

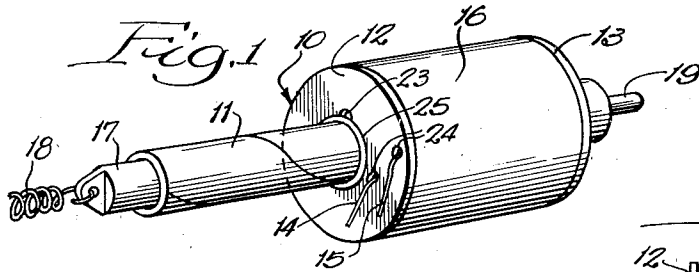
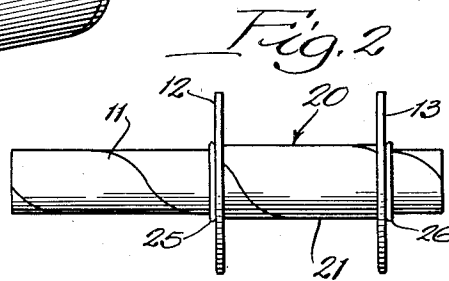
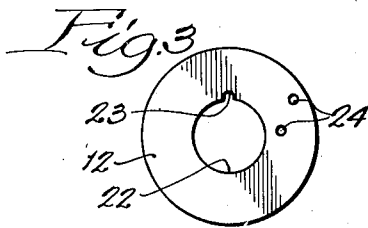
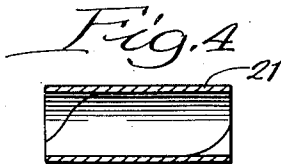
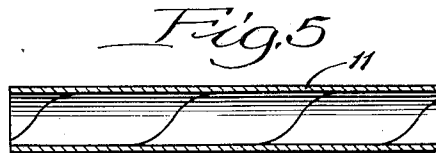
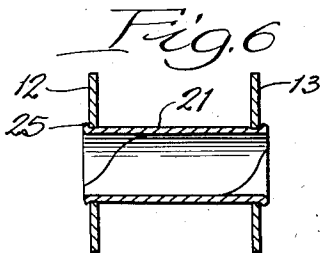
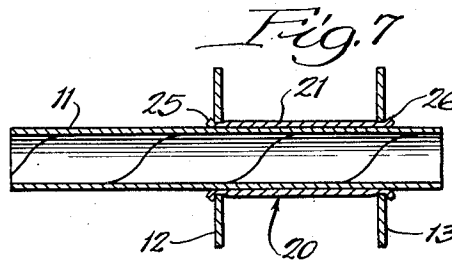
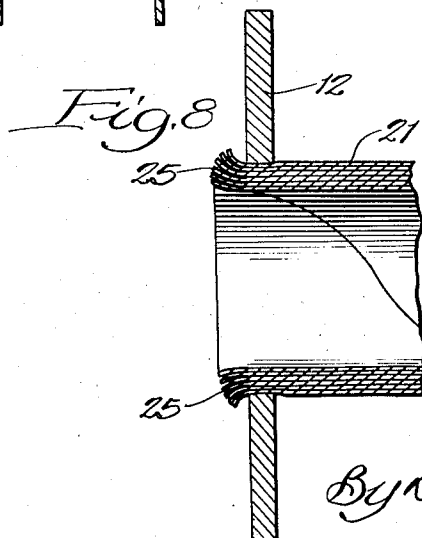
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2,368,025

METHOD OF MAKING FORMS FOR WINDINGS

Filed Sept. 11, 1941



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UNITED STATES PATENT OFFICE

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METHOD OF MAKING FORMS FOR WINDINGS

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5 Claims. (Cl. 93—1)

This invention relates to a form for windings and the like and to a method of making the same and more particularly to a bobbin or spool which is particularly adapted for use as a form for receiving coil windings.

An object of the invention is to provide a light strong form for supporting windings, the structure being simple and inexpensive. A further object is to form a hollow core of substantially uniform internal diameter or cross section throughout the length thereof and to provide the same with means for supporting outwardly extending end flanges. Another object is to provide a form for windings having a laminated paper core of substantially uniform diameter throughout its length, a laminated paper body about the core and end flanges supported by the body.

Another object of the invention is to form a bobbin having a paper core of substantially uniform diameter throughout, the bobbin being of simple construction and easily and inexpensively made. Still another object is to provide a method in which a tubular body carrying outwardly extending end flanges is placed about a hollow tubular core and the body shrunk or contracted about the core to provide a tight fit therewith.

Other features and advantages will appear from the following specification and drawing, in which

Figure 1 is a perspective view of a solenoid in which the coil is wound about a form constructed in accordance with the invention; Figure 2 is a side elevational view of the coil form completely assembled; Fig. 3 is a side elevational view of one of the flanges; Fig. 4 is a longitudinal sectional view of the tubular body which supports the flanges; Fig. 5 is a longitudinal sectional view of a core for the form; Fig. 6 is a longitudinal sectional view of the tubular body with the flanges assembled thereon; Fig. 7 is a longitudinal sectional view of the complete assembly of the form; and Fig. 8 is a fragmentary longitudinal sectional view of one end of the tubular body with the flange applied thereto showing the separation of the laminations of the tubular body as a result of the swaging operation.

It has been heretofore proposed to mount outwardly extending end flanges on a core of laminated paper to provide a bobbin or coil form. In the construction of such forms the flanges are provided with apertures which receive the ends of the core and the ends of the core are swaged outwardly to fix the flanges in position. However, the outward swaging of the ends of the core tends to produce an inward bending or buckling in the body of the core and the cores of such forms are therefore not of uniform diameter or cross section throughout the length thereof. Accordingly these forms are not suitable for use in solenoids wherein a plunger or striker is re-

ceived within the hollow core and should fit snugly within the same without binding on the inside of the core.

The present invention avoids these difficulties and provides a simple sturdy construction wherein the core of the form is of substantially uniform diameter or cross section throughout its length. In this construction, the form, if desired, may be made entirely of paper.

In the illustration of the invention described herein and referring particularly to Figure 1, a solenoid 10 includes the winding form having a core 11 and end flanges 12 and 13. The wire of the coil is wound about the form between the flanges 12 and 13 and the ends 14 and 15 of the wires of the coil extending from the flange 12. Preferably the outer surface of the winding is covered with a layer 16 of paper or other suitable material. Within the core 11 is the metal plunger 17 which may be provided with a spring 18 at one end and with a striker pin 19 at the other. The plunger 17 is slidably received within the core 11 and should fit snugly within the same without binding upon the inner walls of the core.

The winding form 20 as seen particularly in Fig. 7, in itself includes the core 11, the end flanges 12 and 13, and a tubular body 21 received about the core 11 and supporting the flanges 12 and 13.

The tubular body 21 may be made of any suitable material but is preferably constructed of paper wound in the form of a laminated tube. Laminated paper tubes of the type shown herein are well-known in the art and need not be described in detail herein. They may be made in a number of ways, the usual method being to wind a plurality of layers of gummed tape about a mandrel so that the adhesive on the gummed tape secures one winding to the next and provides a laminated tubular body. Usually the tubular body will be formed in a long tube which may be cut to the desired lengths for the coil form.

The flanges 12 and 13 may be formed of paper, fiber, synthetic resin or any other suitable material. Each flange is provided with a central aperture or opening 22 adapted to receive the end of the tubular body 21. The flange may be provided with a small groove 23 along the periphery of the opening 22. The flange may also be equipped with a pair of openings 24 adapted to receive the ends of the coil wire.

The flanges are mounted on the tubular body 21 by inserting the ends of the body in the central openings of the flanges. The end portions of the tubular body 21 are then swaged outwardly at 25 and 26 as seen in Fig. 6 to fix the flanges in position.

When the ends of the tubular body 21 are swaged outwardly the swaging operation tends

to cause a shattering of the adhesive bond between the layers of the paper in the laminated body and to produce a slight separation of the tape windings at the ends of the body. The outwardly swaged ends of the tubular body may be securely fixed and maintained in the swaged position by applying to the same a hardening material such as a varnish, lacquer or synthetic resin. The hardening material will penetrate the spaces between the slightly separated layers of the laminated body and will fill the spaces preventing the return of the swaged ends to their original position.

The tubular body with the outwardly extending flanges mounted on the ends thereof is then ready for application to the core 11. Preferably the inner diameter of the tubular body is slightly less than the outer diameter of the core 11. In order to place the tubular body 21 on the core 11, the body is immersed or otherwise treated with water or other suitable liquid which will cause the paper to expand or swell, thus increasing its internal diameter sufficiently to permit the body 21 to be placed over the core 11. The body 21 carrying the flanges 12 and 13 is then placed over the core 11 and permitted to dry whereupon the contraction of the tubular body will cause the same to fit tightly about the core 11.

The core 11 is substantially uniform throughout its length in cross section and is adapted to snugly receive the plunger 17 without danger of having the plunger bind on the inner surface of the core. The tubular body 21 about the core may have a slightly irregular internal diameter without, in any way, affecting the operation or usefulness of the device. Moreover, as the tubular body is shrunk about the core 11, any bends or dents in the body are likely to be removed.

If desired, the entire assembly may be coated with a hardening material such as varnish, lacquer or synthetic resin, and this coating may be applied with the coating on the ends 25 and 26 of the body 21. The application of the hardening material after the complete assembly of the body is desirable since it does not then interfere with the expanding and shrinking of the tubular body.

The bobbin structure may, of course, be of any suitable cross section. If desired, the core and tubular body may be square or polygonal instead of circular in cross section as shown. It is understood that the term tubular is intended to include polygonal shapes as well as circular members.

While in the foregoing description certain specific illustrations of the invention have been set forth, it is to be understood that modifications may be made without departing from the spirit and scope of the invention.

I claim:

1. A method of making a form for windings and the like comprising, providing a hollow tubular core of substantially uniform cross section throughout the length thereof, securing outwardly extending flanges to a tubular body, said body being of an internal diameter slightly less than the external diameter of the core, expanding said body to increase the internal diameter thereof beyond the external diameter of the core, placing the body on the core, and contracting the

body to provide a tight fit of the same on the core.

2. A method of making a form for windings and the like comprising, providing a hollow paper core of substantially uniform cross section throughout the length thereof, providing a tubular paper body of an internal diameter slightly less than the external diameter of the core, mounting a pair of apertured flanges on the end portions of said body with the ends of the body extending through the apertures of the flanges, outwardly swaging the ends of the body to fix the flanges in position, wetting the body to expand the same until the internal diameter thereof exceeds the external diameter of the core, placing the body on the core, and drying the body to contract the same about the core, providing a tight fit between the body and the core.

3. A method of making a form for windings and the like comprising, providing a hollow laminated tubular paper core of substantially uniform cross section throughout the length thereof, providing a laminated tubular body of internal diameter slightly less than the external diameter of the core, mounting a pair of apertured flanges on the end portions of said body with the ends of the body extending through the apertures of the flanges, outwardly swaging the ends of the body to slightly separate the laminations thereof and to fix the flanges in position, wetting the body to expand the same until the internal diameter thereof exceeds the external diameter of the core, placing the body on the core, drying the body to contract the same about the core providing a tight fit between the body and the core, and applying a hardening material to the swaged ends of the tubular body to maintain the same in swaged position.

4. A method of making a form for windings and the like, comprising providing a hollow tubular core of substantially uniform diameter throughout at least a portion of the length thereof, securing outwardly-extending flanges to a tubular body, said body being of an internal diameter slightly less than the external diameter of said portion of the core, expanding said body to increase the internal diameter thereof beyond the external diameter of the core, placing the body on said portion of the core, and contracting the body to provide a tight fit of the same on the core.

5. A method of making a form for windings and the like, comprising providing a hollow tubular core of substantially uniform diameter throughout at least a portion of the length thereof, securing outwardly-extending flanges to the ends of a laminated tubular body of internal diameter slightly less than the external diameter of said core, outwardly swaging the ends of the body to slightly separate the laminations thereof and to fix the flanges in position, expanding said body to increase the internal diameter thereof beyond the external diameter of the core, placing the body on said portion of the core, contracting the body to provide a tight fit of the same on the core, and applying a hardening material to the swaged ends of the tubular body to maintain the same in swaged position.

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