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2,475,321

MOLDED CORE

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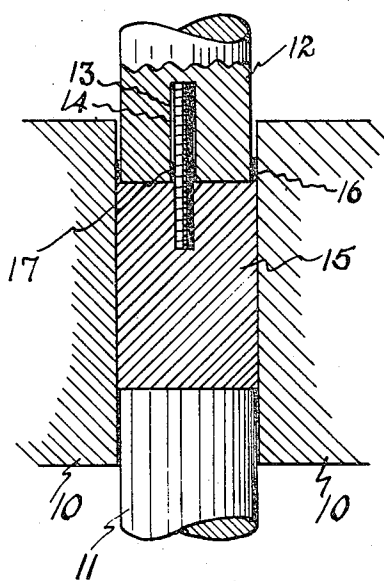


Fig. 1.

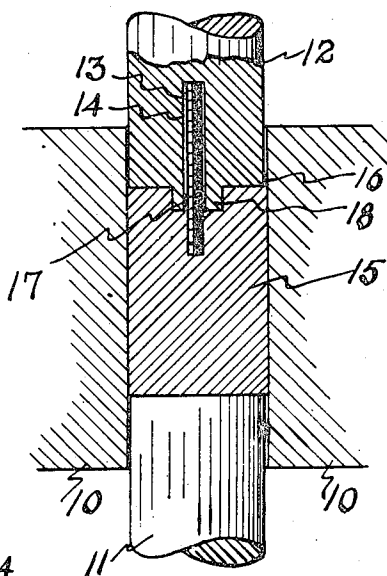


Fig. 2.

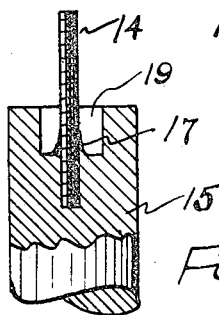


Fig. 3.

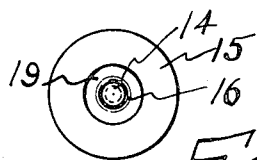


Fig. 4.

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MOLDED CORE

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3 Claims. (Cl. 175—21)

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This invention relates to improved machinery and methods by means of which improvements in molded metal products may be secured.

The subject matter of this invention is concerned with metal bodies molded from metal powders and particularly with iron cores molded from powdered iron and constructed for use as a core for current carrying coils of electrical apparatus of various types. For example in some forms of radio circuits it is a practice at the present time to provide the tuning coils thereof with iron cores which may be longitudinally adjusted with respect to the coils to vary the inductance thereof. In order to facilitate such adjustments these cores are provided with a threaded rod or screw at one end which is secured in place by being molded therein during the formation of the core. The threaded rod extends beyond the end of the core a suitable distance and in use passes through a plate or other support in threaded engagement so that upon rotation the core is caused to move longitudinally.

Cores of this type are molded from extremely fine iron powders under very high pressures in a ram type of press having a fixed die forming a pocket into the opposite ends of which the rams move to compact the powder under such high pressure as to cause the particles to become permanently bonded together. The durability of such core is commonly increased by sintering the molded product after compression.

One of the movable rams is provided with a central bore in which the threaded rod for the core is mounted with the end projecting so as to be inserted into the powder during molding. The rams, of course, have a sliding fit in the fixed die, but there is sufficient clearance so that under the extremely high pressures encountered some of the powdered metal will flow around the periphery of the ram a short distance into the space between it and the adjacent wall of the fixed die. Likewise some of the powder will flow under pressure into the space around the threaded rod between it and the surrounding wall forming the recess in the ram in which the screw is mounted. As the result of this escape of powdered metal there are formed fins which are termed in the art "flashes" at the ends of the core around the outer peripheral edges and around the projecting screw. The outer peripheral fins are easily removed, but it is a more difficult and less satisfactory operation, as well as an expensive one, to remove the flash around the screw which, of course, is molded into the threads of the screw.

If the material of the flash around the screw

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is not completely removed it will ultimately work loose when the core is in use, producing a fine iron powder or dust which gets through the electrical equipment and becomes a nuisance even if it does not, as it often may, disturb the electrical characteristics of the equipment. For example, in the case of ultra high frequency radio circuits a small amount of iron powder loose in the coils may cause electrical disturbances of undesirable magnitude.

The subject matter of this invention is concerned with a method of molding metal cores and projecting screws so as to overcome the difficulty particularly encountered with the flash which forms about the screw.

This invention resides substantially in the combination, construction, arrangement, relative location of parts, steps, series of steps, and the product, all as hereinafter described in full detail.

In the accompanying drawing,

Figure 1 is a vertical, central, cross-sectional view through a metal powder molding press showing the manner of molding the screw in a molded body and the flash forms;

Figure 2 is a similar view of such a press modified in accordance with this invention;

Figure 3 is a vertical, central, cross-sectional view of one end of a core manufactured in accordance with this invention; and

Figure 4 is a top plan view thereof.

In the usual metal outer molding process a press capable of producing very high pressures per square inch, say of the order of 100,000 pounds per square inch is provided. It includes a fixed die 10 which is a body of steel having a passage therethrough of the configuration of the body to be molded. The core illustrated is of circular cross-section, and hence the passage through the fixed die 10 is circular in cross-section. The lower end of the passage is closed by a bottom ram 11. With the ram 11 in lowermost position closing the bottom end of the opening, a predetermined quantity of metal powder is poured into the chamber thus formed. The top ram 12 is provided with a recess 13 in which the screw 14 to be molded into the core is inserted. As the rams are moved towards each other the metal powder is compressed into a coherent body 15 in which the screw 14 is embedded. Due to the enormous pressures employed some of the powder will flow into the space between the ram 12 and the die 10 to form a flash or fin, as indicated at 16. In a like manner a flash 17 will form around the screw. Of course, a flash will form

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at the bottom of the core 15 around the bottom ram, although this has not been illustrated in the drawings. The rams are withdrawn, freeing the molded body. The flash 16 is easily broken off, but the flash 17 is harder to eliminate. The description of the above old practice will be helpful in understanding the subject matter of this invention.

This subject matter is illustrated in Figures 2, 3 and 4. The fixed die 10 and bottom ram 11 are the same as the arrangement of Figure 1. The top ram 12 is however provided with a projecting collar 18 surrounding the recess 13 and of a length beyond the end of the ram at least equal to the normal length of the flash 17 which forms. When the body 15 is formed by compression the flash 16 will form as well as one at the bottom end and the flash 17 will also form around the screw 14. However, as illustrated in Figure 3, the recess 19 in the end of the core or body 15 is of such longitudinal length that the flash 17 which forms will be within the end of the core, and hence out of the region of that portion of the screw 14 which must cooperate with a threaded support. Thus it is not necessary to go to the expense or bother of removing the flash 17 and it is so positioned and projected that it will not normally be broken loose during the use of the device. Of course, the flash formed around the outer periphery at the ends of the core is easily removed, and therefore no provision is made in accordance with this invention for special handling thereof as in the case of the flash 17.

From the above description it will be apparent to those skilled in the art that the subject matter of this invention is capable of some variation, and I do not, therefore, desire to be strictly limited to the disclosure as given for illustrative purposes, but rather by the scope of the claims granted me.

What is claimed is:

1. A molded body composed of densely compacted particles of metal having a screw embedded therein and projecting beyond one face

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thereof, said body having a recess surrounding said screw of an axial length at least equal to the material of the body which flashes around the screw.

2. A magnetizable core comprising a form-sustaining body of iron particles with a metal insert embedded therein and projecting beyond one face thereof, said body having a recess opening at said face and lying concentric with said metal insert whereby the material which flashes around the insert will lie in the recess.

3. A method of molding a body of powdered metal with an insert embedded therein and projecting from one face, which comprises compacting the metal powder into a shape to form a recess in the resultant body surrounding the insert and simultaneously forming a flash at the periphery of said face and in the recess in said face surrounding the insert, and fixing said insert extending through said recess and beyond said face, said recess having an axial length at least equal to the height of the flash surrounding the insert.

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