Oct. 13, 1931. R. C. SHERMUND 1,827,376

METHOD OF MAKING MAGNETIC CORES

Filed Oct. 3, 1928

FIG. 1.

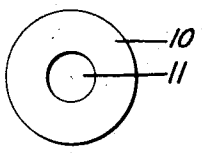


FIG. 2.

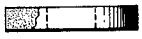
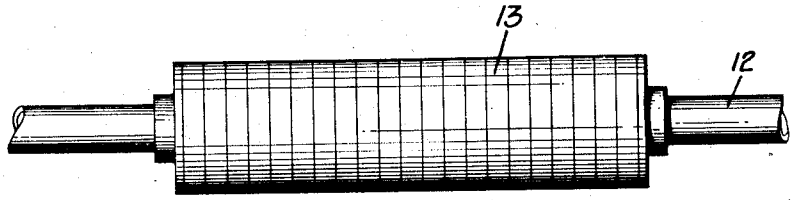


FIG. 3.



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UNITED STATES PATENT OFFICE

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METHOD OF MAKING MAGNETIC CORES

Application filed October 3, 1928. Serial No. 309,967.

This invention relates generally to a composition of matter in solid form particularly adapted for use as a magnetic core material, and to methods of manufacturing the same.

It is a general object of this invention to provide a composition of matter having relatively high magnetic permeability, low hysteresis and eddy current losses, of sufficient mechanical strength to form a self supporting structure.

A feature of the invention is a magnetic core composed of finely divided particles of a magnetic metal or alloy separated by a heat resistant binding and insulating substance whereby the core may be exposed to high temperature without altering either its electrical and magnetic properties or its mechanical strength.

Referring to the drawings:

Figure 1 is a plan view illustrating a convenient form for my composition.

Figure 2 is a side view of the form shown in Fig. 1, a portion of the material being broken away.

Figure 3 is a side elevational view of an assembled magnetic core formed of a plurality of members such as shown in Figs. 1 and 2.

It has previously been proposed to utilize fusible binding materials, such as various phenol condensation products, in the manufacture of solid compositions containing comminuted metallic materials. For various reasons the use of binding materials of this character is often undesirable, as for example, they cannot withstand the temperatures to which the finished product should be heated for annealing purposes. The composition and method of this invention is the result of the discovery that mica when in proper condition can be employed alone without other binding materials as a means for retaining divided metallic material in solid form. Mica is not only readily available at low cost, but is a material which is capable of withstanding relatively high temperatures.

In compositions in accordance with this invention it is preferred to utilize ordinary mica which has been ground to fine condition. Preferably the remaining ingredients of the composition, such as a divided metallic material, is mixed with the mica by grinding them together. The resulting mixture is subjected to high pressure whereby it is transformed into a solid mass having considerable mechanical strength.

As the compositions are particularly useful for magnetic cores, the preferred embodiment of the invention utilizes finely divided mica together with a comminuted magnetic material such as iron, nickel, or an iron nickel alloy. A composition of good permeability has been obtained by using eight to ten per cent of mica with the balance finely divided iron. The iron and mica are individually ground to a sufficient fineness to pass a 100 mesh screen, and are then introduced into a ball mill and are ground together and thoroughly intermixed. During this intermixing and grinding the particles of iron apparently become coated by the minute particles of mica. The resulting mass is then introduced into a press where it is compressed to solid form by a pressure of say 200,000 pounds per square inch. The resulting composition when removed from the press, can be subjected to heat treatment for increasing its effective permeability.

In Figs. 1 and 2 of the drawings the composition is shown compressed to form a relatively flat disk shaped member 10, which can be drilled or otherwise provided with a central aperture 11. Referring to Fig. 3 a plurality of these members 10 are shown assembled upon an insulating rod 12 to form a cylindrical magnetic core 13.

The composition produced by the process of this invention is not only cheap and simple to manufacture, but its magnetic qualities are such that it can be employed to form cores of high frequency inductances, such as are employed in radio apparatus.

The mica utilized in the composition not only serves as a binding means, but also electrically insulates the metallic particles from each other. Therefore losses due to eddy currents are minimized when the composition is employed as a core for a varying magnetic field.

I claim:

1. The method of making a magnetic core which comprises grinding together finely comminuted magnetic material and mica and compressing the resultant mass into a self sustaining solid.

2. The method of making a magnetic core which comprises grinding together finely comminuted magnetic material and mica and compressing the resultant mixture into a self sustaining solid.

3. The method of making a magnetic core which comprises grinding together finely comminuted magnetic material and mica and compressing the resultant mixture into a self sustaining solid under a pressure of at least 150,000 pounds per square inch.

In testimony whereof, I have hereunto set my hand.

RALPH C. SHERMUND.