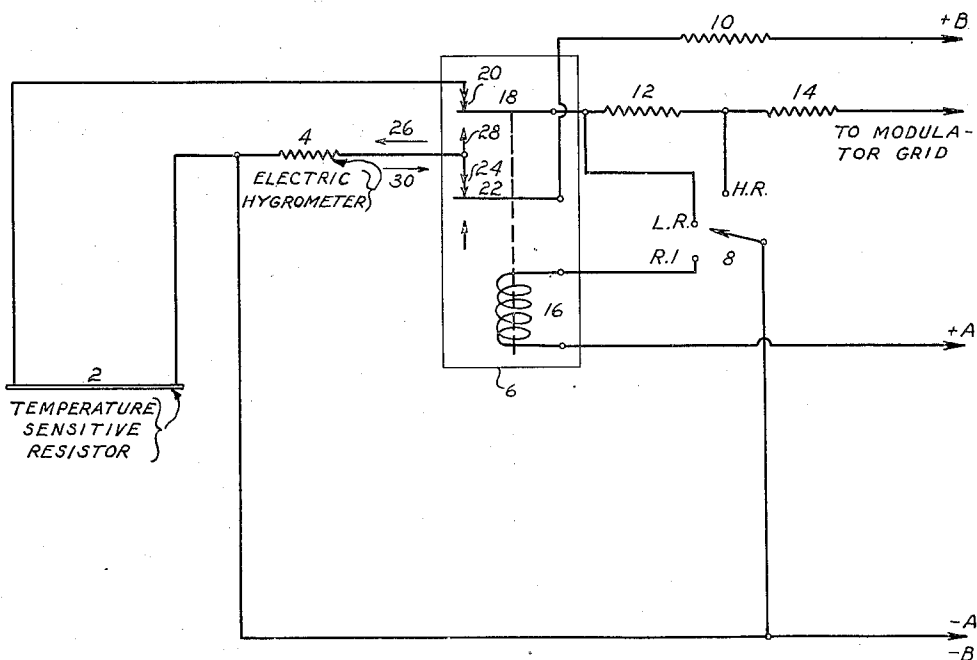


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SYSTEM FOR IMPROVING OPERATION OF ELECTRICAL
HYGROMETERS IN RADIOSONDES
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34

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UNITED STATES PATENT OFFICE

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SYSTEM FOR IMPROVING OPERATION OF
ELECTRICAL HYGROMETERS IN RADIO-
SONDESCharles B. Pear, Jr., College Park, Md., assignor
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1 Claim. (Cl. 177—380)

1

This invention relates to the art of radiosonding, by which is meant the radiation, from a transmitter carried aloft by a balloon, of signals which are caused to vary in accordance with changes in atmospheric conditions such as humidity, temperature and pressure, the reception of such signals on the ground and the interpretation of such signals to record atmospheric conditions at various altitudes.

In present radiosonde practice it is common to use electric hygrometers as the humidity responsive means. It has been found that these electric hygrometers, particularly those of the type described and claimed in the patents to Fiene No. 2,064,651 and Dunmore No. 2,285,421, and comprising in general a film of hygroscopic material on a non-hygroscopic support, deteriorate in use in the radiosonde. I have found that this deterioration is due at least in part to the fact that in known radiosonde circuits the flow of current through the conducting film of the humidity responsive element is in a single direction. I have also found that the observed deterioration of the humidity responsive film may be prevented by periodically reversing the current therethrough.

It is therefore the principal object of this invention to provide a radiosonde including an electric hygrometer of the type referred to and an energizing circuit therefor which is so operative that the current flow through the humidity-sensitive film of the hygrometer is periodically reversed, whereby the observed deterioration which is referred to above, is prevented or retarded.

Other objects and features of novelty of the invention will be made apparent by the following description and the annexed drawing which, it will be understood, are only illustrative of the invention and impose no limitation thereon not imposed by the appended claim.

The single figure of the drawing discloses that part of the circuit of a radiosonde including the electric hygrometer and the energizing circuit therefor. This circuit comprises temperature-sensitive resistor 2, electric hygrometer 4, relay 6, switch means 8 and resistors 10, 12 and 14. The switch means 8 is actuated by the pressure sensitive element of the radiosonde and the contact arm of this switch means is successively open-circuited, connected to contact RI, open-circuited, connected to contact LR, open-circuited, and connected to contact HR, in accordance with a program sequence determined by the connection of the contacts in the pressure sensitive ele-

2

ment. When switch means 8 is open-circuited the coil 16 of relay 6 is not energized and contact arm 18 is connected to contact 20 and contact arm 22 is connected to contact 24. Under these circumstances, two circuits are completed. The first of these is a circuit from the modulator grid through resistors 12 and 14 and temperature-sensitive resistor 2 to the -A, -B terminal of the battery. This causes modulation of the radiosonde signal in accordance with the value of the temperature sensitive resistor 2. The second circuit is from the positive terminal of the B battery, through resistor 10, contact arm 22 and contact 24 of relay 6, humidity sensitive resistor 4 and back to the negative terminal of the B battery, the value of the current in this circuit being controlled by proper choice of resistor 10. This current flows in the direction indicated by arrow 26. When by operation of the pressure sensitive device switch means 8 is connected to terminal RI, a circuit is completed from the positive terminal of the A battery, through coil 16 of relay 6 and switch means 8 to the minus terminal of the A battery. This energizes relay 6 and causes contact arm 18 to disconnect from contacts 20 and connect to contact 28, and contact 22 to disconnect from contact 24. Under this condition the circuit from the modulator grid is connected through resistors 12 and 14 and humidity sensitive resistor 4 to the -A, -B terminal of the battery. This causes the signal of the radiosonde to be modulated in accordance with the value of humidity sensitive resistor 4. Under these circumstances current flows through the circuit comprising resistors 12 and 14 and humidity sensitive resistor 4 in the direction indicated by arrow 30. It will be seen that this current is in the opposite direction to the current flowing when the relay 6 is de-energized.

When switch means 8 is connected to contact LR the relay 6 is de-energized and the modulator grid circuit is returned to the -A, -B terminal through resistors 12 and 14. This causes the transmission of a reference signal by the radiosonde. The circuit from the plus B contact of the battery through resistor 10, contact arm 22 and contact 24 of relay 6 and humidity sensitive resistor 4 is again completed causing current to flow through the humidity-sensitive resistor 4 in the direction of arrow 26. When switch means 8 is on the contact marked HR the conditions are exactly the same except that resistor 12 is eliminated from the modulator grid circuit thus causing a different reference signal to be transmitted by the radiosonde.

3

Thus, it will be seen that when the humidity signal is transmitted current flows through the humidity sensitive resistor 4 in the direction of the arrow 30, while at all other times current flows through humidity sensitive resistor 4 in the opposite direction indicated by arrow 26, thus causing periodic reversal of the current through the resistor 4 and preventing the deteriorating effects referred to above. Proper choice of the resistance 10 enables the current in the direction 10 26 to be adjusted to compensate for the deteriorating effects produced by the current flowing in the direction of arrow 30.

While I have described and illustrated one form which my invention may take, it will be understood by those skilled in the art that other embodiments may be made, as well as modifications of that disclosed, all without departing in any way from the spirit or scope of the invention, for the limits of which reference must be had to the appended claim.

What is claimed is:

A radiosonde comprising an electric circuit, a device comprising a supporting member and a film thereon which varies in electrical resistance with the amount of moisture therein and which is caused to deteriorate by the uni-directional passage of current therethrough, means for periodically connecting said film in said circuit to produce a uni-directional current therein the strength of which is dependent on the resistance of said film and therefore on the amount of mois-

4

ture therein, and means for retarding such deterioration of said device comprising a second circuit, means operable during the intervals between periods when said device is connected in the first circuit for connecting said film in the second circuit, and means for causing the passage of uni-directional current in said second circuit and through said film in a direction opposite to that of the first current.

CHARLES B. PEAR, Jr.

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