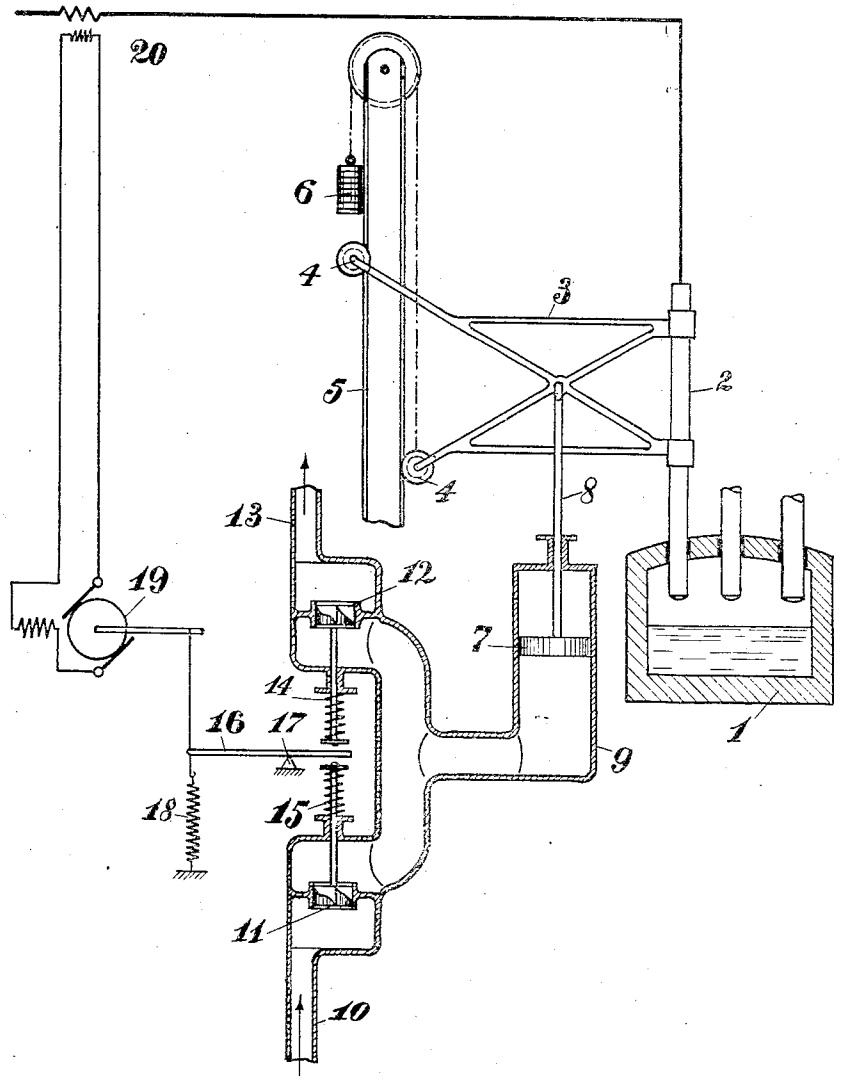
Mar. 3, 1925. 1,528,510

J. RITZ

AUTOMATIC REGULATING APPARATUS FOR ELECTRIC FURNACES

Filed Aug. 28, 1922



Inventor
J. Ritz
By Mackaye & Clark
Atty's

Patented Mar. 3, 1925. 1,528,510

UNITED STATES PATENT OFFICE.

JULES RITZ, OF ZURICH, SWITZERLAND, ASSIGNOR TO AKTIENGESELLSCHAFT BROWN, BOVERI AND CIE., OF BADEN, SWITZERLAND.

AUTOMATIC REGULATING APPARATUS FOR ELECTRIC FURNACES.

Application filed August 28, 1922. Serial No. 584,824.

To all whom it may concern:

Be it known that I, JULES RITZ, a citizen of the Swiss Republic, residing at No. 33 Gartenstrasse, Zurich, Switzerland, have invented certain new and useful Improvements in Automatic Regulating Apparatus for Electric Furnaces, of which the following is a specification.

This invention has for its object to provide an improved automatic regulating apparatus for electric furnaces designed to maintain as constant as possible the current or power which each electrode of the furnace takes from the current-supply network.

More particularly this invention has for its object to provide an improved apparatus of this kind which will develop sufficient force for adjusting the large masses of the electrodes rapidly and with certainty, and which nevertheless can follow quickly all the variations in the current or power taken by the electrodes, and in which over-regulations are avoided without employing a returning mechanism.

The advantages of this invention and the apparatus in which it is embodied, will be understood from the following description in connection with the accompanying drawing which illustrates by way of example a practical embodiment of the invention.

This drawing is a diagrammatic elevation of the entire improved regulating apparatus.

As shown:—1 is the electric furnace with three electrodes; 2 is one of the furnace electrodes; and 3 is a framing supporting these electrodes. This supporting framing is adapted to travel by means of rollers 4 along a guide bar 5. The weight of the electrodes is partly balanced by a counterweight 6. A piston 7 is connected by means of its piston rod 8 to a supporting framing 3. This piston 7 works in a cylinder 9. To this cylinder pressure water can be supplied from a pipe 10 through a valve 11. The pressure water contained in the cylinder 9 can be discharged into the atmosphere through a valve 12 and a pipe 13. The two valves 11 and 12 are kept in their closed position by means of springs 14 and 15; they are adapted to be opened by means of an operating lever 16. This operating lever 16 is fulcrumed at 17; its left-hand end is acted upon by the mutually opposing forces of a spring 18 and an electric motor 19. This motor 19 is fed from a transformer 20 with current that is proportional to the current taken by the electrode 2.

The motor 19 develops a torque which increases and diminishes with the electrode current. When the electrode current is normal, that is to say, has the value which is to be kept constant by means of the improved regulating apparatus, the torque of the motor is exactly equal to that of the spring 18 when the operating lever 16 is in its mid-position. On an increase occurring in the electrode current, the motor 19 develops a greater torque and thereby stresses the spring 18 to a higher degree. The right-hand end of the operating lever 16 will therefore move downwards and will open the valve 11 the wider the more the current deviates from the normal. The valve 11 is so constructed that for a small movement of same, first only a small flow-aperture is uncovered, and as the movement increases, the aperture becomes gradually greater. Consequently pressure water will flow from the pipe 10 into the cylinder 9 and will move the piston 7. The velocity of this movement increases with the admission of the water, that is to say, with the size of the flow aperture of the valve 11, that is to say, with the stressing of the spring 18, and therefore with the deviation of the electrode current from its normal value.

In the case of a decrease of the electrode current the spring 18 is on the contrary relieved of load, so that the operating lever 16 will press upon the valve 12, and the latter (like the valve 11) will uncover a greater flow aperture the more the spring 18 has been relieved of load.

This improved apparatus has the following advantages:—

The motor 19 is able to follow the smallest variations in the current without lag, and by its movement it will open the valve 11 or 12 directly, and thereby allow the pressure water to flow into the cylinder 9 or to flow out of said cylinder. There is therefore in the regulating action no lag of any kind that might be caused by interposed motion-transmission members.

The piston 7 which is actuated by pressure water can be easily designed to develop a force sufficient for adjusting the electrodes.

Immediately the electrode begins to move under the influence of the opening of the

valve, the current in the leading-in lead of the electrode will at once become normal again. In this operation the torque of the motor 19 diminishes, and the operating lever 16 moves back towards its mid-position. The open aperture of the valve 11 or valve 12 is diminished so that the inflow or outflow of the water is throttled, and the movement of the piston 7 and of the electrode 2 is immediately retarded again.

When the current has resumed its normal value, the movement of the piston and electrode will immediately stop. There is therefore no risk of over-regulation although a returning mechanism is not provided.

What I claim is:—

In an automatic regulating apparatus for electric furnaces the combination of an hydraulically actuated piston for adjusting the furnace electrodes, an operating valve which is constructed so as to serve also as a reducing valve, which adjusts the velocity of the water flowing into or flowing out from the said cylinder according to the position of said valve, and an electro-magnetic actuating device acting directly upon said valve, and whose position depends upon the electric current or the power taken by said electrodes.

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

JULES RITZ.

Witnesses:
MAURICE HUSIK,
F. HEIM.