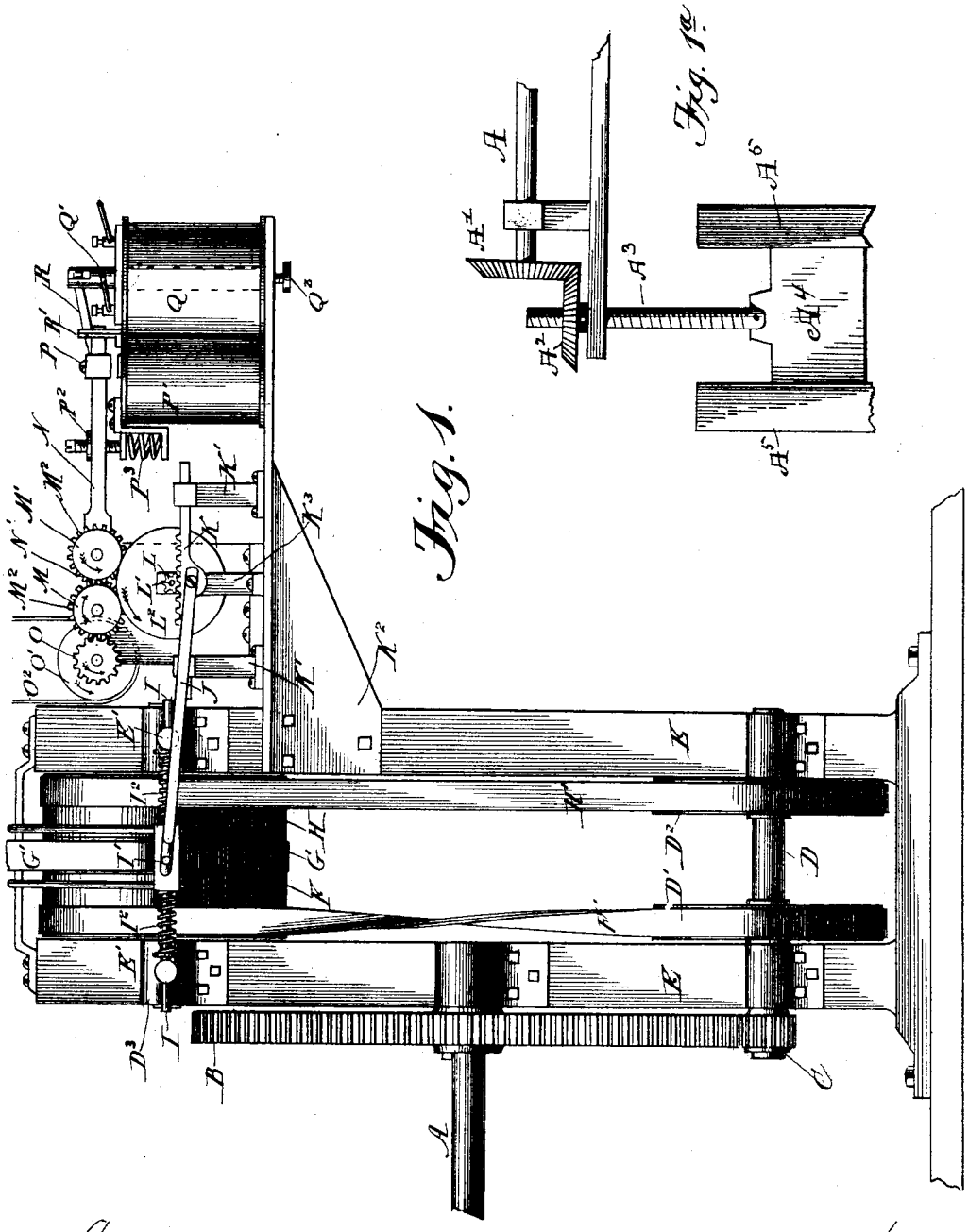


Fig. 1.

Fig. 1a.

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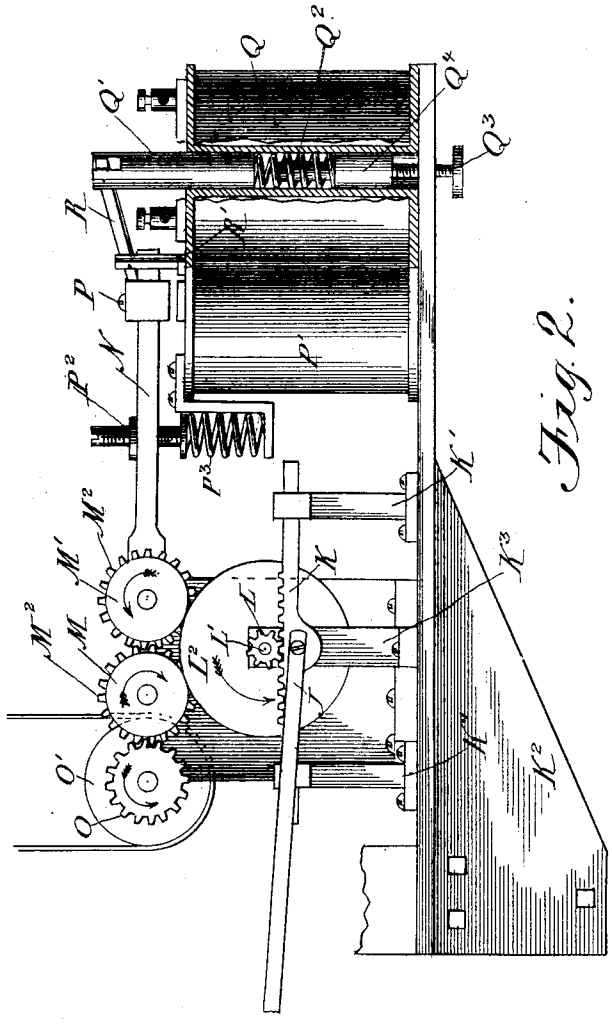


Fig. 2.

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UNITED STATES PATENT OFFICE.

EDWARD H. AMET, OF CHICAGO, ILLINOIS, ASSIGNOR TO HERBERT A. STREETER, OF SAME PLACE.

ELECTRIC GOVERNOR FOR WATER-WHEELS.

SPECIFICATION forming part of Letters Patent No. 328,556, dated October 20, 1885.

Application filed October 16, 1884. Serial No. 145,674. (No model.)

To all whom it may concern:

Be it known that I, EDWARD H. AMET, a resident of Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Electric Governors for Water-Wheels, of which the following is a full, clear, concise, and exact description, sufficient to enable others skilled in the art to which it appertains to make and use the same.

This invention has among its objects the provision of means for automatically governing the supply of water to a water-wheel, so that the power exerted by the wheel shall be increased or decreased in proportion to the amount required of the mechanism which is operated by the wheel. In this instance the water-wheel furnishes the power to drive a dynamo for the purpose of generating electricity in an electric-lighting system, and the purpose in view is to proportion the supply of water to the strength of the current generated by the dynamo.

Another object of the invention is to provide a secondary controlling device for the purpose of insuring safety in cases of accident, in that the supply of water to the wheel shall be completely cut off.

The invention consists in certain features of construction, hereinafter described, and specifically set forth in the claims.

Referring to the drawings, Figure 1 is a general view of the entire apparatus. Fig. 1ª is a general view of one manner of operating a water-gate. Fig. 2 is a side elevation of apart of the governing and the safety devices.

Like letters indicate like parts in both the figures.

A represents a shaft, which, by means of suitable connections, is capable, by rotating in opposite directions, of opening and closing the gate or gates through which water is conducted to a water-wheel. In Fig. 1ª the shaft A is provided with a miter-gear, A′, which meshes with a companion gear, A^2, which is screw-threaded to fit the shaft A^3, to which the gate A^4 is secured, so that by rotating shaft A the gate may be raised or lowered in its ways A^5, according to the direction in which shaft A is rotated.

B represents a master-gear rigidly mounted on the shaft A, and C a pinion mounted upon a shaft, D, and meshing with the master-gear B.

E represents standards, serving as bearings for the moving parts of the apparatus. Upon the shaft D are rigidly mounted two pulleys, D′ and D^2, and at the upper part of the standards is another shaft, D^3, arranged parallel to the shaft D, and having mounted thereon a loose pulley, F, a fixed pulley, G, and a loose pulley, H, in the order named.

Connecting the pulleys F and D′ is a cross-belt, F′, and connecting the pulleys H and D^2 is a straight belt, H′, and from the fixed pulley G on a shaft over head (not shown) is a belt, G′, receiving motion from the water-wheel. The faces of the pulleys F and H are wider than the cross-belt F′ and the straight belt H′, and the faces of the pulleys are wider than, preferably twice as wide as, the face of the pulley G, so that by suitable means the belt G′ may be shifted from the pulley G upon either the pulleys F or H—that is, upon that portion thereof which is not occupied by either the belt F′ or H′—so that, continuous motion being given to the belt G′, while upon the pulley G said pulley and the shaft D^3 are constantly rotated in one direction, and when said belt is shifted, as described, upon the pulley H the belt H′, through the medium of pulley D^2, shaft D, and pinion C, turns the master-gear in one direction, while when said belt G′ is shifted onto the pulley F said master-gear is turned in an opposite direction through the medium or by means of the cross-belt F′, shaft D, and the pinion C, in which case the belt H′ is also driven, the pulley H being loose upon the shaft D^3 permitting said operation of the said belt.

The means employed for shifting the belt G′, as described, comprises the following elements: Mounted in suitable brackets, E′, in the standards is a cross-bar, I, carrying any suitable belt-shifter, I′, between which and the brackets are interposed cushioning-springs I^2, one upon each side of the shifter, so that normally the shifter is held in such position as to maintain the belt G′ in contact with pulley G. Extending from the shifter, and pivotally connected thereto, is a rod, J, which is similarly connected to a rack-bar, K, mounted in standards K′, projecting above the shelf or bracket K^2, secured to one of the standards E. A pinion, L, is mounted upon a shaft, L′, carrying

a pulley, L^2, the shaft having bearings in standards K^3, projecting from the shelf or bracket K^2. The pulley L^2, when rotated by any suitable means, reciprocates the rack-bar K, and through the medium of connecting-rod J the belt-shifter I′ is in like manner reciprocated. Above the pulley L^2 are two small friction-rollers, M and M′, which are positively geared to each other by gears M^2, the gears and frictions being mounted upon a lever, N, pivoted at N′ to an upward extension of one of the standards K^3, so that said lever may be oscillated on its pivot to bring either one or the other of the frictions M M′ in contact with the friction-pulley L^2. In a suitable standard is journaled a third gear, O, and pulley O′, the gear meshing with the gear M^2 on the lever N, the pulley O being driven by a belt, O^2, to any positively-driven shaft—as, for example, the same which drives the belt G′; or it may be geared to the end of shaft D^3. The free end of the lever N carries the armature P of an electro-magnet, P′, and an adjusting-screw and spring, P^2 P^3, are provided between the magnet and the pivot of the lever. A solenoid, Q, is mounted in proximity to the magnet, and is provided with a core, Q′, which is rendered adjustable by means of a spring, Q^2, and an adjusting-screw, Q^3. (See Fig. 2.) The upper end of the core is positively connected with the lever R, pivoted to a standard, R′, the free end of the lever being projected above the free end of the lever N. The office and function of the solenoid and its connected lever is that of a safety device, operating as hereinafter described.

This being the construction of the controlling and safety devices, the operation of the former is as follows: When the belt G is driven at a normal speed, and a normal current is being produced by the dynamo, no action of the machine is apparent; but suppose, for example, that a lamp should be switched out of the circuit, leaving a surplus of electricity therein. This surplus acts through the electro-magnet P′ to attract the armature P, thus throwing the friction-roll M′ in contact with the periphery of friction-roll L^2, causing it to rotate in one direction, (to the left, as shown by arrow.) This, through the medium of pinion L, draws the rack-bar K and the belt-shifter I′ to the left, thus throwing the belt G′ upon the face of the pulley F, and conducting positive force through said pulley, its belt F′, and the pulley D′, the shaft D, and the pinion C to the master-gear B, causing it and the shaft A, to which it is secured, to rotate in one direction, (from the observer, as shown in Fig. 1,) the shaft A being connected by suitable devices with the gate or gates of the water-wheel in such a manner that a rotation of the same in such direction acts to close the gate or gates. Now this positive driving of the shaft A in the direction stated is continuous so long as the belt continues in contact with the pulley F. As soon, therefore, as the current of electricity caused by the dynamo assumes its normal tension in accordance with the requirements of the circuit with the supposed light switched therefrom the spring P^3 forces the lever N back, so that the friction-roll M′ is released from contact with friction-roll L^2, and leaving it free to revolve. At the same time the cushion-spring I^2 forces the shifter back to the center, and the belt G′ is returned to pulley G. On the other hand, an increase of resistance in the circuit weakens the magnet, allowing the spring P^3 to force the lever N upward, throwing the friction-roll M into contact with friction L^2 and an opposite rotation and movement of the connecting devices takes place, and the shaft A is rotated in the opposite direction, and the gates are opened until the normal operation of the apparatus is secured. (The direction of movements of the several parts indicated by arrows.)

It now remains to describe the action of the safety device shown in Fig. 2. In said device, Q^4 is a stationary core, around the small end of which is wound the spring Q^2. Upon the spring Q^2 rests the movable core Q′, to the upper end of which is attached the lever R, pivoted to bracket R′.

The operation is as follows: The current passing through the solenoid Q, the core Q′ is drawn down until it comes in contact with Q^4. The lower part of the core and the spring Q^2 are so adjusted by means of screw Q^3 that variations in the resistance of the circuit do not release the core Q′; but should the circuit be broken the core Q′ is instantly released, forcing the lever R up and its short end down upon the lever N, which is forced down and securely locked, and the friction M′ comes in contact with the friction L^2, and, in the manner heretofore described, the water is completely shut off, and the operation of the machine ceases.

Having described my invention and its operation, what I claim is—

1. The combination, with a water-gate, of power-conveying devices for opening and closing the same, comprising belts and a belt-shifter, a lever carrying an armature, an electro-magnet operating with said armature and gearing intermediate the belt-shifter and armatured lever for operating said shifter, and a solenoid, the core of which is connected with a secondary lever arranged with the said armatured lever, substantially as and for the purpose specified.

2. In a water-wheel governor, a belt-shifter, a rack-bar, and a rod connecting the two, in combination with a pinion and pulley, and with a positively-driven pair of friction-wheels mounted upon a pivoted bar carrying an armature, substantially as specified.

3. The combination of belt-shifting devices, a lever carrying an armature, and friction or gear arranged at each side of the pivot of said lever, an electro-magnet, and a solenoid having a pivoted lever projecting above the armature-lever, substantially as specified.

4. The combination of the shaft A, having

a gear, B, the pinion C, the shafts D and D^3, cross-belt F', straight belt H', and the pulleys F G H, a positively-driven belt, a belt-shifter, and friction-wheels mounted upon an armatured lever for operating the shifter, substantially as specified.

5. The combination, with a shaft, A, having a gear, B, pinion C, shafts D and D^3, the belts F' H', and pulleys F G H, of the belts G O^2, the shifter I', connecting-rod J, rack K, the positively-geared pulleys L M M' O', the gears O M^2, and the pivoted lever N, armature P, and magnet P', substantially as shown and specified.

6. The combination of the magnet P', armatured lever N, the solenoid Q, having a core, Q', screw Q^4, and the lever R, substantially as shown and described.

7. The combination of the magnet P', the lever N, the armature P, mounted thereon, the geared rolls M and M', the pulley L^2, the pinion L, the rack K, the rod J, the shifter I, and the springs I^2, substantially as shown and described.

8. The combination of solenoid Q, having the double core Q' and Q^3, the spring Q^2, and the screw Q^4, with the pivoted levers R N, substantially as shown and described.

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