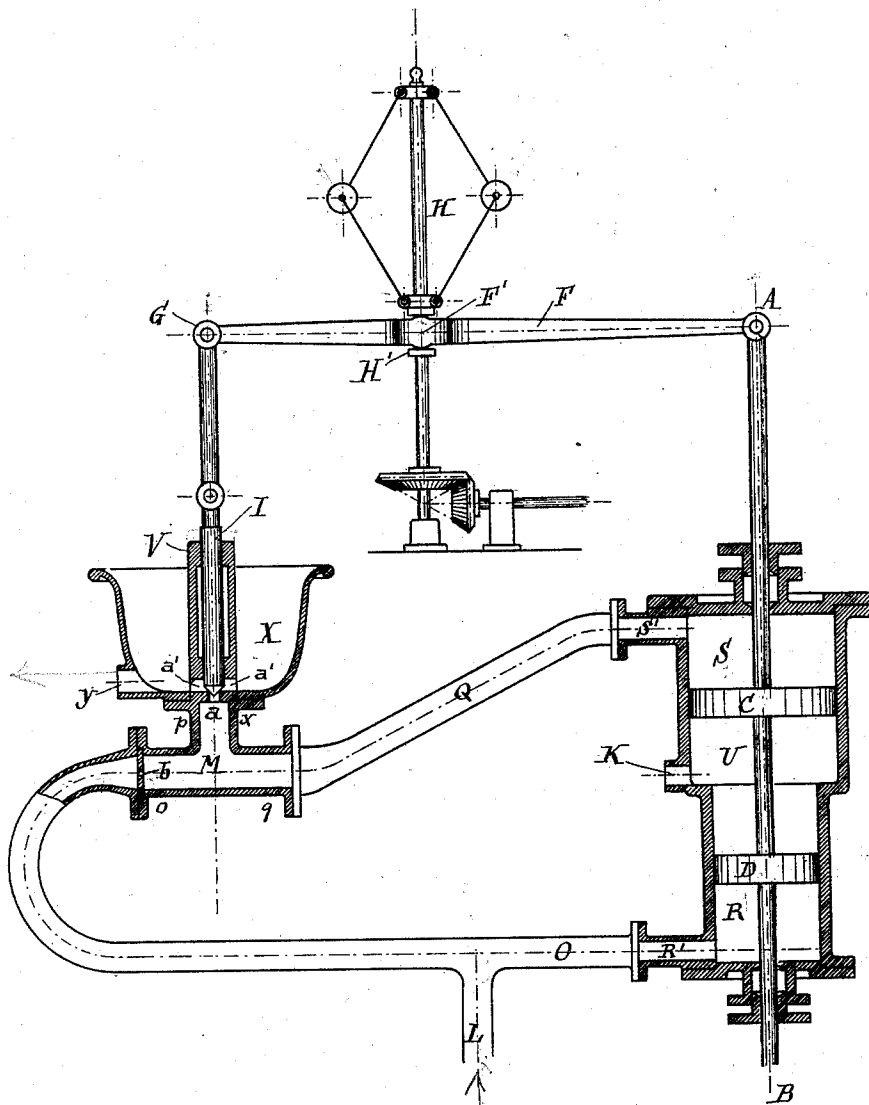


(No Model.)

P. PICCARD.
GOVERNOR.

No. 474,064.

Patented May 3, 1892.



Witnesses

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PAUL PICCARD, OF GENEVA, SWITZERLAND.

GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 474,064, dated May 3, 1892.

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To all whom it may concern:

Be it known that I, PAUL PICCARD, engineer, of Geneva, Switzerland, have invented certain new and useful Improvements in Governors, of which the following is a specification.

It is a well-known fact that the usual centrifugal governor cannot practically be connected directly to the flood-gate of hydraulic motors, the working of such flood-gate necessitating a power superior to that obtained by the action of the centrifugal force in the governor. The instantaneous working of the flood-gate by every action of the centrifugal governor being of very great importance to secure the regular working of the motor, there have been constructed several intermediate devices intended to transmit as rapidly as possible to the flood-gate the action of the centrifugal governor; but those devices did not realize the perfect regularity of speed, which is more peculiarly necessary in cases where the hydraulic motor is intended to act upon dynamo-electric machines.

The purpose of my invention is therefore to provide an improved device intended to transmit instantaneously to the flood-gate of a hydraulic motor the oscillations of a centrifugal governor or other governor capable of overcoming but a small resistance and to work said flood-gate according to the action of said centrifugal governor, however powerful the resistance of said flood-gate may be, the movements imparted to the flood-gate being thereby the exact but amplified reproduction of those of the centrifugal or other governor.

I will now proceed to describe, with reference to the accompanying drawing, my improved governor, it being understood that the drawing shows a diagrammatic illustration of the different parts of the devices described below, the cylinders R S and valve-box M being shown in vertical section.

A B is a rod, which is connected at A to the governor-lever F and provided with a piston having heads C and D of unequal diameters, which play in two superposed fixed cylinders S and R, being also of unequal diameters. The lower end of the rod A B is connected in any suitable manner to the flood-gate, (not shown,) which is disposed so as to open when the rod A B is lowered and to close when said rod is

lifted. The space U between the piston-heads C and D has a passage K, connecting therefrom to the exterior.

At the point G of lever F there is suspended a valve-rod I, guided in the head-piece V of the valve-box M, and having its lower end formed as a cone and playing like a valve on the hole *a* of said valve-box M. The latter is formed of three tubular arms *x*, *o*, and *q*. The arm *o* is connected by means of a tube O to the passage R' of the cylinder R, connecting the box M to the said cylinder beneath the piston-head D, and the arm *q* is connected by means of a tube Q to the passage S' of the cylinder S on the top of the piston-head C.

To the above-mentioned tube O, which connects the box M with the cylinder R, there is connected at any suitable place a supply-pipe L for liquid under pressure, as described below. The arm *o* of the box M is provided with a hole *b* of a diameter smaller than that of the hole *a* of the arm *x*. On the top of the latter there is provided an open cup X, having an overflow *y*, and the head-piece V is provided with lateral openings or holes *a'*. Thus the liquid under pressure contained in the box M may flow out of the latter through the openings *a*, *a'*, and *y* if the valve-rod I is lifted. If said valve-rod I is lowered and closes the opening *a*, the liquid under pressure entering the box M through the hole *b* passes the tube Q and is led over the piston-head C into the top of the cylinder S. There is further provided a centrifugal governor H, the socket H' of which embraces at the point F' the governor-lever F.

The above-described devices work as follows: The tube L receives, as specified above, a liquid under pressure, which will be in some cases the water acting upon the hydraulic motor or another liquid (water, oil, or the like) compressed by means of suitable pumps or flowing into said tube from an elevated tank or from an accumulator. Said liquid under pressure entering constantly the space R of the cylinder, it will constantly have the tendency of raising the piston and its rod A B. Now the said liquid under pressure flowing at the same time through the small opening *b* into the box M, if the valve-rod I shuts the hole *a* it will flow through the pipe Q to the

top of the cylinder S and act upon the piston-head C. The diameter of the latter being larger than that of the piston-head D, the pressure of the liquid will cause the rod A B to descend and open the flood-gate or other regulating device. If the valve I is lifted, the hole *a* is open, and the liquid entering the box M through hole *b* will flow out of the apparatus through the holes *a* and *a'*, and the hole *a*, which is larger than *b*, being open the liquid under pressure will at same time flow back from the cylinder S to the box M and into the overflow-cup X, said liquid under pressure pressing against the piston D upward, causing the flood-gate to be shut. From this disposition it appears that if the motor works too fast the socket H' of the governor A, being lifted by the centrifugal force, will lift the valve-rod I. Then the rod A B will be lifted, as above specified, and the valve-rod I will open the hole *a* and the rod A B shut the flood-gate. If, on the contrary, the motor works too slowly, the inverse movement will be produced, and the valve I being shut the rod A B will descend and cause the flood-gate to be opened. In the intermediate position of the parts, in which the valve I partially closes the hole *a*—for instance, so much as to give passage to the same quantity of liquid as the hole *b*—the rod A B is at rest and the flood-gate not acted upon at all. The

point G of the lever F being always in the same position when the flood-gate gets into rest, the successive displacements of the point A or of the flood-gate are the exact but amplified reproduction of the displacements of the socket of the governor.

Having thus fully described my invention, I claim—

The combination, with a centrifugal governor and a connection for the flood-gate, of two connected cylinders, piston-rod and pistons of unequal diameters, a pipe for supplying a liquid under pressure and connecting pipes from the same to the opposite ends of the cylinders, a contraction with an opening *b* in the pipe leading to the largest cylinder and piston, there being a second opening *a* of larger diameter, the box M, the valve I to the opening *a*, and the lever F, pivoted at one end to the rod of the valve I and at the other end to the piston-rod and acted upon by the governor for raising the valve to lessen the pressure on the larger piston when the gate is to be closed, or the reverse, substantially as set forth.

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

PAUL PICCARD.

Witnesses:

E. IMER-SCHNEIDER,
E. PRENTICE NAYLOR.