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BOBBIN AND CORE ASSEMBLY

Filed Aug. 23, 1963

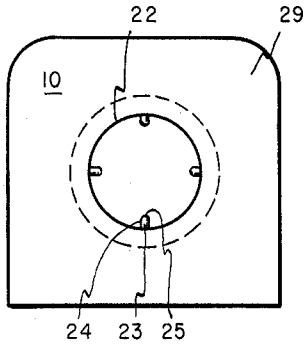

FIG.2

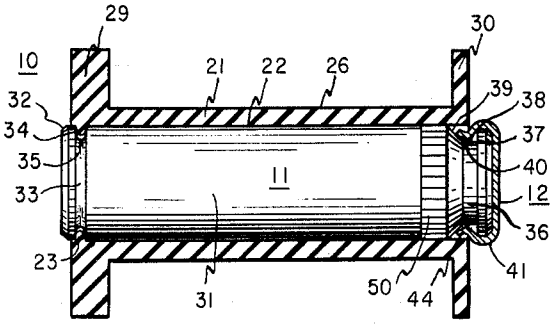

FIG.1

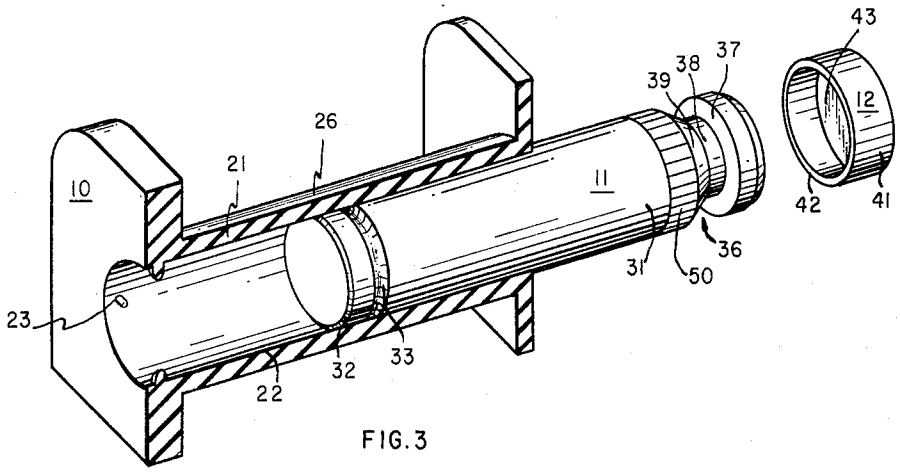

FIG.3

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BOBBIN AND CORE ASSEMBLY

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The invention relates generally to a coil bobbin and core assembly, and more particularly to arrangements for securing a core within a molded coil bobbin and for securing a residual element to the core when the assembly is used in an electromagnetic device.

The advent of the use of molded coil bobbins in quick release type electromagnetic devices, while advantageously allowing the coil to be wound on an integrally molded bobbin instead of on a core, also created two problems. The first of these problems involved the need for securing the core in the molded bobbin to prevent them from separating after assembly; the second involved the use of a residual element of non-magnetic material on the core to provide for quick release of an armature or other device upon destruction of the magnetic field in the core and the need for securing such an element to the core.

The arrangement disclosed in the copending application of Joseph E. Zerwic, Serial No. 24,930, filed April 27, 1960 (now U.S. Patent 3,106,669, issued October 8, 1963), provided one solution for the first of the above mentioned problems; but the solution necessitated the use of an element external to the bobbin and core and an objectionably large molded extension on the core itself. It also required several assembly steps.

Therefore, it is an object of the invention to provide a novel and improved molded coil bobbin and core design for securing the core within the bobbin.

It is a further object of the invention to provide an arrangement for mounting and securing a residual element on a core in quick release type electromagnetic device.

The invention features small molded projections on the inner surface of the hollow tubular portion of the molded bobbin and a groove in the core receiving the projections to secure the core within the bobbin.

The invention also features a depression in the core receiving a constricted portion of the hollow cylindrical portion of the residual element to secure the residual element to the core.

Other objects and features and a fuller understanding of the invention will be had by referring to the following description taken in conjunction with the accompanying drawing in which:

FIG. 1 is an elevated view of this embodiment of the invention with the molded bobbin and the residual element in half section.

FIG. 2 is an end view of the bobbin without the core inserted.

FIG. 3 is an exploded perspective with a portion of the bobbin cut away to show the core partially inserted and with the residual element in position for mounting on the core.

Referring to the drawing, reference character **10** designates an integrally molded coil bobbin which may be formed of any plastic insulating material; reference character **11** designates a core piece which may be formed of magnetic iron; and reference character **12** designates a residual element which may be of brass or other non-magnetic metal.

The molded bobbin **10** has a hollow tubular portion **21** with outer surface **26** on which a coil of wire may be wound between the two end flanges **29** and **30**. The inner surface **22** of the tubular portion **21** has thereon, near the end with the flange **29**, four small radial projections **23**. The radial projections **23** are integrally molded on

the bobbin **10** and are spaced apart 90° on the circumference of the inner surface **22**. The projections **23** have cylindrical bases **24** and semispherical tops **25**.

The magnetic iron core **11** is received by the hollow tubular portion **21** of the bobbin **10**. One end of the core **11** has a small chamfer **32** which enables the projections **23** on the bobbin **10** to ride up onto the circumferential surface **31** of the core **11** more easily. The circumferential surface **31** has, near the chamfered end, a narrow, shallow depression or groove **33** which encompasses the whole circumference of the core. The groove **33** has flat sides **34** and a semicircular bottom **35** and is formed on the core **11** to receive the molded projections **23** on the bobbin **10**.

The molded bobbin **10** and the magnetic iron core **11** are assembled as shown partially accomplished in FIG. 3. The end of the core **11** having the chamfer **32** is inserted into the hollow tubular portion **21** at the end of the bobbin **10** having the flange **30**. As the core **11** is inserted deeper into the tubular portion **21**, the projections **23** engage the chamfer **32** and ride up onto the surface **31** of the core **11**. The core is further inserted until the projections **23** slip into the groove **33**. When this has been done the core is secured in the bobbin and cannot be easily removed. This securing then has been accomplished by the improved design of the coil bobbin and core featuring the projections on the bobbin and the groove on the core.

The core **11** also has a fluted knurl **50** on the surface **31** near the end opposite the chamfer **32**. The knurl engages the inner surface **22** of the tubular portion **21** of the bobbin **10** to retard rotary movement of the core **11** in the bobbin **10**.

Between the knurl **50** and the end of the core **11** nearest the knurl is a wide, shallow depression **36**. The form of the depression **36** causes that end of the core to be shaped somewhat like the head of a pop bottle when viewed from the side. The depression has four flat portions **37, 38, 39,** and **40**. The flat portion **37** comprises one side of the depression **36** and is nearest the end of the core and perpendicular to the surface **31**. The flat portion **38** is the bottom of the depression **36** and is parallel to the surface **31**. The flat portion **39** with the flat portion **40** comprises the other side of the depression and forms a bevel which is spaced apart from the flat portion **38**.

The residual element **12** has a hollow cylindrical portion **41** with an open end **42** and a closed end **43**. The open end **42** is received by the end of the core **11** having the depression **36**. The constricted portion **44** of the cylindrical portion **41** is received by the depression **36** in the core **11** to secure the residual element on the core. The depression **36** on the core **11** has thus combined with the constricted portion **44** on the residual element **12** to provide an arrangement for mounting and securing the residual element on the core.

The assembly of the core **11** and residual element **12** is accomplished by fitting the open end **42** of the hollow cylindrical portion **41** over the end of the core **11** and then forming the constricted portion **44** by a crimping process. This could be done by hand with a crimping tool or by an automatic machine.

The above description discloses one embodiment of the invention, however it is to be understood that numerous changes in detail and structure may be made without departing from the scope of the invention as hereinafter claimed. For example, the groove receiving the projections on the bobbin could have sections which are not cut out, thus preventing the projections from sliding around the groove, securing the core against rotary motion in the bobbin, and eliminating the need for a knurl on the core.

What is claimed is:

1. In a quick release electromagnetic device, a bobbin and core assembly comprising a cylindrical core of magnetic material having two ends and an external surface, said external surface having a pair of grooves therein, each of said grooves surrounding said core near one end, a molded coil bobbin having a hollow tubular portion with an internal surface, said internal surface having at least one radial projection thereon, said core received by said hollow tubular portion of said bobbin, said projection engaging said core in one of said grooves to lock said core in said bobbin, and a residual cap of non-magnetic material having a hollow cylindrical configuration with one open end and one closed end, a constricted portion on said open end, said cap being mounted over the end of said core with said constricted portion engaging said core in the other of said grooves to lock said cap on said core.

2. In an electromagnetic device, in combination:

a core of magnetic material having a generally cylindrical outer surface, and a coil bobbin of insulating material, preformed separately from said core, with a hollow tubular portion,

the radius of said outer surface of said core being sufficiently less than the radius of the inner surface of said hollow tubular portion to enable said core to be slidably inserted into said tubular portion of said bobbin,

said bobbin having at least one projection extending radially inward from said internal surface, said projection being integral with said bobbin and adjacent one end thereof, the inner surface of said radial projection being spaced from the axis of said bobbin by an amount less than said external radius of said core,

said core having a groove in its outer surface spaced from the corresponding end of said core by a relatively narrow portion of said outer surface, said core being slidably inserted in said bobbin so that said projection rides up onto said narrow portion of said core surface and then snaps into said groove to fasten said core in said bobbin.

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