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BOBBIN FOR ELECTRICAL WINDINGS

Filed June 20, 1969

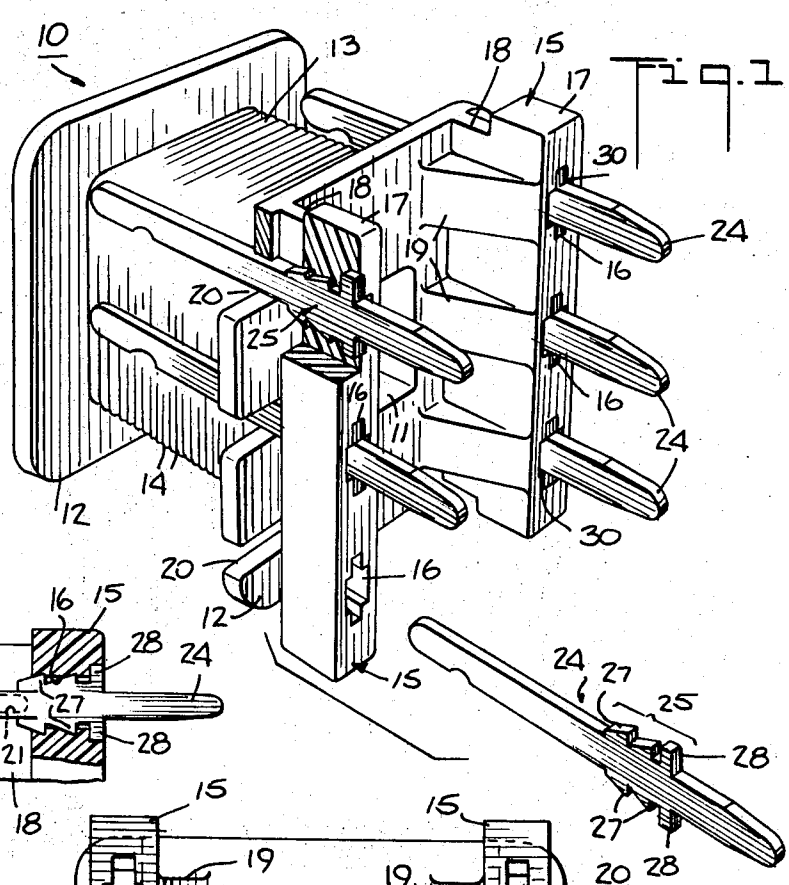


Fig. 1.

Fig. 3.

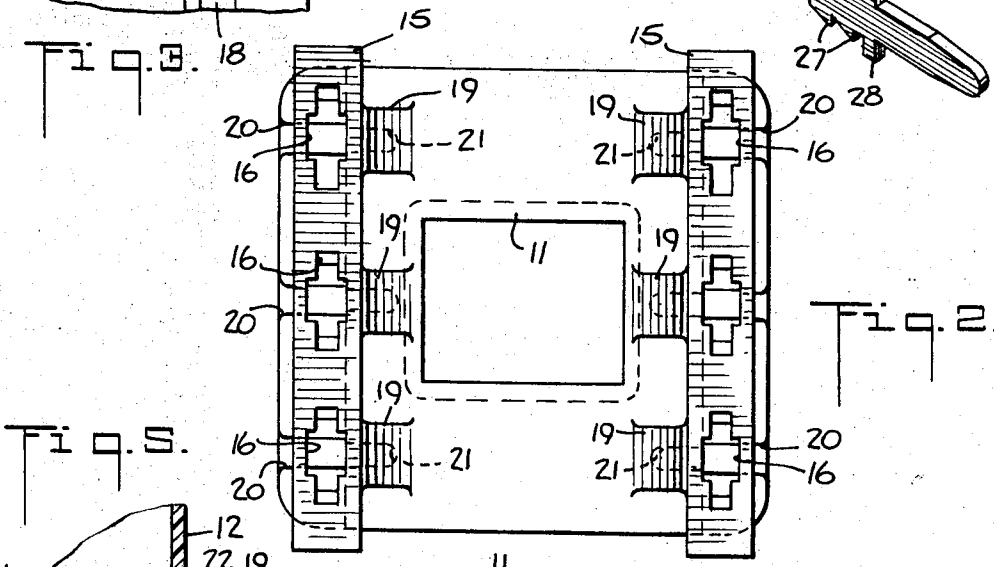


Fig. 2.

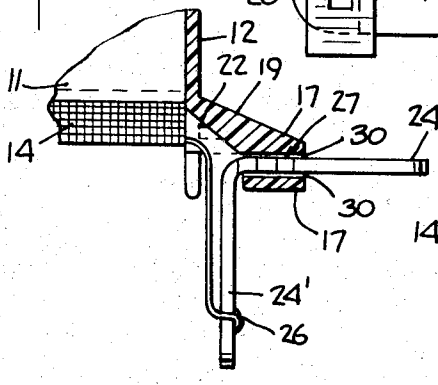


Fig. 5.

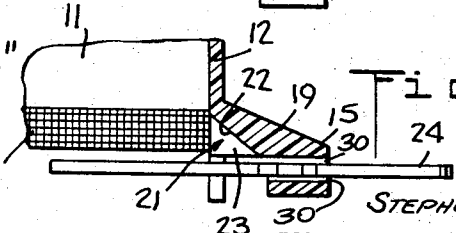


Fig. 4.

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BOBBIN FOR ELECTRICAL WINDINGS

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ABSTRACT OF THE DISCLOSURE

A bobbin is formed with a pair of terminal blocks which extend from one of the flanges of the bobbin and a plurality of L-shaped metal terminal pins secured in air insulated pockets in each of the terminal blocks. Each terminal pin is provided with a barb so as to be secured within the pockets through an interference fit. In addition, each terminal pin is bent on itself so as to further facilitate securement to the bobbin. The lead wires are connected to the pins through flange slots overlying each pocket.

SPECIFICATION

This invention relates to a bobbin for electrical windings. More particularly, this invention relates to a nylon bobbin having metallic terminals and that is of the type which is adapted to be employed with printed circuits.

BACKGROUND OF THE INVENTION

Many known bobbins include features that aid in insulating the lead wires from the turns of the winding. Many such bobbins are constructed of thermoplastic or thermosetting materials. In addition, some of the bobbins are provided with metal terminal lugs which are seated within a recess of a flange of the bobbin so that the ends of the winding can be soldered or otherwise secured to the terminal lug.

In those instances where the ends of a winding are soldered to the terminal lugs, the heat generated tends to cause the flanges of the bobbin to become warped or otherwise deformed. For example, nylon bobbins usually begin to soften at 450° F. and to melt at 500° F. Yet the heat of soldering is in a range of 450° F. to 800° F. the heat transferred through the terminal lugs thus causes the bobbin flanges to melt or to soften and warp so that the seating of the terminal lugs becomes offset. Consequently, it has not been possible to accurately seat the terminal lugs in a suitable structure, such as a printed circuit board. Furthermore, in many instances, the securement of the winding ends to a terminal lug has not reliably insulated the ends of the winding from each other or from the turns of the coil. In some cases, the windings short-circuit.

Accordingly, it is an object of the invention to provide a bobbin with terminals which can be soldered to winding ends without substantially affecting the structure of the bobbin.

It is another object of the invention to provide a nylon bobbin with terminal lugs which effectively insulate the ends of a winding from each other and from the turns of the coil.

It is another object of the invention to provide a nylon bobbin in which metallic terminals can be securely positioned.

It is another object of the invention to provide a bobbin with terminals wherein the heat of soldering when joining a winding end to a terminal can be more adequately dissipated.

SUMMARY OF THE INVENTION

The following description relates to a bobbin having a pair of flanges extending outwardly from a rectangular

core. The main axis of the bobbin can be considered the axis of the core. Thus, herein, the convention will be followed of using the terms "inwardly" and "outwardly" with reference to this axis. Thus, the flanges are said to extend outwardly of the core because the flanges extend further away from the axis than does the core. Furthermore, since the bobbin is designed to be plugged into a printed circuit board, it is convenient to consider the portion of the terminals that plug into such a board as being at the base of the bobbin. Thus, the terms "above" and "below" will be used, herein, to designate relationships on the assumption that the base of the bobbin is below the upper flange of the bobbin. For example, the terminal blocks which extend from the lower one of the two flanges will be deemed as extending below that flange while the other flange will be considered to be above the flange to which the terminal blocks are connected. Obviously, however, the bobbin may in fact be used in any attitude.

Each of the terminal blocks contains pockets of substantially cruciform cross-section. These pockets extend through the terminal blocks in a direction substantially perpendicularly to the plane of the bobbin flanges. In addition, a metal terminal with a barb at an intermediate point is secured in each of the cruciform pockets with an interference fit on two sides. Each terminal is sized to be received in the cruciform pocket so that a pair of passageways are formed on opposite sides of the terminal to act as air insulation and thus minimize heat transfer from the terminal to the terminal block during soldering.

The terminals are inserted into and through the pockets in the terminal blocks until the barbs come into interference fit within the respective pockets. Thereafter, the upper ends of the terminals, which are initially within the interior of the bobbin winding compartment, are bent outwardly so as to extend parallel to the flanges of the bobbin. Next, the ends of the winding within the winding compartment are led out to the bend ends of the terminals and soldered to the terminals. In the event that an excessive amount of heat is generated in a terminal during this soldering operation, the heat may cause the nylon material of the terminal block about the barb of the terminal to soften tending to cause the terminal to become loose. However, upon solidification of the nylon with cooling, the terminal will be securely held in place.

Since the terminal blocks are spaced in a cantilevered fashion below the lower bobbin flange, the points of securement of the terminals to the bobbin are remotely positioned from the bobbin flanges thereby reducing heat transfer to the flanges during soldering. Also, should the terminals become slightly offset due to warping of the terminal blocks, the inherent resiliency of the terminal block mounting on the bobbin flange will permit some flexing of the terminal blocks to accommodate insertion of the terminals into a printed circuit board. Further, since the ends of the terminals to which the winding leads are soldered are also spaced from the terminal blocks, the heat of soldering is further dissipated before reaching the bobbin.

In addition to the terminal blocks, a plurality of wire lead slots are formed in the flange containing the terminal blocks in alignment with the terminal positions so that a winding end can be led through a slot away from the windings.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of the invention will become more apparent from the following detailed description and appended claims taken in conjunction with the accompanying drawings in which:

FIG. 1 illustrates a perspective view of a bobbin according to the invention;

FIG. 2 illustrates an end view of the terminal end of the bobbin of FIG. 1;

FIG. 3 illustrates a fragmentary cross-sectional view of a terminal secured within a terminal block according to the invention;

FIG. 4 illustrates a fragmentary cross-sectional view of a terminal secured within the bobbin prior to bending; and

FIG. 5 illustrates a view similar to FIG. 4 with the terminal bent away from the winding compartment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, the bobbin **10** may be constructed of a material such as nylon. The bobbin **10** includes a core **11** of substantially hollow rectangular configuration and a pair of rectangular or square flanges **12** extending outwardly from the ends of the core **11**. The core **11** and flanges **12** are of known dimension and serve to define a winding compartment **13** to contain the windings **14** of electrical wire. In addition, the bobbin **10** is provided with a pair of terminal blocks **15** extending down from opposite ends of the lower flange **12** in cantilevered fashion. Each terminal block **15** is provided with a plurality of pockets **16** of cruciform cross-section which extend through the terminal blocks **15** substantially perpendicularly to the plane of the flanges **12**.

Each terminal block **15** has as its main component a section **17** which is rectangular in cross-section. A thin walled section **18** supports the rectangular section **17** below and spaced from the lower flange **12**. The rectangular shaped section **17** is sized so as to have the pockets **16** pass completely therethrough. The thin walled section **18** is positioned to be spaced inwardly from the plane of the pockets **16**. A plurality of abutments **19** are formed between the rectangular sections **17** and the bobbin flange **12**, each abutment **19** being in alignment with a pocket **16** to provide further support for the terminal blocks **15** at such areas.

Each side of the lower flange **12** has a plurality of wire lead slots **20**. Each slot overlies a separate pocket **16**. Each wire lead slot **20** extends inwardly past the thin walled section **18** to a point substantially within the interior of an abutment **19**. In this way, the interior surface of each abutment **19** is formed with a recess **21** having an inclined rear wall **22** and parallel side walls **23**.

Referring to FIGS. 1 and 3, there is employed a metal terminal pin **24** of substantially flat shape provided with a barb area **25** at an intermediate section and a notch **26** near an upper end thereof. The terminal pin **24** is positioned in each of the pockets **16** of the terminal block **15**. The barbs on each terminal **24** are formed as a pair of inclined saw tooth teeth **27** and a stop **28** which extend from the two opposite narrow sides of the terminal pin **24**. The other two broader surfaces of the terminal **24** are free of any interruption. The notch **26** is formed in one of the narrow surfaces of the terminal.

Each terminal pin **24** fits within the main portion of a pocket **16**. However, the opposite broader pair of pocket walls have recesses therein so that an air space is formed between each broad side of each terminal **24** and the material of the terminal block **15**. The dimensions of the terminal **24** are such that its thickness is substantially equal to the central width of the pocket **16**. The width of each terminal is slightly greater than the control length of the pocket so that the terminal **24** is held within the pocket with minimum contact between terminal and block **15** except where the barbs **27** and stop **28** make contact. In this fashion heat transfer from terminal **24** to block **15** is minimized.

In order to assemble the bobbin for use, a terminal **24** is inserted into each of the cruciform pockets **16** of the terminal blocks **15**, notch end first until the stop **23** abuts a shouldered recess within the pocket **15**. During insertion, the teeth **27** form an interference fit with the side walls of the slots **16** to secure the terminal **24** in place against an opposite movement. In one embodiment employing a nylon bobbin, a 0.005" interference fit was found useful.

Thereafter, the notch **26** end of each terminal **24** is bent at a right angle outwardly of the winding compartment so as to become substantially parallel to the flange **12** and thus form an L-shaped terminal **24'** (see FIG. 5). Next, the end **29** of a winding is led out through a wire lead slot **20** in the lower flange **12** and recess **21** in the adjacent abutment **19** and wrapped about the notch **26** in the upper leg of the terminal **24**. The lead wire is then soldered to the terminal **24'**. In the event that heat is transmitted through the terminal **24'** toward the terminal block **15** during soldering, some of the heat will be dissipated to the air in the passages **30** formed between the terminal **24'**. With the wire end soldered to the terminals **24'**, the bobbin can now be placed onto any suitable arrangement, such as a printed circuit board, so that the free terminal ends can be inserted into the proper places.

It is noted that by leading a wire end **29** through a wire lead slot **20**, that wire end **29** becomes insulated by the material of the flange **12** and the abutments **19** from other winding ends.

It is further noted that the bending of the terminals **24'** permits the terminals **24'** to be retained in the bobbin **10** in a secure position and cooperates with the interference fit of the teeth **27** within the pockets **16** of the terminal blocks **15**.

It is also noted that the abutments **19** serve to reinforce the terminal blocks **15** with respect to the support of the blocks **15** from the flange **12**. In this way, the terminal blocks **15** remain in a substantially secure relationship to the flanges **12** to maintain the terminals **24'** in a secure position. Furthermore, should the terminal blocks **15** warp due to heat, the resiliency of the thin wall section **18** permits the terminals **24'** to be suitably positioned in place in a printed circuit board.

The invention thus provides a bobbin which can be used for various uses such as a transformer bobbin and which can be easily and quickly constructed and put in place. Further, the bobbin can be made of a thermosetting material of electrical grade and the terminals can be dip soldered to fix the winding ends in place without becoming loosened. Also, the invention provides a bobbin in which terminals can be held in a secure position, not only by the actual shape of the terminals within the bobbin, but also by an interference fit. Furthermore, the ends of the windings are insulated from each other by three or more reinforcing barriers between the flanges and the terminals.

Still further, the invention provides a terminal which can be quickly and easily inserted into a bobbin in a secure relationship while permitting one end to be secured to a winding end while the opposite end is inserted in a printed circuit board or other electrical component.

What is claimed is:

1. A bobbin having a base flange thereon adjacent a winding compartment comprising:

at least one terminal block mounted on and extending from said flange,

said terminal block having a pocket extending therethrough in a direction substantially perpendicularly to the plane of said flange, said pocket being adapted to receive a terminal pin therein, and

a lead wire slot extending inwardly into said flange and into said terminal block to form an outwardly facing recess in said terminal block, said lead wire slot overlaying and extending inwardly past said pocket.

2. The bobbin of claim **1** wherein:

said pocket has a main portion rectangular in cross-section and adapted to receive a terminal pin rectangular in cross-section, the opposite broader pair of walls of said pocket each containing a recess to

provide air spaces between said block and whatever terminal is received in said pocket.

3. A bobbin having a base flange thereon adjacent a winding compartment comprising:

at least one terminal block mounted on and extending from said flange,

said terminal block having a pocket extending therethrough in a direction substantially perpendicularly to the plane of said flange, said pocket being adapted to receive a terminal pin therein,

a rectangular section containing said pocket,

a resilient thin wall section connecting said rectangular section to said flange, whereby said rectangular, pocket containing section is resiliently mounted on and spaced from said flange, and

a buttress between said block and said flange, said buttress being positioned in alignment with said pocket inwardly of said block and below said flange.

4. The bobbin of claim 3 further including a lead wire slot extending inwardly into said flange, and past said thin wall section and into said buttress to form an outwardly facing recess in said buttress, said lead wire slot overlaying and extending inwardly past said pocket.

5. The bobbin of claim 4 wherein:

said pocket has a main portion rectangular in cross-section and adapted to receive a terminal pin rectangular in cross-section, the opposite broader pair of walls of said pocket each containing a recess to provide air spaces between said block and whatever terminal is received in said pocket.

6. The bobbin of claim 2 comprising:

an L-shaped terminal received in said pocket, said terminal having an intermediate section rectangular in cross-section in interference fit relationship with said pocket, a first leg extending downward out of said pocket, and a second leg extending outwardly above said pocket and below the plane of said flange, the opposed broad surfaces of said intermediate section spanning said recesses in said pocket.

7. The bobbin of claim 5 further comprising:

an L-shaped terminal received in said pocket, said terminal having an intermediate section rectangular in cross-section in interference fit relationship with said pocket, a first leg extending downward out of said pocket, and a second leg extending outwardly above said pocket and below the plane of said flange, the opposed broad surfaces of said intermediate section spanning said recesses in said pocket.

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ELLIOT A. GOLDBERG, Primary Examiner

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