No. 873,253. PATENTED DEC. 10, 1907.

P. MacGAHAN.

COIL FOR ELECTRICAL APPARATUS.

APPLICATION FILED OCT. 18, 1905.

Fig. 1.

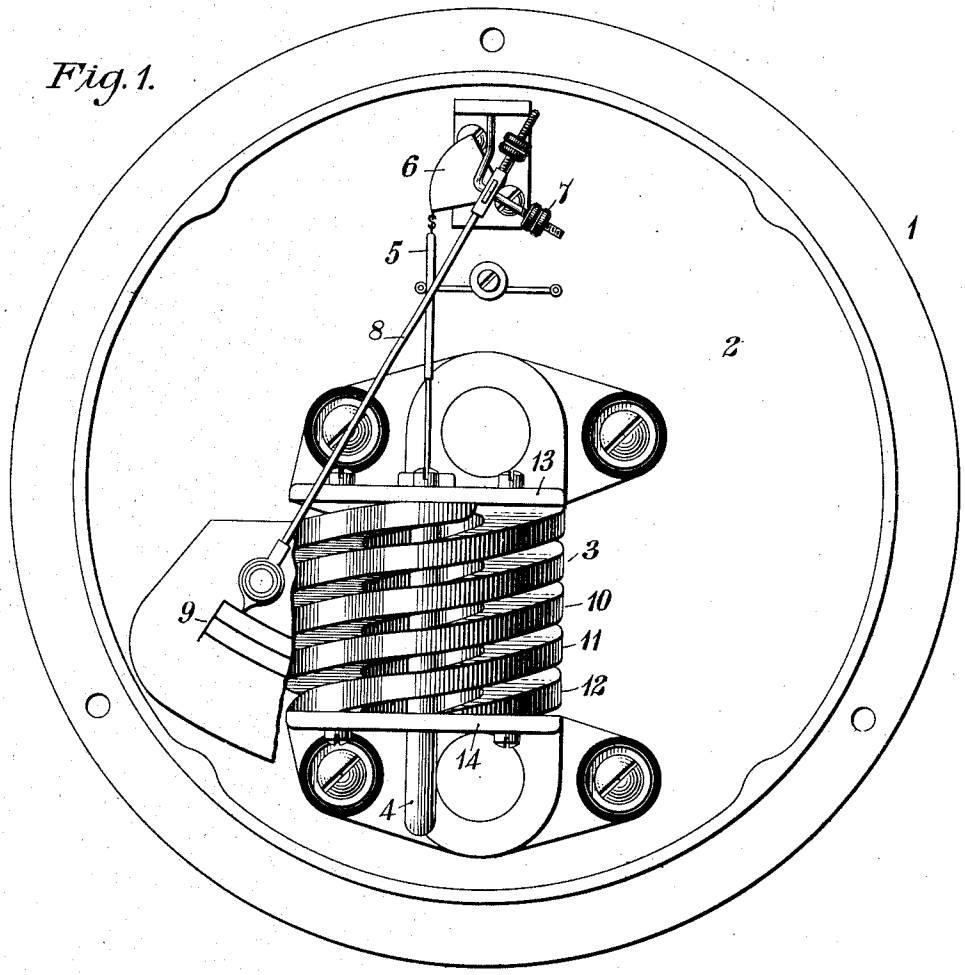


Fig. 2.

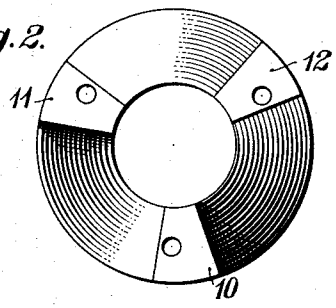
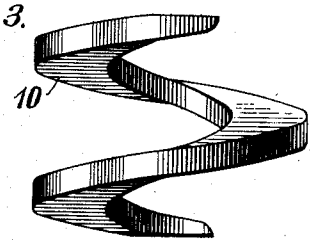


Fig. 3.



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COIL FOR ELECTRICAL APPARATUS.

No. 873,253. Specification of Letters Patent. Patented Dec. 10, 1907.

Application filed October 18, 1905. Serial No. 283,338.

To all whom it may concern:

Be it known that I, PAUL MacGAHAN, a citizen of the United States, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Coils for Electrical Apparatus, of which the following is a specification.

My invention relates to electrical apparatus and particularly to helical coils for such apparatus.

The object of my invention is to provide a helical coil of a small number of turns which shall exert a uniform, magnetic pull.

In the operation of a solenoid, as ordinarily constructed, that comprises only one or but a few convolutions of a large conductor it has been found that a non-uniform magnetic field is produced in the interior space occupied by the core, the denser portions of the field being produced in proximity to the sides of the solenoid where the larger number of conductors occur. For instance, in a solenoid having but a single convolution the denser portion of the field occurs near the side where the conductor crosses itself at the beginning and ending of the convolution. If a magnetizable core is movable longitudinally in the interior space it will be drawn to one side so as to operate in the denser portion of the field. This displacement from an axial position is objectionable in many devices, such, for example, as measuring instruments.

A solenoid constructed in accordance with my invention comprises a plurality of interleaved and symmetrically disposed helices the corresponding ends of which are uniformly spaced apart and connected to suitable ring-shaped terminal pieces. The number of conductors adjacent all sides of the opening is substantially the same and the field, consequently, is uniform.

My invention permits of the construction of solenoids having less than a single convolution or any full or fractional numbers of convolutions which will produce substantially uniform fields throughout their interior spaces.

Figure 1 of the accompanying drawing is a front elevation of an electrical measuring instrument having a coil that embodies my invention. Fig. 2 is a plan view of the coil shown in Fig. 1 and Fig. 3 is a side elevation of one section of the coil shown in Figs. 1 and 2.

The casing 1 of the instrument may have a suitable back or base plate 2 upon which are supported the operating parts of the instrument, these parts comprising a solenoid 3, a core 4, a flexible support 5 for the core, a segmental block 6 to which the flexible support 5 is connected and with the curved face of which it engages, an adjustable counter weight 7 for the block 6 and a pointer 8, the free end of which moves over a suitable scale 9. The parts just referred to may be of any well known construction except the solenoid 3, the novel, structural features of which constitute my present invention. The coil 3, instead of being composed of a single continuous helix, as is usual, comprises a plurality of helices 10, 11 and 12 that are interleaved and symmetrically disposed and the ends of which are uniformly spaced apart and connected to suitable conducting rings 13 and 14.

While I have here shown the compound helix as composed of three constituent helices I desire it to be understood that the number may be greater or less than three if desired, it being essential, however, in order to secure substantial uniformity of the magnetic field thoughout the area of the opening in the solenoid, to uniformly space the constituent portions, and obviously the greater the number of members employed the closer will be the approximation to uniformity in the magnetic field.

I claim as my invention:

1. A solenoid comprising a plurality of interleaved single layer helices of substantially equal diameter and length and connected in parallel relation.

2. A solenoid comprising a plurality of interleaved, equally spaced helices of equal length and conducting rings connecting corresponding ends together.

3. An actuating coil for electrical measuring instruments comprising a plurality of interleaved, helices of the same diameter and separated throughout by air spaces and means for electrically connecting corresponding ends together.

4. A multiple solenoid comprising a plurality of helical strap coils symmetrically disposed and separated from each other by uniform air spaces, and means for connecting corresponding ends together.

5. A solenoid comprising a plurality of interleaved helices uniformly separated from

each other by air spaces and connected in parallel relation.

6. A solenoid comprising a plurality of interleaved and symmetrically disposed helices the corresponding ends of which are spaced apart and connected to suitable ring-shaped terminal pieces.

In testimony whereof, I have hereunto subscribed my name this 13th day of October, 1905.

PAUL MacGAHAN

Witnesses:
S. M. TRUXAL,
BIRNEY HINES.