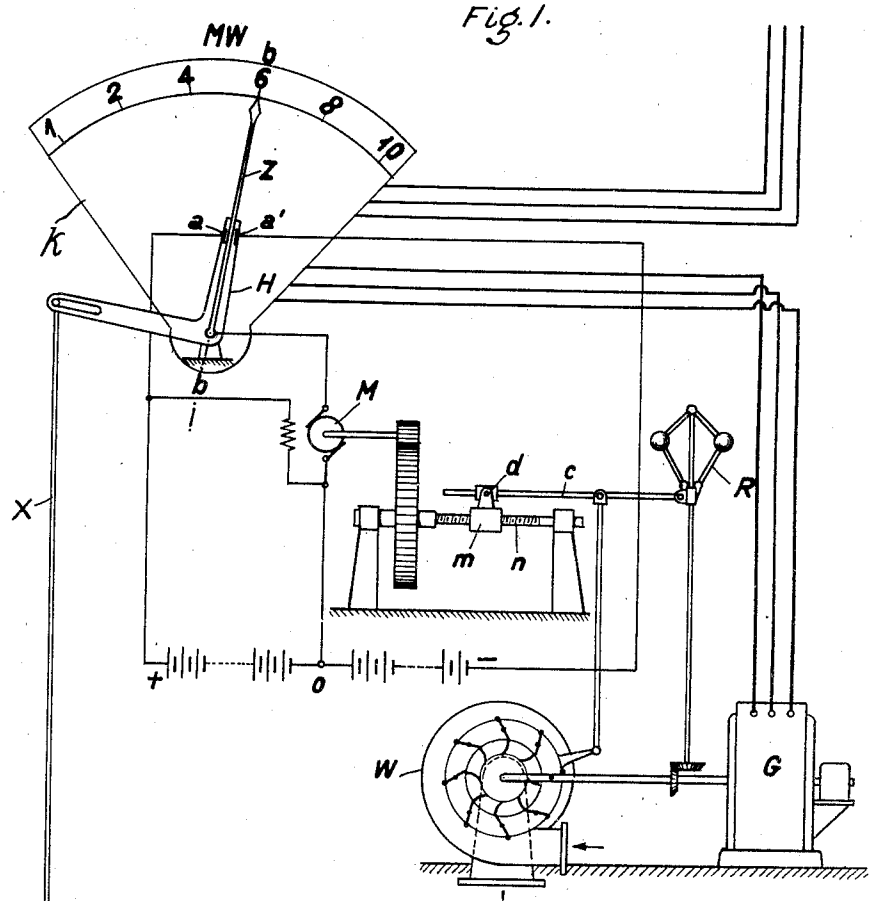
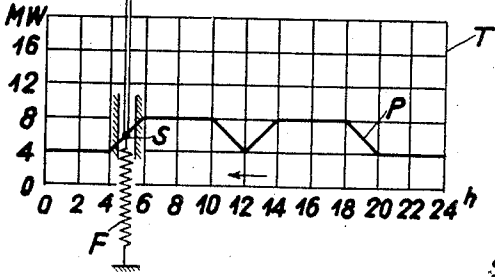
March 28, 1933. J. LEONPACHER 1,903,055

SYSTEM OF AUTOMATIC CONTROL

Filed June 7, 1928

Fig. 1.





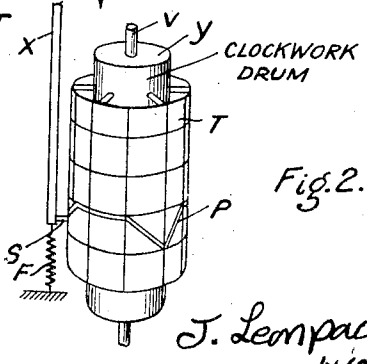


Fig. 2.

J. Leonpacher
INVENTOR

By: Marks & Clerk
Attys.

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UNITED STATES PATENT OFFICE

JOSEF LEONPACHER, OF MUNICH, GERMANY, ASSIGNOR TO AKTIENGESELLSCHAFT BROWN, BOVERI AND CIE., OF BADEN, SWITZERLAND

SYSTEM OF AUTOMATIC CONTROL

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When a plurality of (say n) current generating machines feed a common network, it is usual for the management to lay down for n—1 machines a so-called "power time table" which determines exactly for each machine what power it has to generate and supply to the common network at any given moment, the function of the last machine being to maintain the periodicity, i. e., to supply sufficient power to the network to prevent the periodicity either rising or falling. It is the duty of the switchboard attendant by suitably controlling the servo motor to see to it that the "time tables" laid down for the separate machines are adhered to and that the periodicity is kept constant. The arrangement described hereinafter effects more particularly the former action automatically.

The arrangement consists substantially of a clock and a power indicator.

The invention will be described by way of example with reference to the accompanying drawing, wherein Figure 1 shows an arrangement for controlling the power output of an electric generator G driven by a water turbine W by means of a pin S sliding in the slot P of a "timetable" T and coacting with the pointer Z of the watt meter k. Figure 2 shows the "timetable" fastened to and raised from the surface of the drum y, rotatable by clockwork.

The clock drives a drum provided with an hour scale, which makes one revolution in 24 hours. On the surface of the drum the "power time table" cut out of cardboard or sheet metal is fixed in such a manner that above each hour division there appears the power output in megawatts of the machine to be controlled prescribed for this moment. The datum-line of the "time table", on which the times from 0 to 24 o'clock are inscribed, must therefore be just as long as will go completely round the drum. In the accompanying drawing T is the developed surface of the "timetable" and P the slot fixed in it.

By means of the spring F a pin S which is guided in a longitudinal slot or by means of a link is pressed against the contour of the time table T, which is raised somewhat from the surface of the drum y, so that when travelling over the surface of the drum it always rests against the said contour. The drum y and spindle V are rotated by clockwork to make a complete revolution in 24 hours.

The motion of the pin S is transmitted by means of a rod X to a lever H which is pivoted so as to turn about the axis of rotation of the pointer Z of the wattmeter k of the machine to be controlled, in such a manner that the centre line b—b' of the pivoted lever H adjusts itself to a power indication on the wattmeter scale corresponding to the power on the time table where the pin S at the moment rests.

When the wattmeter pointer Z is in the same position as the centre line b—b' of the lever H, that is in the position shown in the drawing, this signifies that the power developed by the machine to be controlled at the moment in question agrees with the power which the machine is to give off according to the prescribed time table P. When the wattmeter pointer is more to the left, the power of the machine is smaller than that which it should develop according to the time table. In this case the pointer, after travelling through a small clearance closes through the contact a the armature circuit of the servo motor M, such that the servo motor will cause the machine to develop more power. When the wattmeter pointer is too far to the right, that is should the power developed by the machine be greater than that which it should develop according to the time table, the pointer will close over the contact a' the armature circuit of the servo motor in the opposite sense and will cause the machine to develop less power.

This automatic regulating operation will in each case continue until the wattmeter pointer Z oscillates freely between the stops a and a', that is until the power developed by the machine corresponds to the power it should develop according to the time table.

A water turbine W is provided for driving the electric generator G, the guide blades of the said turbine being displaced by the regulator R. The pivot d of the regulator

lever *c* is displaced by means of being fastened to the nut *m*, which is displaceable on the screw spindle *n* driven by the motor M. Of course this arrangement is only one of the numerous constructional forms possible according to the invention.

The above description relates to the control effected by a "power time table". The arrangement may of course be used in the same manner for operating with another time table, for instance a voltage, periodicity, idle current, steam pressure, and the like time table. Similarly the fire of a boiler may be automatically controlled by increasing the draught and accelerating the coal supply, with or without a corresponding lead with respect to the power time table.

What I claim is:

Means for controlling the output of an electric generating plant comprising a strip of sheet material the width of which at any point corresponds to a given power output, a following device adapted to follow variations in the width of said strip, means for conveying said strip past said following device, a pair of relatively fixed contacts adapted to be moved by said following device, a third contact situated between said relatively fixed contacts, means for moving the third contact in accordance with the output of the plant and means for increasing the output of the plant when the third contact contacts with one of the said relatively fixed contacts and decreasing the output of the plant when the third contact contacts with the other relatively fixed contact.

In testimony whereof I have signed by name to this specification.

JOSEF LEONPACHER.