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ELECTRIC CURRENT DRIVE TYPE SERVOAMPLIFIER

Filed Sept. 20, 1963

Fig. 1

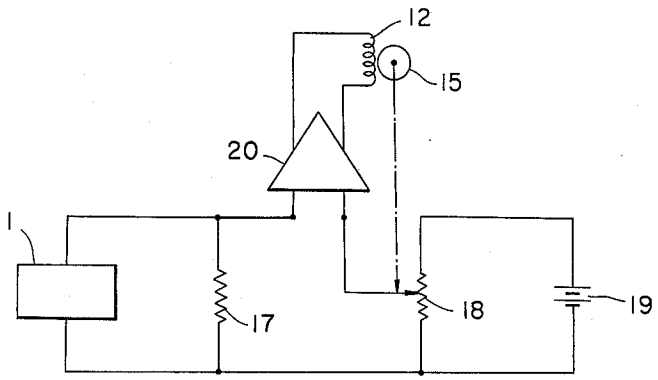
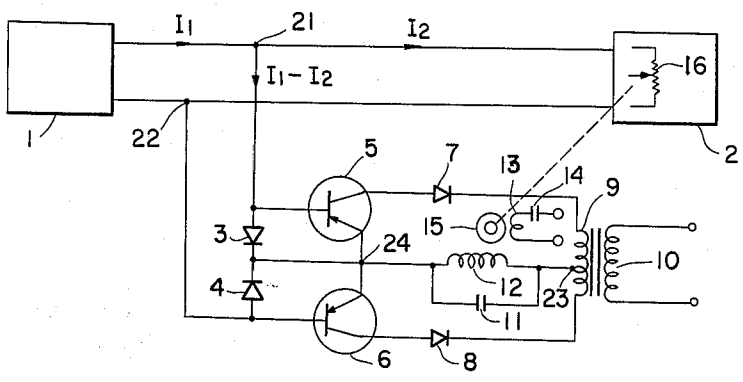


Fig. 2



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ELECTRIC CURRENT DRIVE TYPE SERVOAMPLIFIER

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1 Claim. (Cl. 318—29)

The present invention relates to an electric current drive type servoamplifier used for indication and recording of a signal current from a constant electric current type transmitter which transmits by converting the physical amounts to be measured to uniform electric current signals.

Conventional servoamplifiers have, as shown in FIG. 1, generally a voltage comparison system; after converting an input signal electric current from a constant electric current type transmitter **1** to a voltage signal through an input resistor **17**, said input signal electric current is added to a servoamplifier **20**; said servoamplifier **20** detects a deflection between a set voltage and said voltage signal and adds it to servomotor **15**; and, said servomotor **15** moves by revolving a sliding member of variable resistor **18** for a voltage setting and makes it to carry out indication and recording in order to eliminate said deflection voltage. It is necessary that said servoamplifier should make the voltage to be of a high input impedance in order to make it as an input signal; further, since it should be constructed into a circuit having a fairly large amplification in order to detect a minute voltage, it will become a very complicated and valuable circuit. Also, in case an input signal is an electric current, in order to convert it to a voltage signal in proportion to the current value, a fixed resistance must be provided, and a power loss is inevitable. The object of the invention is to eliminate such defects.

The object and advantage of this invention will become readily apparent from the following detailed description, in which:

FIG. 1 is a construction theory view of a conventional servoamplifier, and

FIG. 2 is a skeleton connection diagram of an embodiment of an electric current drive type servoamplifier in accordance with the present invention.

We will explain the construction and the operation of a current drive type servoamplifier in accordance with the present invention.

In FIG. 2, a current drive type servoamplifier to be inserted between a constant electric current type transmitter **1** and a constant electric current device **2** for balance as a constant electric current type receiver has input terminals **21** and **22** and output terminals **23** and **24**. The anode of diode **3** is connected with the input terminal **21** and a base electrode of PNP type transistor **5**, and the anode of diode **4** with input terminal **22** and a base electrode of PNP type transistor **6**, and the cathodes of both diode **3** and diode **4** are connected with output terminal **24**. A collector electrode of transistor **5** is connected through diode **7** for protection of the transistor with one end of secondary winding **9** of a transformer and a collector electrode of transistor **6** is connected through diode **8** for protection of the transistor with another end of secondary winding **9** of the transformer respectively, and both emitter electrodes of the transistors **5** and **6** are connected with output terminal **24**. Output terminal **23** is a middle tap of secondary winding **9** of the transformer, and control winding **12** of servomotor **15** is connected with output terminals **23** and **24**. To excite control winding **13**, such a proper alternating current is given as it will excite the servomotor. Capacitances **11** and **14** exist for the

purpose of having an excitation electric current and a control electric current of servomotor **15** have a phase difference of 90°.

A proper alternating current is applied to primary winding **10** of the transformer and a control voltage of said servomotor **15** is supplied. **16** is a variable resistor for a current setting contained within a constant current devices for the balance as a constant electric current type receiver, and a slidable member of said variable resistor **16** is connected mechanically to said servomotor **15**.

Supposing that, in such a circuit construction, a signal current from constant electric current type transmitter **1**, is I_1, an electric current from constant current device **2** is I_2, I_1 is larger than I_2, and I_1 and I_2 flow as shown in FIG. 2, the balance of currents (I_1–I_2) flows from input terminal **21** through diode **3** to output terminal **24**, and from the emitter to the base of transistor **6** to input end **22**.

Then, a collector current flows in transistor **6**, and therefore a control winding current flows in control winding **12** and rotates the servomotor **15**. Said servomotor **15** moves the slidable member of variable resistor **16** and makes I_2 to be equal to I_1 and at the same time makes it to carry out indication and recording. If electric current I_2 of constant current device **2** is larger than signal current I_1 from a constant electric current type transmitter, the balance current flows from input terminal **22** through diode **4**, output terminal **24**, and from the emitter to the base of transistor **5** to input terminal **21**. Then, a collector current flows in the transistor **5**, and therefore a control winding current flows in control winding **12** of the servomotor **15** and rotates said servomotor **15**.

A current drive type servoamplifier in accordance with this invention can use a liquid pressure actuating operation equipment in lieu of said servomotor **15** as its operation equipment, and, if a relay or SCR is used, it can become a warning device.

If a current of a constant electric current type receiver **2** is changed to saw tooth waves by using a relay or SCR as an operation equipment of a servomechanism, it becomes a time division telemeter transmitter and constructs an integrating device by entirely the same circuit, and also, if, in the same way, a three-action control meter is used in lieu of a constant electric current type transmitter **1**, it constructs a time ratio control device.

As mentioned above, the electric current drive type servoamplifier in accordance with this invention is very simple in the construction of a circuit as compared with conventional servoamplifiers of a voltage comparison system and moreover there is almost no loss of electric power.

While a preferred embodiment of the present invention is disclosed, it is recognized that the scope of the present invention is not limited thereto and it is therefore intended that the scope of the present invention be defined by the scope of the appended claim.

What is claimed is:

An electric current drive type servoamplifier comprising

a polarity discrimination circuit including two diodes connected to be responsive to the polarity of a current difference between a signal current from a constant electric current type transmitter and a balancing current from a constant electric current type receiver,

a first transistor having an input connected to said circuit to cause said difference current to flow in said input only when said difference current is of one polarity and flows through one of said diodes,

a second transistor having an input connected to said circuit to cause said difference current to flow in the last mentioned input only when said difference current is of the opposite polarity and flows through the other of said diodes,

a two-phase servomotor having a control winding con-

nected to the outputs of said transistors and supplied thereby with a voltage dependent upon said difference current, and having a rotor which rotates in one direction when said difference current flows in one of said inputs, and which rotates in the opposite direction when said difference current flows in the other of said inputs, and

means coupling said rotor to said receiver to cause said rotation in one direction to increase said balancing current, and to cause said rotation in the opposite direction to decrease said balancing current.

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JOHN F. COUCH, *Primary Examiner.*