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METHOD OF REMOTE CONTROL OF ANGULAR, AZIMUTH, ZENITH OR RECTILINEAR VARIATIONS, PARTICULARLY, FOR COMPASS INDICATION AND VARIATION AND DEVICE EMBODYING SAID METHOD

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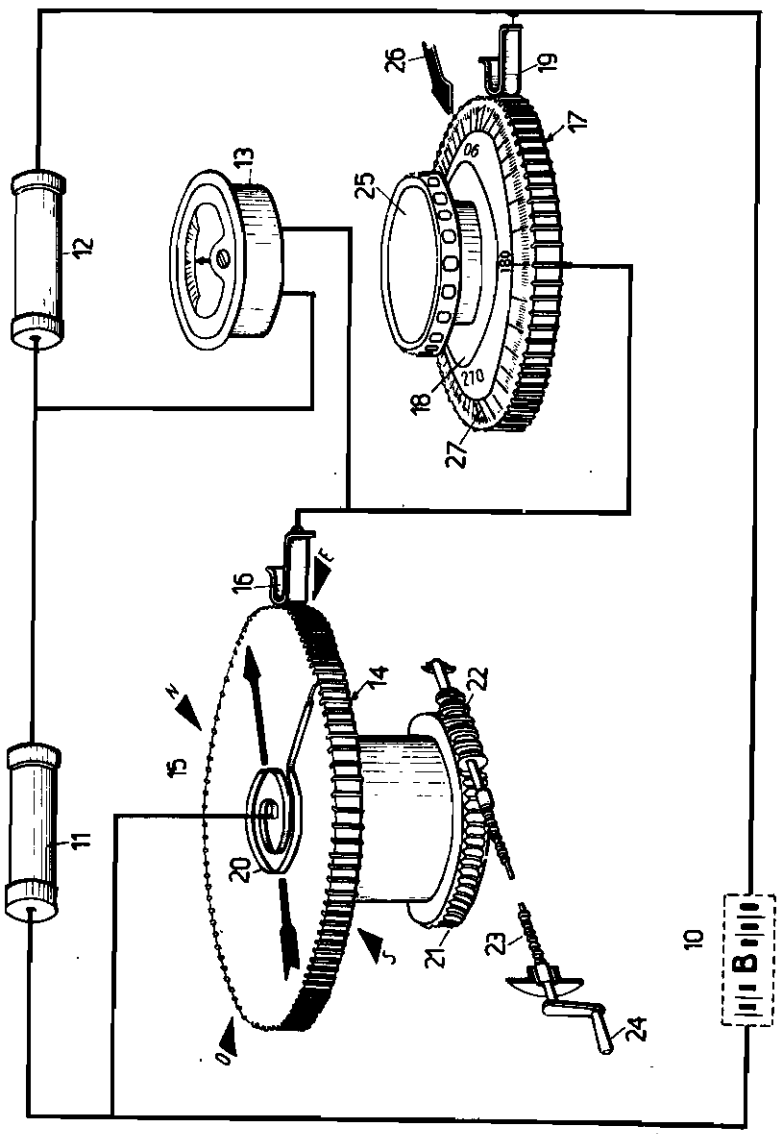

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METHOD OF REMOTE CONTROL OF ANGULAR, AZIMUTH, ZENITH OR RECTILINEAR VARIATIONS, PARTICULARLY, FOR COMPASS INDICATION AND VARIATION AND DEVICE EMBODYING SAID METHOD

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The present invention concerns a method of remote control of angular, azimuth, zenith or rectilinear variations, particularly for compass indication and variation and the device embodying said method.

The method according to the invention consists essentially in that at least four ohmic resistors are employed, two of which are either fixed or adjustable and two are variable, and which are suitably connected by a circuit, an electric indicating means, a source of electromotive force so that the variation of the resistance of one of the variable resistors is effected by the other, thus obtaining the possibility of a remote control.

The device embodying said method is characterized by the fact that it comprises in combination at least four ohmic resistors, two of which are either fixed or adjustable and two are variable, and which are suitably connected by a circuit, an electric indicating means and a source of electromotive force.

In a preferred embodiment, the device comprises the variable resistor wound in a toroidal form preferably on an insulating support, the outer part of said variable resistors being so arranged as to cooperate with lamellar contacts or brushes for the connection with the circuit.

The device provides that one of the variable resistors is drivably connected, by manual drive, or directly engaged with the displacements of the movable body, the positions of which are to be transmitted, the other variable resistor, suitably actuated, reproducing the positions of the movable body upon the displacements by the indicating instrument.

Advantageously this latter variable resistor is so actuated as to reproduce sinchronally and simultaneously the displacements of the movable body by a driving means actuated in the suitable direction by the displacements performed by the indicating instrument.

The above and other features of the invention will appear from the following description which refers to the attached drawing, given by way of indicative example only.

The attached drawing diagrammatically shows the device according the invention with some organs represented by sectional and perspective views.

In the drawing, 10 indicates the feeding battery of the apparatus, 11 and 12 are two fixed ohmic resistors of suitable resistance or of the adjustable type, so that calibration can be easily attained when mounting the device.

An indicating device 13 of the central zero galvanometric type is inserted as hereinafter explained.

A variable ohmic resistor 14 consists of a toroidal or like coil, the turn—of which are wound on a circular support 15 of insulating material. The turn—which result to be on the outside of said support are uncovered to provide a contact with an elastic metal strip or brush 16 so as to realise the variation of resistance continuously and in the desired manner. A resistor 17 of the above type is similarly realised, that is by winding a coil on a circular support 18 of insulating material so that it assumes complexly—a toroidal or like shape. Similarly to the above the outer turn—are in contact with an elastic metal strip 19 to provide the desired variation of resistance.

One end of the resistor 14 is connected to a flat spiral spring 20 fixed on the rotational spindle (not shown in the drawing) of the disc 15. The latter is rigidly connected to a gear 21 engaging with the relative worm gear 22 driven through a suitably drive 23, by a crank 24 or other suitable means to displace when desired the disc 15, thus varying the resistance of the resistor 14. Resistor 17 has the disc 18 rigidly connected to an actuating knob 25 or the like, while a pointer 26 cooperates with the graduations 27 provided on said disc. The connection of the fixed and variable resistors and the other organs referred to above is performed according the Wheatstone bridge diagram. Namely fixed resistors 11 and 12 are connected in series as well as variable resistors 14 and 17. The terminals of said resistors are so connected to one another to dispose said couples of resistors in parallel and feed the same by the battery 10.

The indicating instrument 15, instead, is placed on the diagonal of the parallelogram formed by said resistors, i. e. between the connection of each couple of fixed and variable resistors. In the circuit switching means for the electric energy may be inserted.

It is apparent that if R_1 indicates the resistance of the fixed resistor 11, R_2 that of resistor 12 and R_3, R_4 respectively indicate those of the variable resistors 14 and 17, when in the diagonal whereon indicating instrument 13 is inserted, no current circulates, the relation:

$$\frac{R_1}{R_3} = \frac{R_2}{R_4}$$

must exist, that is the difference of potential at the terminals of said instrument will be zero. If the resistance of one of the two resistors 14

and 17 is varied, no more equality will exist in the above proportion: the resistance of the other of the variable resistors must be varied to restore the balance.

It is apparent that if the variable resistor is either engaged with or even anyhow actuated, even manually, in dependence from the displacements performed by the movable organ, whereof the angular or linear positions (rotations or translations) are to be transmitted, actuation of the instrument 13 will be caused, the operator will then displace the resistor 11 to bring to zero said instrument. The new position taken by the disc 18 coincides with the position of the movable organ, so that said movements are synchronised owing to the univocal correspondence of each resistance of resistor 14 to one single resistance of resistor 17.

If the transmission of the position of the movable organ is desired to take place simultaneously with its movement, it is sufficient to provide the movable armature of the instrument 13 cooperating with a couple of contacts to close, either directly or through relays or the like, the circuit of suitable means for actuation in the proper direction, which by operating on the disc 18 should vary the resistance of the resistor 17, thus re-establishing the balance of the bridge. Thereupon, feeding of the actuating means stops, owing to the aperture of one of the contacts of said couple due to the return of the instrument to zero.

The device realised according to illustrated diagram is advantageously convenient to automatically remotely transmit the course of a vehicle, if the resistor 14 is suitably engaged with the movable armature of a compass of any known type. Besides this application, the device may be used to remotely transmit the position of movable organs such as weapons indicators of speed and number of revolutions, and so on. It is also apparent that the indicating instrument 13 instead of being a galvanometer, may consist of any indicator of known type, such as for instance a cathode ray tube or Braun tube, and particularly a 6E5 valve known in the wireless art under the denomination of "magic eye" or "electric eye". This latter expedient is particularly suitable when an instrument deprived of inertia is desired.

In the case that the movable body has a rectilinear motion, the remote transmission of its position can be realised either by engaging the disc 15 with known driving means to transform the rectilinear motion into a rotary motion (i. e. by crank and connecting rod) or placing the variable resistors on straight supports so as to reproduce the displacements of the movable body. The variable resistors 14—17 may have a linear quadratic, logarithmic or other variation to perform the desired displacements.

It is intended that in the practice the constructional details, as well as the destinations may any how vary without exceeding the limits of the inventions.

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