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DUST IRON CORE

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Magnetic Core, comprising powdered iron, powdered silicon and insulating material.

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DUST IRON CORE

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2 Claims. (Cl. 175—21)

This invention relates to a dust iron core of the type used in particular for high frequency, for instance, of the order of 100 kcs. and especially for frequencies beyond 200 kcs.

Such dust iron cores mostly consist of a ferromagnetic powder, for instance, iron powder, especially carbonyl iron powder and the like, of a particle size of 0.01 mm. and less, and a binder. In many instances, the magnetic particles are surrounded by a solid insulating skin.

It is an important object of the present invention to provide a dust iron core, of the type referred to, in which only a certain percentage of the solid powder contained in the core consists of ferromagnetic material, the balance being non-magnetic material.

Another object of the invention is to provide means for regulating the permeability and losses of the core material and to vary the composition of the magnetic powder which is being used, in accordance with the specified permeability and losses.

Still another object of the invention is to provide a non-magnetic solid admixture increasing the mechanical strength of the core and its accuracy regarding dimensions and ensuring low wear of the pressing tools.

In the drawing, a core is shown in elevation which may be made in accordance with the invention. The particular core shown in the drawing is a so-called plug core of the screw type, having a screw thread on its surface and operating slots at both ends. Cores of this type are advantageously used for tuning coils in radio receivers, since they permit accurate adjustment of the coil inductance by screwing them more or less into the coil.

With the above mentioned objects in view, I use silicon powder as an admixture of filling powder in the core, in addition to the iron or other magnetic powder and the binder. Of course, silicon is an electric conductor and, therefore, it might be expected that the eddy current losses are increased by the admixture of silicon powder, compared to the conventional use of non-conductive powder, such as quartz powder and the like. I have found, however, that the silicon powder, if sufficiently comminuted, does not cause any additional losses compared to non-conductive powders. While it is not intended to offer a definite theoretical explanation for this fact, it may be that owing to the small size of the individual particles and the relatively high specific resistance of silicon, the loss currents formed in each particle are so small as to be negligible compared to the iron losses.

Advantageously, the silicon powder is ground to a similar size as the magnetic particles, i. e., to a diameter of a few microns. The amount of silicon powder admixed to the magnetic powder depends on the specified permeability and loss data and may range from a few percent up to 80% weight of the core. The great advantage of this filling material compared to the conventional filling powders resides in the fact that the cores become extremely hard and solid and that resilient action of the filler which, for instance, may occur with quartz powder and would cause subsequent changes of dimensions and electrical data after the pressing operation, and low mechanical strength, is absolutely eliminated. The cores are very hard, strong and true to specified dimensions.

Example

In order to make a screw type plug core for short wave coils, 50% by weight of carbonyl iron powder is mixed with 50% of silicon powder of substantially the same particle size. It is not necessary for the silicon powder to be absolutely pure (for instance, 98% silicon, 2% iron). Now, a varnish consisting of the condensation products of phenol and formaldehyde is admixed as a binder and the moist powder thus obtained is compressed in a cold or thermoplastic state to the cores of the required shape. It is also contemplated that the compression may be carried out in two steps, comprising an initial cold pressing and a subsequent pressing under heat, followed by a hardening step in a suitable furnace.

I claim:

1. A high-frequency ferromagnetic core consisting of a pressure-formed body consisting essentially of discrete particles of ferromagnetic powder and of silicon powder in substantially equal amounts by weight, said particles being held together solely by means of a thermo-setting insulating binder.

2. A high-frequency ferromagnetic core consisting of a pressure-formed body consisting essentially of discrete particles of ferromagnetic powder and of silicon powder in substantially equal amounts by weight, said particles being of substantially the same particle size and being held together solely by means of a thermo-setting insulating binder.

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