

Nov. 27, 1956

L. GALBREATH

2,771,849

UNIVERSAL BOBBIN FOR ROTARY, DOMESTIC SEWING MACHINES

Filed June 20, 1956

3 Sheets-Sheet 1

FIG. 1

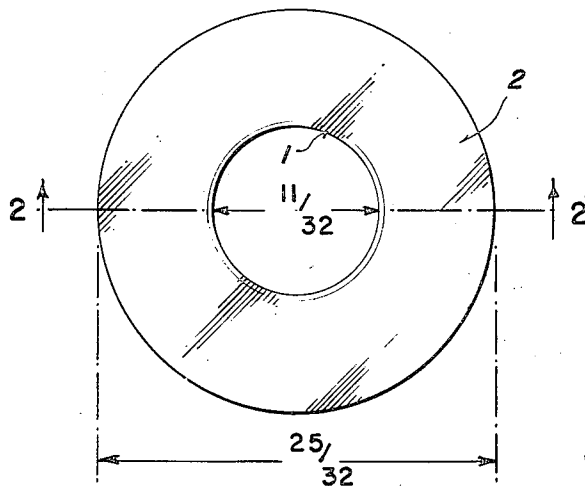


FIG. 2

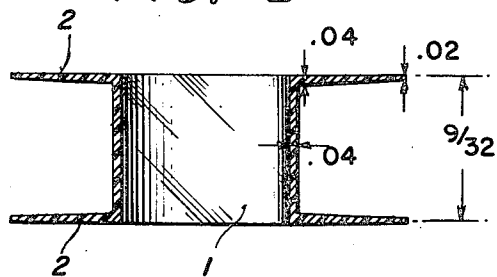


FIG. 4

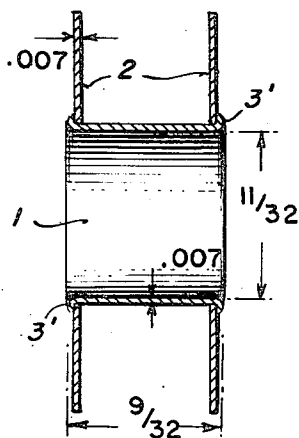
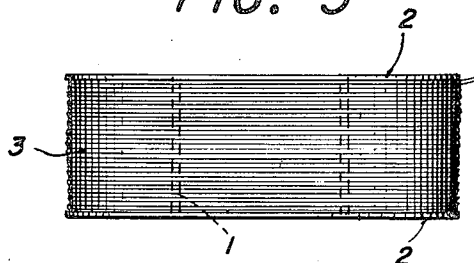


FIG. 3



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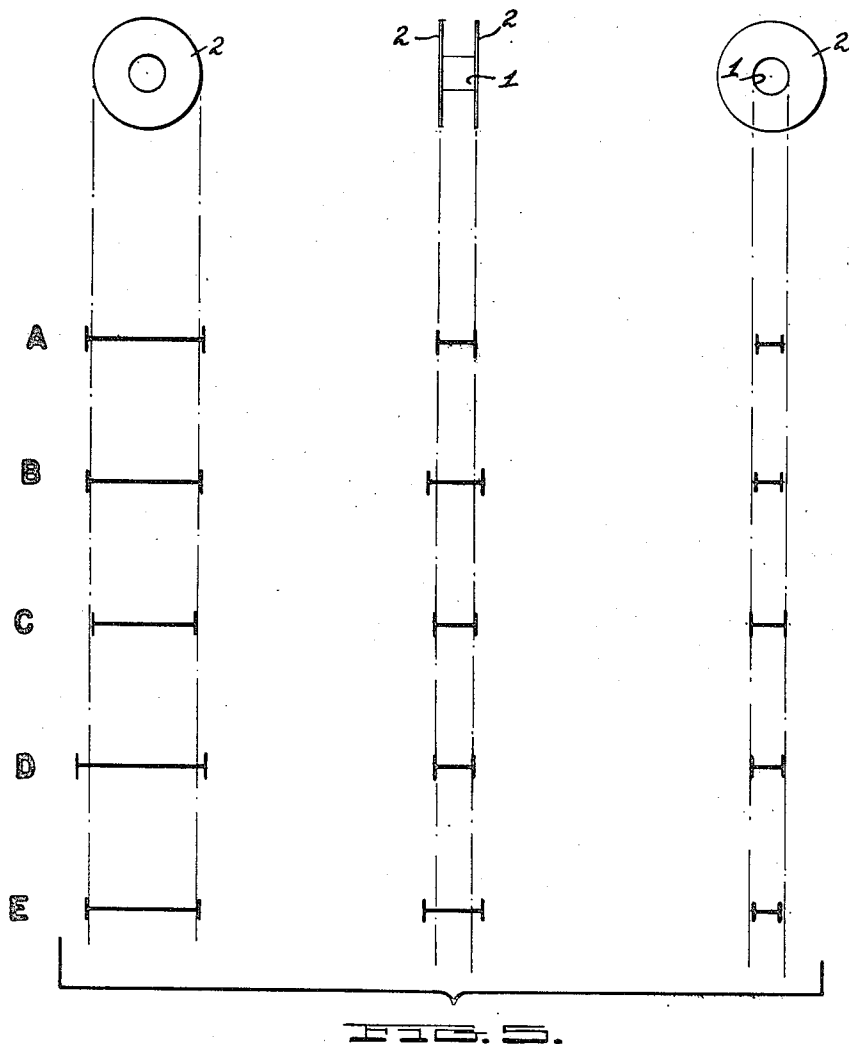
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3 Sheets-Sheet 3

FIG. 6

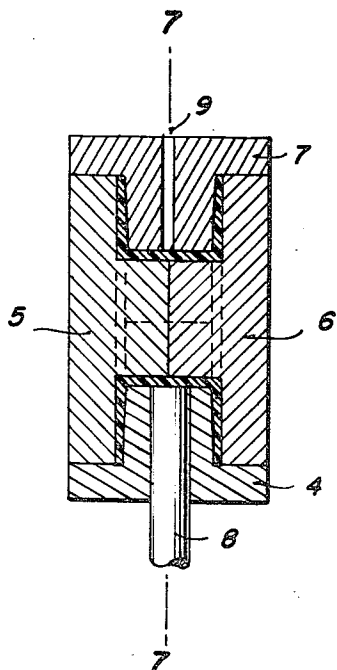


FIG. 7

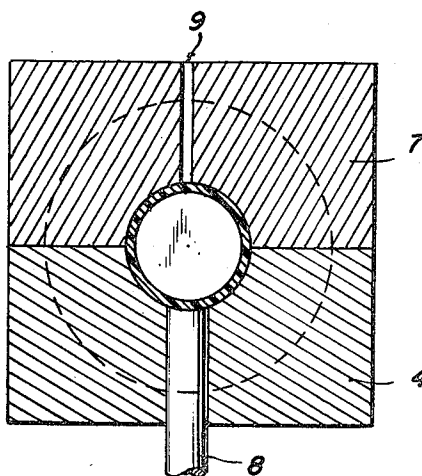
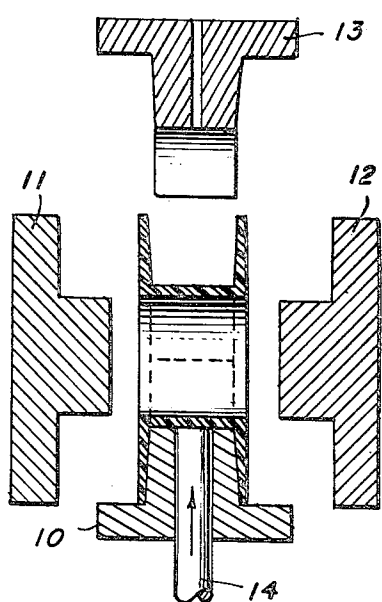


FIG. 8

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2,771,849

UNIVERSAL BOBBIN FOR ROTARY, DOMESTIC SEWING MACHINES

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Application June 20, 1956, Serial No. 592,681

16 Claims. (Cl. 112—251)

This invention relates to a rotary bobbin for domestic sewing machines, which bobbin will fit into the bobbin case of all of the better known, commercially sold standard makes of domestic, rotary sewing machines. By "rotary bobbin" is meant a bobbin which rotates on a spindle or center pin. The patent application of this invention is a continuation-in-part of application Serial Number 218,005 filed March 28, 1951.

As to all the commercial rotary bobbins for such domestic sewing machines with which the inventor has knowledge, which comprise some dozen kinds, the bobbin for each of these brand name, rotary sewing machines is designed to fit a sewing machine bobbin case or shuttle of a particular, given size. In other words, prior to the present invention a bobbin from one brand name domestic, rotary sewing machine would fit into the bobbin case of only that make and model, not other makes of machines and models respectively thereof; they were thus not interchangeable.

It is an object of the present invention to furnish a bobbin which because of its specific size, dimensions and shape will fit into the bobbin case of any of the standard brand name domestic, rotary sewing machines which are known in the trade. This is equally true of both the wound and the unwound bobbin.

It is also an object, which is practical because of time saving, to provide a rotary bobbin with thread wound thereon offered for sale in dry good stores or in comparable sales channels, thus dispensing with the operation on the part of the home sewer of winding thread from a wooden spool onto a bobbin every few minutes. It is also an object to provide a rotary bobbin made from plastic material or from light metals or alloys of such metals in thin thickness, such as aluminum and its alloys, affording strength yet while having ample space for carrying such quantities of thread that spools of thread for use on domestic sewing machines are relegated to uselessness.

It is moreover an object to provide a rotary bobbin which is so cheap to manufacture that after the thread which comes wound thereon has been used up the bobbin is simply discarded.

According to the present invention, the rotary bobbin is composed of a core of a definite length and of a definite inside diameter, and two flat discs each of a definite outside diameter. Preferably this rotary bobbin is a single unit structure made as one piece. However, it can be made from a separate core to which two flat end discs are affixed. The thickness of the make up material will depend somewhat on the strength of the plastic or of the light metal or its alloys.

My bobbin will hold approximately fifty (50) yards of thread of #50 size, which is most generally used. It would hold less thread of #8, #20 and #40 size, but slightly more yards of #60, #70 and #100 size. By selecting a plastic or a light metal or light weight alloy of such a metal, of 0.02–0.045 inch thickness the bobbin attains sufficient strength and durability, yet because of

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its thinness this contributes to affording maximum free space for thread which is wound upon the core as a merchandisable article. This is in contrast to the structure of the heavy metal bobbins currently being offered for sale which mate up only with a particular make and even a particular model of domestic sewing machine, and because of the small available free space on the bobbin necessitate frequent refilling from the thread wound upon wooden spools.

The size or measurements of the rotary bobbin of my invention must be exact. For otherwise, the advantage my bobbin possesses of universal utility in any of the commercially sold rotary, domestic sewing machines would be sacrificed. The core length must be exact, and also its inside circumference; this means also the inside diameter would be exact since any circumference bears a definite ratio to its diameter. The outer circumference of the two discs must be exact, and likewise they must be the same size. When the bobbin is made from two separate end discs and a core the inner circumference of the discs is determined somewhat by the thickness of the material from which the core is made, as the disc must fit snugly over the outside of the core. Therefore, in this embodiment, this inner circumference would be slightly larger in relation to the core and not an exact size.

The space between the outer circumference of the core and the inside face of the discs or heads must be completely open and free from all obstruction, so that the bobbin will revolve freely and evenly. When thread is wound onto the bobbin in this provided space and when a straight wind is employed as explained later, and as seen from Fig. 3, the thread lies flush with the substantially flat end pieces.

The following is a description of my invention, reference being had to the accompanying drawing.

Fig. 1 is an end elevation of the bobbin, illustrating the critical dimensions within such view.

Fig. 2 is a horizontal, sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a side elevation of the wound bobbin.

Fig. 4 is a sectional view illustrating the critical dimensions, in the lengthwise cross-sectional view of a less preferred embodiment made from three pieces of 0.007 inch foil.

Fig. 5 is a diagrammatic showing of comparative dimensions of various bobbins in the trade compared with the bobbin of this invention.

Fig. 6 is a cross-sectional view through a mold for making the bobbin.

Fig. 7 is a sectional view on line 7—7 of Fig. 6.

Fig. 8 is a cross section of one device for making the bobbin from two separate end discs and a core.

As seen from Fig. 1, the outside diameter of the flat discs or end-plates 2 is $\frac{25}{32}$ of an inch. The inside diameter of the core 1 is $\frac{11}{32}$ of an inch. The length of the core is $\frac{9}{32}$ of an inch. If the bobbin is made from two separate end plates and a core, this last dimension includes the swaged or flanged ends 2' if they are turned as shown in Fig. 4. In this last figure, aluminum from which the core and discs are constructed is foil of 0.007 inch thickness.

In Fig. 2 the bobbin which is the preferred embodiment is made of a core portion of 0.04 inch thickness. The discs at the juncture with the core portion each have a thickness of 0.04 inch, which progressively decreases to a thickness of 0.02 inch at the periphery of the respective discs. In this figure the bobbin shown is made as a unit in one piece.

Fig. 3 represents the bobbin of the present invention with straight wound thread thereon, the thread bearing numeral 3.

In Fig. 5 the first column shows the comparison of the diameter of my bobbin as compared with that dimension of five (5) well known makes of sewing machines. The second column shows the comparison of the outside width of my bobbin (core length) as compared with that dimension of the same five (5) well known makes of sewing machines. The third column shows the comparison of the inside diameter of the core of my bobbin as compared with that dimension of the same five (5) well known makes of sewing machines.

It will be seen from Figs. 1, 4 and 5, particularly from column 1 of Fig. 5 that my bobbin is small enough to fit into the space of the smallest bobbin case. Howbeit, it will work equally well in larger bobbin cases for rotary type domestic sewing machines. From column 2 of Fig. 5 and from Fig. 4 it is apparent from the width of my bobbin that it is as narrow as the narrowest bobbin core of these five well known makes, which is from a portable domestic sewing machine. My bobbin would work smoothly in wider cases because of the tension spring in a bobbin case. From Fig. 5, column 3 and Fig. 1 it will be seen that the hollow center of my bobbin (inside diameter of the core) is as large as the largest center hole of any of these five well known sewing machines, thereby revolving easily on the largest size center pin of a bobbin case. It would a fortiori revolve easily on the smaller size center pins.

Plastic material of 0.02–0.045 inch thickness is preferably used, however, aluminum or magnesium and their light alloys may be used. Paper of this thickness is not serviceable. This is apparent because to attain strength the thickness would have to be so great that the space for thread is limited. Thinner paper would not inherently possess sufficient strength to hold the bobbin together when thread is wound thereon.

As has been explained above the respective dimensions of my bobbin are $\frac{25}{32}$ of an inch for the outside diameter of the flat discs or end-pieces, $\frac{11}{32}$ of an inch for the inside diameter of the core and $\frac{9}{32}$ of an inch for the length of the core. Because rotary sewing machine bobbins will operate with a slight latitude of looseness or closeness of fit on the spindle of a sewing machine, and with slight leeway in thickness and/or diameter of the bobbin within the bobbin case, the aforesaid respective dimensions, more particularly the inside diameter of the core, may be varied $\frac{1}{32}$, i. e. 0.0312 of an inch in the present invention of a universal, rotary sewing machine bobbin.

The preferred bobbin is made in one piece from such plastics as Bakelite polystyrene compound or other firm plastic materials. The end discs are integrally formed upon the respective ends of the core. This kind of bobbin can be formed of the same thickness throughout, such as 0.03–0.04 of an inch but, as shown in Fig. 2 of the drawing, the core portion has a thickness of 0.04 of an inch and the end discs taper from 0.04 inch at the juncture with the core to 0.02 inch at its periphery thereof.

The bobbin can be made as one piece by injection molding, using apparatus shown in Figs. 6 and 7. This apparatus consists of four metal pieces with a vertical hole 9 in the top member 7 or a hole in a side member 6 for the introduction of a semi-liquid plastic. When assembled the semi-liquid plastic is introduced and spreads out in the space between the four elements, to form the one-piece bobbin. After the injected semi-liquid plastic has set up in the mold, the members 5, 6 and 7 are removed and ejector pin 8 is pushed up to dislodge the bobbin from the mold's base 4.

A suitable plastic material for the manufacture of my bobbin constructed from three separate pieces is "Bakelite" Vinyl rigid sheeting of 0.03 of an inch thickness. For uniting two end discs to the core a liquid adhesive material having a welding effect made from "XT-5015 Bake-

lite,"¹ but substituting methyl isobutyl ketone for "Troluol" is very satisfactory.

The exact formulation of the adhesive liquid is:

	Parts by weight
5 Flexol plasticizer DOP ² -----	5
Methyl acetate (82%)-----	58
Ethyl acetate (85%)-----	10
Butyl acetate-----	10
10 Methyl isobutyl ketone-----	15
Acetic acid-----	2

² "Flexol Plasticizer DOP" is described by these same manufacturers (Carbide & Carbon Chemical Corporation) as di-(2-ethylhexyl)phthalate of molecular weight 390.54, insoluble in water, having a flash point (Cleveland open cup) of 425° F., absolute viscosity at 20° C., 81.4 cps.

15 Instead of the methyl acetate and ethyl acetate there may be substituted 68 parts by weight of methyl ethyl ketone.

The manufacture of the bobbin of this type will now be described. In this embodiment Bakelite Vinyl rigid sheeting of 0.03 inch thickness was used for the end discs. The core is made from plastic tubing, such as produced by extrusion or by injection molding. The two separate end discs are forced over the core at the two respective ends. The assembled parts are then pushed in place on the base member 10 shown in Fig. 8, the core resting on the top of base element 10. The protruding solid cylindrical portion of elements 11 and 12 are pushed into the core from the two respective ends, and top element 13 is pushed downward between the two parallel discs; when these four elements are brought closer together the two discs are forced into close contact with the core. Then members 11, 12 and 13 are removed by mechanical means leaving the three piece bobbin on base element 10. If the end discs are to be cemented or solvent-welded a pair of forceps is used to lift the bobbin off, whose core rests in the trough of base element 10 and the lower sides of which bobbin straddle the raised portion of base element 10. The bobbin is then dipped in the cementing liquid above described, removed and let harden.

40 Instead of tenaciously cementing the two parallel end discs to the core in the manner previously described, elements 11 and 12 can be designed to turn the ends of the core to hold the discs onto the core by heat fusion or simply by pressure or by both, flanging the ends of the core. If the ends of the core have been flanged in any of these modes ejector pin 14 can be pushed upwardly to throw the bobbin off of element 10.

An embodiment of the present invention, which however is not now preferred when making the comparison with those supra made from a plastic material, is that made from aluminum foil; the thickness of this foil is substantially 0.007 of an inch. In this embodiment the two circular heads or discs fit over the respective end parts of the core. The core is slit endwise, i. e., is not joined in the lengthwise direction. It is preferred for the two heads or discs to be held upon the core simply by flanged ends of the core. In this way, the discs are slidable freely upon the core.

60 The sides of the heads are straight, not curved. Their diameter is the same as specified in the summary supra. By having the core split it can be formed from a flat piece of aluminum foil or other light metal foil made into the shape of a cylinder of the chosen but critical length and diameter. However, it can be a preformed, cylindrical shape tube of this proper size without a lengthwise split. The use of the split core enable pieces of metal foil to be shipped flat. Furthermore, an extra cost would be needlessly entailed in joining the lengthwise two edges

70 ¹ "XT-5015 Bakelite" is a solvent adhesive whose composition in parts by weight is given by its manufacturers, Carbide & Carbon Chemical Corporation (unit of Union Carbide and Carbon Corporation) of New York City, as: 58 parts methyl acetate (82%), 10 parts ethyl acetate (85%), 10 parts butyl acetate (85%), 5 parts of dibutoxyglycol phthalate, 15 parts of "Troluol" solvent and 2 parts of glacial acetic acid.

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of the core. The split in the core moreover permits of a certain compression of the core, which is helpful in shoving the two end discs over the ends of the core. The discs should fit closely or snugly around the core, whereby there is no need to attach the discs of metal foil to the core, which would be an added expense. After the two discs or heads have been shoved well over the ends of the core, the ends are flattened or turned as shown in Fig. 4 of the drawing. There are several ways in which the turning, swaging or flanging of the two ends can be done as spinning, rolling or pressing. One way will now be described in some detail. A plunger fits into the shaped bowl of another plunger so as to leave no ridge. End discs are placed on the plunger. The plungers are then brought together slightly. A flat piece of aluminum foil of the correct length is placed around the plungers whereby the edges meet perfectly to form the core. The discs are slipped onto the core. Presses are brought into place around the shaft formed by the plungers. The plungers are forced with light pressure toward each other to flatten the ends of the core.

The discs can be slipped into place before the ends are flanged. The discs should fit snugly over the core so as to hold the outer position on the core while being filled with thread. The bobbin would thereby roll into place in machinery without having to be adjusted by hand and would be filled automatically just as wooden spools are handled. Or the discs could be slipped into place later, when needed for assembling the parts for the bobbin; in this mode the split core with flanged ends could be compressed enough to slip the discs in place, then the core expanded back to its normal size so that the edges forming the split meet. The choice could be made by the thread manufacturer as to which would be of greater advantage to him.

By using a straight wind of thread upon the bobbin of my invention, the space afforded for the thread will hold more thread than with a cross wind. For the same length of wound core the cross wound thread will be two thicknesses of thread whereas the straight wind is only one thickness.

The bobbin of my invention would be filled with thread by employing some standard winding machine such as now used to put thread on wooden spools, with slight adjustment to take care of the difference in width (length) in my bobbin as compared with that of a wooden spool, which have various widths themselves. The placing of the bobbin and filling it with thread is all done automatically without being touched by hand. To fill the bobbin of the last described embodiment, one way is to employ a guide on each side, and a center guide that rises as the bobbin is filled with thread to help hold its shape while being filled. Approximately fifty yards of thread are wound on my bobbin; this will depend, as explained previously, on the size of thread. The wind which the thread has to gain greater advantages is a straight wind. When my bobbin is filled with thread, indicated in Fig. 3 by the numeral 3, it becomes an article for sale in dry goods stores.

Some of the advantages of my bobbin will be summarized. The uniqueness of its size, fitting any domestic, rotary sewing machine would eliminate the necessity of thread manufacturers putting out so many various sizes of bobbins to fit different makes of domestic sewing machines. This is confusing to the home sewer and the retail merchant alike. He has moreover to carry a large stock of different bobbins and addition wooden spools of thread to service the bobbins.

My bobbin made of the materials specified above would be cheaper to manufacture, therefore disposable. The bobbins marketed now are made of steel of about $\frac{1}{32}$ inch thick and the parts are welded together, which makes them relatively expensive.

My bobbin with straight wind has no problem of the

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thread thereon being caught between the thread mass and discs as is the case with cross wound paper bobbins which sometimes tear up when its thread catches in this way.

Among the major advantages that my thread-carrying bobbin possesses is that of convenience to the home sewer and the time saving element. When sold as a staple commodity she can dispense with having to unwind thread from a large wooden spool onto a sewing machine bobbin every few minutes. It would in addition eliminate the sewer having to disconnect the sewing mechanism of the sewing machine while she fills the bobbin with thread. Any sewer knows that after this time has been spent on this task, the bobbin has to be put in place, and the sewing machine then again connected before the sewing operation can be commenced. This is recognized as a nuisance and a source of complaint on the part of home sewers generally. A marketed, filled bobbin on the other hand is constantly ready without having to fill a bobbin or look for an empty bobbin to fill or take thread from an old bobbin in order to get an empty one.

My bobbin can also be used on top of the sewing machine instead of a wooden spool of thread, since a sewing machine must have both top thread and thread in a bobbin. Hence my filled bobbins could be sold in pairs, one to go on top of the sewing machine and the other to go into the bobbin case.

I have described herein several specific embodiments of the rotary bobbin and the best mode contemplated by me for carrying out my invention. However, it will be evident to those skilled in the art, different embodiments of this invention may be made without departing from the spirit thereof, and consequently I do not limit myself other than by the scope of the invention as defined in the appended claims.

I claim as my invention:

1. A bobbin for rotary, domestic sewing machines characterized by a core and two substantially flat, circular end discs arising from the periphery of the core, the size of these parts being fixed in the following particulars: the length of the core substantially exactly $\frac{1}{2}$ of an inch and its inside diameter substantially exactly $\frac{11}{32}$ of an inch, and the outside diameter of the two end discs substantially exactly $\frac{25}{32}$ of an inch, the aforesaid parts being made from a member of the group consisting of plastics and light metals.

2. A bobbin for rotary, domestic sewing machines characterized by a core and two substantially flat, circular end discs integral with the periphery of the core and arising therefrom, the size of these parts being fixed in the following particulars: the length of the core substantially exactly $\frac{1}{2}$ of an inch and its inside diameter substantially exactly $\frac{11}{32}$ of an inch, and the outside diameter of the two end discs substantially exactly $\frac{25}{32}$ of an inch, the aforesaid parts being made from a member of the group consisting of plastics and light metals.

3. A bobbin for rotary, domestic sewing machines characterized by a core and two substantially flat, circular end discs arising from the periphery of the core, the size of these parts being fixed in the following particulars: the length of the core substantially exactly $\frac{1}{2}$ of an inch and its inside diameter substantially exactly $\frac{11}{32}$ of an inch, the outside diameter of the two end discs substantially exactly $\frac{25}{32}$ of an inch.

4. A bobbin for rotary, domestic sewing machines characterized by a core and two substantially flat, circular end discs integral with the periphery of the core and arising therefrom, the size of these parts being fixed in the following particulars: the length of the core substantially exactly $\frac{1}{2}$ of an inch and its inside diameter substantially exactly $\frac{11}{32}$ of an inch, the outside diameter of the two end discs substantially exactly $\frac{25}{32}$ of an inch.

5. A bobbin for rotary, domestic sewing machines

characterized by a core and two substantially flat, end discs which engage the periphery of the core, the size of these parts being fixed in the following particulars: the length of the core substantially exactly $\frac{9}{32}$ of an inch and its inside diameter substantially exactly $\frac{11}{32}$ of an inch, the outside diameter of the two end discs substantially exactly $\frac{25}{32}$ of an inch.

6. A bobbin for rotary, domestic sewing machines characterized by a core and two substantially flat, end discs which engage the periphery of the core, the size of these parts being fixed in the following particulars: the length of the core substantially exactly $\frac{9}{32}$ of an inch and its inside diameter substantially exactly $\frac{11}{32}$ of an inch, the outside diameter of the two end discs substantially exactly $\frac{25}{32}$ of an inch, the aforesaid parts being made from a member of the group consisting of light metals and plastics of foil thickness.

7. A bobbin for rotary, domestic sewing machines characterized by a core and two substantially flat, end discs fitting closely over the core, the said core having flanged ends, the size of these parts being fixed in the following particulars: the length of the core substantially exactly $\frac{9}{32}$ of an inch and its inside diameter substantially exactly $\frac{11}{32}$ of an inch, the outside diameter of the two end discs substantially exactly $\frac{25}{32}$ of an inch, the aforesaid parts being made from a member of the group consisting of light metals and plastics of foil thickness.

8. A bobbin for rotary, domestic sewing machines characterized by a core and two substantially flat, end discs fitting closely of the core and mechanically held from slipping off the core, the size of these parts being fixed in the following particulars: the length of the core substantially exactly $\frac{9}{32}$ of an inch and its inside diameter substantially exactly $\frac{11}{32}$ of an inch, the outside diameter of the two end discs substantially exactly $\frac{25}{32}$ of an inch, the aforesaid parts being made from a member of the group consisting of light metals and plastics of foil thickness.

9. A wound bobbin for rotary, domestic sewing machines whose thread has a straight wind, further characterized by a core and two substantially flat, circular end discs arising from the periphery of the core, the size of these parts being fixed in the following particulars: the length of the core substantially exactly $\frac{9}{32}$ of an inch and its inside diameter substantially exactly $\frac{11}{32}$ of an inch, the outside diameter of the two end discs substantially exactly $\frac{25}{32}$ of an inch.

10. A wound bobbin for rotary, domestic sewing machines whose thread has a straight wind, further characterized by a core and two substantially flat, circular end discs integral with the periphery of the core and arising therefrom, the size of these parts being fixed in the following particulars: the length of the core substantially exactly $\frac{9}{32}$ of an inch and its inside diameter substantially exactly $\frac{11}{32}$ of an inch, the outside diameter of the two end discs substantially exactly $\frac{25}{32}$ of an inch.

11. A wound bobbin for rotary sewing machines whose thread has a straight wind, further characterized by a core and two substantially flat, circular end discs arising

from the periphery of the core, the size of these parts being fixed in the following particulars: the length of the core substantially exactly $\frac{9}{32}$ of an inch and its inside diameter substantially exactly $\frac{11}{32}$ of an inch, and the outside diameter of the two end discs substantially exactly $\frac{25}{32}$ of an inch, the aforesaid parts being made from a member of the group consisting of plastics and light metals.

12. A wound bobbin for rotary sewing machines whose thread has a straight wind, further characterized by a core and two substantially flat, circular end discs integral with the periphery of the core and arising therefrom, the size of these parts being fixed in the following particulars: the length of the core substantially exactly $\frac{9}{32}$ of an inch and its inside diameter substantially exactly $\frac{11}{32}$ of an inch, and the outside diameter of the two end discs substantially exactly $\frac{25}{32}$ of an inch, the aforesaid parts being made from a member of the group consisting of plastics and light metals.

13. A bobbin wound with thread for use in domestic, rotary sewing machines, further characterized by a core and two substantially flat, circular end discs arising from the periphery of the core, the size of these parts being fixed in the following particulars: the length of the core substantially exactly $\frac{9}{32}$ of an inch and its inside diameter substantially exactly $\frac{11}{32}$ of an inch, the outside diameter of the two end discs substantially exactly $\frac{25}{32}$ of an inch.

14. A bobbin wound with thread for use in domestic, rotary sewing machines, further characterized by a core and two substantially flat, circular end discs integral with the periphery of the core and arising therefrom, the size of these parts being fixed in the following particulars: the length of the core substantially exactly $\frac{9}{32}$ of an inch and its inside diameter substantially exactly $\frac{11}{32}$ of an inch, the outside diameter of the two end discs substantially exactly $\frac{25}{32}$ of an inch.

15. A bobbin wound with thread for use in domestic, rotary sewing machines, further characterized by a core and two substantially flat, end discs which engage the periphery of the core, the size of these parts being fixed in the following particulars: the length of the core substantially exactly $\frac{9}{32}$ of an inch and its inside diameter substantially exactly $\frac{11}{32}$ of an inch, the outside diameter of the two end discs substantially exactly $\frac{25}{32}$ of an inch.

16. A wound bobbin for rotary, domestic sewing machines, whose thread has a straight wind, further characterized by a core and two substantially flat, end discs fitting closely over the core and mechanically held from slipping off the core, the size of these parts being fixed in the following particulars: the length of the core substantially exactly $\frac{9}{32}$ of an inch and its inside diameter substantially exactly $\frac{11}{32}$ of an inch, the outside diameter of the two ends discs substantially exactly $\frac{25}{32}$ of an inch, the aforesaid parts being made from a member of the group consisting of light metals and plastics of foil thickness.

No references cited.