W. KLINCKERT.

ELECTRICAL MEASURING INSTRUMENT.

APPLICATION FILED APR. 8, 1908.

1,008,549. Patented Nov. 14, 1911.

Fig. 1

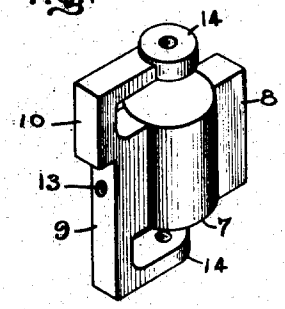


Fig. 3

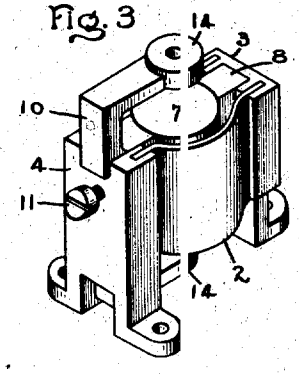


Fig. 2

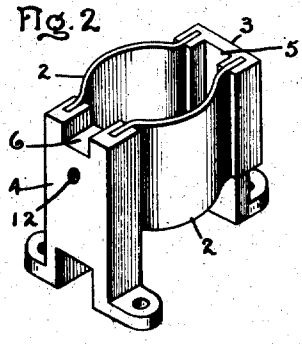
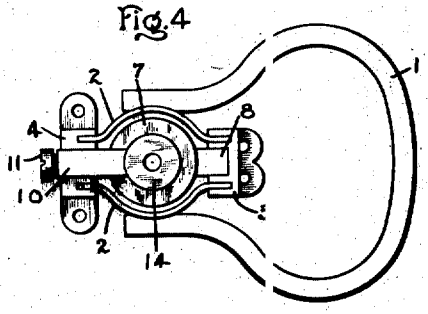


Fig. 4



WITNESSES:

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UNITED STATES PATENT OFFICE.

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ELECTRICAL MEASURING INSTRUMENT.

1,008,549. Specification of Letters Patent. Patented Nov. 14, 1911.

Application filed April 8, 1908. Serial No. 425,819.

To all whom it may concern:

Be it known that I, WILHELM KLINCKERT, a subject of the King of Prussia, residing at Berlin, Germany, have invented certain new and useful Improvements in an Electrical Measuring Instrument, of which the following is a specification.

My invention relates to electrical measuring instruments, and more particularly to instruments of the D'Arsonval and similar types, in which a current carrying coil moves through the intense magnetic field which exists in a narrow air gap in the magnetic circuit of a powerful permanent magnet. The instruments of this type most commonly used consist of two curved pole pieces mounted face to face, with a cylindrical core fixed between them to have a narrow arc-shaped air gap between the core and each pole piece, and a rectangular current carrying coil, with its sides extending through the arc-shaped air gaps, mounted to rotate about the axis of the core in response to variations of current. Since the accuracy and value of the instrument are greater when the air gaps between the pole pieces and the core are equal to each other and are of uniform width, the core must be adjusted and set exactly concentric with the pole pieces by operations which require a skilled workman and increase the cost of the instrument, while great difficulty is encountered in properly re-assembling the instrument after repairs have been made.

The object of my invention is to provide an electrical measuring instrument capable of being easily dismounted and re-assembled without affecting its accuracy, and having a magnetic system so constructed that the various parts, which are made very accurately and rapidly by means of dies or templets, will fit together and interlock when they are in the proper relation to each other, thereby producing an instrument with a magnetic system which may be easily assembled with the utmost accuracy and exactness without any adjustment or hand fitting.

In carrying out my invention the two iron blocks or members, which form the walls of the air gap through which the current-carrying coil moves, are interlocked with each other in exact and definite relation by means of a block of brass or other non-magnetic material, which is preferably rigidly and permanently secured to one of the members by casting or some similar process and is provided with grooves or ribs which fit into corresponding ribs or depressions on the other member. In the preferred form two semi-circular or curved pole pieces mounted face to face are made substantially integral and are held in fixed relation to each other by means of brass space blocks mounted between and rigidly secured to the opposing ends of the pole pieces. The space blocks have grooves cut in them to interlock with corresponding projections on the core and since the interlocking grooves and projections are made very accurately, either by casting or by means of dies and templets, the two members must necessarily assume the exact position required with relation to each other when the ribs and grooves on the two members are completely home and are interlocked.

My invention will best be understood in connection with the accompanying drawing, which shows one of the many forms in which it may be embodied, and in which—

Figure 1 is a perspective view of the core of a D'Arsonval instrument embodying my invention; Fig. 2 a perspective view of the pole pieces of the instrument; Fig. 3 a perspective view of the pole pieces and core in their assembled position, and Fig. 4 a plan view of the entire magnetic system of the instrument.

The moving coil and pointer of the instrument are not shown in the drawing, since these parts are of standard construction and are mounted to rotate about the axis of the cylindrical core. The magnetic field is obtained by means of the powerful permanent magnet 1 with its poles connected to the grooved pole pieces 2, which are mounted face to face, so as to leave a circular space between them. The opposing ends of the pole pieces are joined together by means of space blocks 3 and 4, made of brass or other non-magnetic material and preferably cast or otherwise rigidly and permanently secured to the ends of the pole pieces to make the pole pieces and space blocks an integral rigid structure in which the relation between the pole pieces is definite and unchangeable.

The space blocks 3 and 4 may be constructed in any suitable way to enable them to interlock with the core and hold it in the

exact position required between the pole pieces 2. The preferred arrangement is that shown in the drawings, in which the space block 3 is provided with a longitudinal groove 5 parallel to the axis of the circular pole pieces 2, while the space block 4 is provided near one end with a groove 6 at right angles to the axis of the pole pieces. The cylindrical core 7 must be mounted between the pole pieces 2 and exactly concentric with them, and this result is easily obtained by providing the core with interlocking projections which fit the grooves 5 and 6 and thereby position the core exactly concentric with the pole pieces and also in proper longitudinal relation to them. In the preferred construction, as shown in Fig. 1, the cylindrical iron core 7 is provided with a projection or guide bracket 8 of brass which exactly fits the groove 5, while a second projection or guide bracket 9, diametrically opposite the first, makes a snug fit with the inner surface of the space block 4 to prevent movement of the core toward either space block, and since at the same time the sides of the grooves 5 and 6 fit closely the sides of the projections 8 and 9 the core is firmly positioned exactly concentric with the pole pieces 2 merely by sliding the projections in the core into the grooves on the space blocks. The projection or guide bracket 9 is also provided with a shoulder 10, which fits snugly into the groove 6, and by engaging the bottom of the groove positions the core longitudinally between the pole pieces and prevents further movement of the core in the direction of its axis. Since the grooves 5 and 6 and the projections 8 and 9 are made very accurately by means of dies and templets, and fit into and interlock with each other very accurately, the core is mounted exactly concentric with the pole pieces and in proper position axially by merely sliding the guide brackets 8 and 9 into the grooves 5 and 6 until the shoulder 10 engages the bottom of the groove 6. After the core is in position the parts are held against displacement by means of a stud 11 passing through a hole 12 in the space block 4 and into a hole 13 in the guide bracket 9.

The moving coil is mounted exactly concentric with the core and in such a position that it will swing about the core with a uniform clearance by providing the guide bracket 9 at each end with lugs 14 projecting beyond the axis of the core and separated by a space greater than the length of the core. Holes are bored through the lugs on the exact axis of the core, and the bearings for the moving coil are mounted in these holes, so that no fitting or adjusting by the workman is required when the coil is put in place.

My invention may be embodied in many other forms than that shown and described and the terms of the appended claims are not restricted to the precise structure disclosed, but are intended to cover all changes and modifications within the spirit and scope of my invention.

What I claim as new, and desire to secure by Letters Patent of the United States, is,

1. In an electric measuring instrument, the combination with polepieces, of masses of non-magnetic material rigidly secured to said polepieces and provided with grooves one at right angles and the other parallel to the axis of the polepieces, and a block of iron provided with projections, one of which engages one of said grooves and the other of which engages both sides and the bottom of the other of said grooves to interlock the block of iron with said non-magnetic material against axial movement in one direction and against both rotation and transverse movement in any direction, whereby said block is held in definite relation to the polepieces to form part of the magnetic circuit.

2. In an electric measuring instrument, the combination with polepieces mounted face to face and a magnetic core mounted between said polepieces, of non-magnetic space blocks between and rigidly secured to opposing ends of said polepieces, and a non-magnetic core support interlocked with said space blocks to hold the core against axial movement in one direction and against both rotation and transverse movement in any direction with reference to the polepieces.

3. In an electric measuring instrument, the combination with polepieces mounted face to face, a magnetic core mounted between said polepieces and a moving coil, of non-magnetic space blocks between opposing ends of said polepieces, said space blocks having grooves between said ends one at right angles and the other parallel to the axis of said pole pieces, and non-magnetic supports for said core, one of said supports having lugs adjacent each end of the core to carry bearings for the moving coil and provided with a projection which fits into said groove and engages both the bottom and sides thereof to interlock the core with the polepieces against axial movement in one direction and against both rotation and transverse movement in any direction.

4. In an electric measuring instrument, the combination with curved pole pieces mounted face to face, of space blocks of non-magnetic material integrally secured to the opposing ends of said polepieces, a cylindrical core and means connected with said core interlocking said core with the space blocks against axial movement in one direction and against movement in any direction transverse its axis whereby said core is held concentric with said polepieces.

5. In an electric measuring instrument, the combination with polepieces mounted face to face, of non-magnetic space blocks between said polepieces, a magnetic core mounted between said polepieces, and a flat non-magnetic support for said core thinner than said space blocks and interlocked with said space blocks, to permit movement of said core in only one direction along its axis and to hold the core in position.

In witness whereof I have hereunto set my hand this 23rd day of March 1908.

WILHELM KLINCKERT.

Witnesses:

JULIUS RINNLAND,

KARL GRICKAREN.