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BOBBINS FOR SEWING MACHINES

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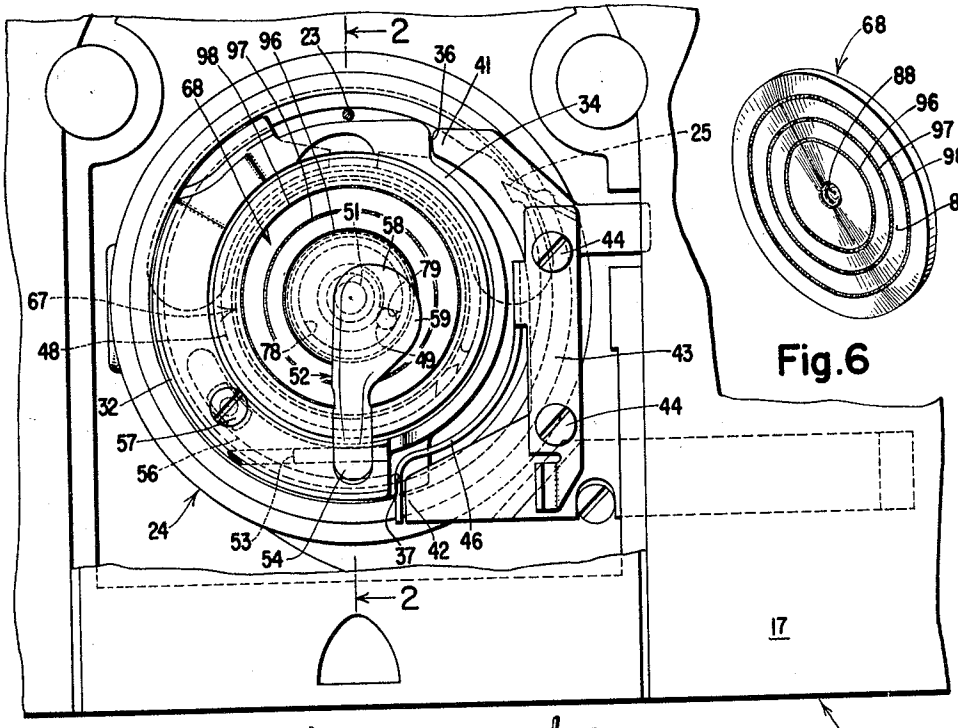


Fig.1

Fig.6

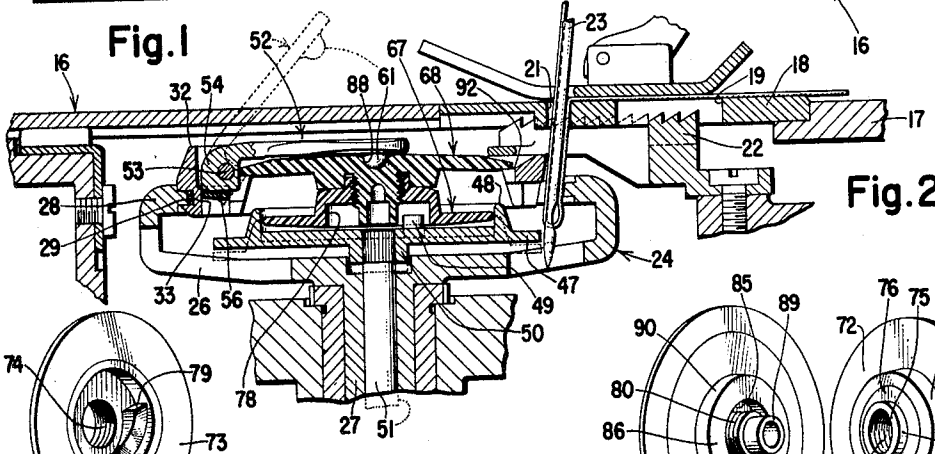


Fig.2

Fig.5

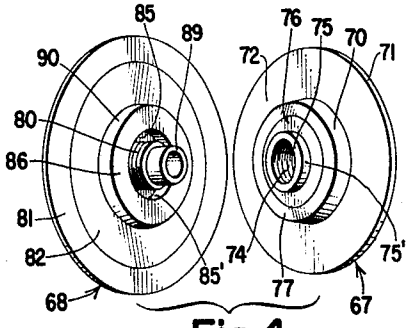


Fig.4

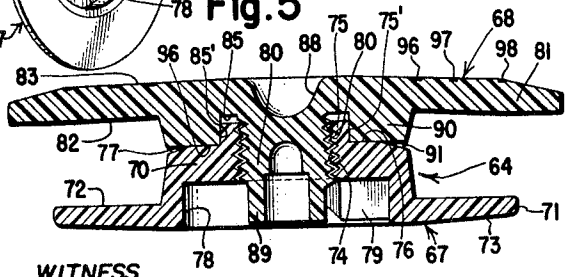


Fig.3

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BOBBINS FOR SEWING MACHINES

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This invention relates to sewing machines and more particularly to bobbins especially adapted, though not necessarily restricted, for use with the loop takers of sewing machines of the class wherein the bobbin of the sewing machine can be wound without removing it from the loop taker. One form of this class of sewing machine is shown and described in United States patent application Serial No. 133,896, filed August 25, 1961, in the name of Stanley J. Ketterer, now Patent No. 3,115,855.

One of the primary objects of the present invention is to provide an improved bobbin suitable for use as part of the loop taker of sewing machines.

Another object of the invention is to provide inexpensive plastic bobbins of an improved design.

A further object of the invention is to provide a multi-part plastic bobbin which is strong and durable and which can be easily manufactured, assembled, disassembled and reassembled.

A still further object of the invention is to provide a two-part plastic bobbin having a body portion and flange portion which can easily be connected to one another.

A further object of the invention is to provide a two-part plastic bobbin having cylindrical aligning surfaces which assure that the two parts will always be assembled concentrically.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the drawings:

FIG. 1 is a top plan view of a portion of a sewing machine showing a loop taker equipped with a multi-part plastic bobbin embodying the present invention,

FIG. 2 is a vertical sectional view taken substantially on the line 2—2 of FIG. 1,

FIG. 3 is an enlarged cross sectional view showing the body and flange portions of the multi-part assembled bobbin,

FIG. 4 is a reduced scale exploded perspective view of the bobbin showing, among other things, the inside surfaces of the body and flange portions thereof,

FIG. 5 is a reduced scale perspective view showing, among other things, the outer surface of the body portion of the bobbin, and

FIG. 6 is a reduced scale perspective view showing the outside surface of the flange portion of the bobbin.

A sewing machine **16**, portions of which are illustrated in FIGS. 1 and 2, comprises, in part a frame including a bed **17**, a throat plate **18** having a feed dog slot **19** and a needle hole **21** designed respectively to accommodate a feed dog **22** and a needle **23**. The sewing machine **16** also has a vertical axis rotary hook type loop taker, indicated generally by the numeral **24**. The loop taker **24** has a beak **25** formed on an upwardly open cup-shaped member **26** mounted on the upper end of a vertical hollow shaft **27**. The cup-shaped member **26** and the shaft **27** preferably rotate at a speed of two revolutions for each reciprocation of the needle **23**. The upper end of the cup-shaped member **26** extends inwardly as at **28** and has formed on its inner circumference an infacing raceway **29**. An annular bobbin case **32** is partly housed within the cup-shaped member **26** and the bobbin case **32** has an outfacing external semicircular raceway **33** which is complemental to the raceway **29**. The bobbin case **32** is restrained from rotary movement by a means presently to be described and the cup-shaped member **26** rotates about the non rotating bobbin case **32**. To complete the circular form of the bobbin case **32** the ends of the bobbin case raceway **33** are joined by a substantially semicircular arm **34**. The bobbin case **32** is formed with oppositely-faced, spaced abutments **36** and **37** which are engaged by the ends of spaced fingers **41** and **42** formed as part of a bracket **43** slidably secured to the bed **17** by two screws **44**. A leaf spring **46** carried on the bracket **43** and extending between the finger **42** and the abutment **37** serves to cushion any vibrations of the bobbin case **32**.

Disposed within the cup-shaped member **26** is a flat annular disc **47** having formed on its upper side an upstanding annular rib **48** and a driving pin **49**. The lower side of the disc **47** carries a hub **50** which secures the disc **47** to the upper end of a rod **51** located inside the hollow shaft **27**.

The function of the disc **47**, the rib **48**, the pin **49** and the rod **51** are fully set forth in United States Patent No. 3,115,855, supra, therefore, suffice it to say that the rod **51** and the disc **47** may be raised to cause the pin **49** to drive a bobbin hereinafter described.

A bobbin hold-down arm **52** is pivoted on a pin **53** carried by the bobbin case **32**. The end of the arm **52** carried on the pin **53** is enlarged, as at **54**, and the enlargement is engaged by one end of a leaf spring **56** carried beneath the bobbin case **32** and the tension of the spring **56** may be adjusted by turning a screw **57**. The free or distal end **58** of the arm **52** has a laterally extending handle **59** designed to facilitate turning the arm **52** on the pin **53**. The end **58** of the arm has on its lower surface (FIG. 2) a downwardly protruding semi-spherical bearing **61** the function of which will presently be described.

The bobbin case **32** and the cup-shaped member **26** house a multi-part plastic bobbin, indicated generally by the numeral **64**, and the complete bobbin **64** is formed by two separable parts, namely a body part **67** and a flange part **68**. The body part **67**, which is preferably made of clear plastic, is circular in form and has a concentrically located cylindrical hub **70**. The hub **70** extends axially inwardly from a flat circular plate **71** having an inside surface **72** and an outside surface **73**. The hub **70** is formed with a concentrically located internal threaded hole or connecting member **74**. The innermost portion of the hub **70** takes the form of a reduced diameter end **75** having an accurately formed external cylindrical surface **75'** (FIG. 4). A plane mating surface **76**, perpendicular to the axis of the body part **67**, is formed on the hub **70** and extends radially from the base of the end **75**, and the outer edge of the plane surface **76** is beveled as at **77**. The outer side **73** of the body part **67** is formed with a recessed circular groove **78** and approximately 45° of the circumference of this groove is partly filled with a face-cam having an axially extending abutment **79** which may be engaged by the driving pin **49**, previously described. The flange part **68**, which is preferably made of clear plastic, is also circular but of a larger outside diameter than the body part **67**. The flange part **68** is formed with a concentrically located externally threaded stud or connecting member **80**, and the stud **80** extends axially inwardly from a substantially flat circular plate **81** having an inside surface **82** and an outside surface **83**. The base of the stud **80** is surrounded by an accurately

formed annular groove **85**, the groove **85** having an accurately formed cylindrical surface **85'**, the inside diameter of the surface **85'** is only slightly greater than the outside diameter of the previously mentioned cylindrical surface **75'**. Because of this, the two surfaces **75'** and **85'** engage one another in such a manner as to guarantee that the body part **67** will be concentric with the flange part **68**. The outer edge of the groove **85** defines the inner circumference of a plane mating surface **86** (FIG. 4) which is perpendicular to the axis of the flange part **68**. The plate **81** and the stud **80** are not completely apertured and thus the flange part **68** does not have a hole passing all the way therethrough. However, the outside surface **83** of the plate **81** is formed with a concentrically located, semispherical bearing depression **88** which is of such size and shape as to receive the previously mentioned semispherical bearing **61**. The stud **80**, while not having an aperture extending all the way therethrough, is hollow and unthreaded adjacent to its free or distal end **89**. The flange part **68**, in addition to having the plate **81**, is formed with a hub **90** which extends away from the inside surface **82** a distance substantially equal to the depth of the groove **85**. The external cylindrical surfaces of the hubs **70** and **90** combine to form that portion of the bobbin **64** on which thread may be wound. Preferably, the threaded hole **74** and the threaded stud **80** will engage one another with what is known as a "class two fit." In other words the fit of the threads is relatively loose and the stud **80** can easily be threaded into the hole **74**. Thus the concentricity of the part **67** and the part **68** depends on the two accurate surfaces **75'** and **85'** and not on the threads **74** and **80**.

The parts **67** and **68** are assembled in the following manner. The body part **67** is placed adjacent to the body part **68** so that the inside surface **72** of the part **67** faces the inside surface **82** of the part **78**. Then the unthreaded free end **89** of the stud **80** is entered into the threaded hole **74** until the threaded portion of the stud **80** engages the threads of the hole **74**. Then the two parts are relatively rotated until plane surfaces **76** and **86** abut. When the surfaces **76** and **86** abut, the bevel **77** and a portion of the surface **86** form an annular thread gripping notch **91**. The assembled bobbin **64** may then be placed into the loop taker **24** by first grasping the handle **59** and turning the arm **52** upwardly against the action of the spring **56**. When the arm **52** is raised (dash-dash position FIG. 2), the assembled bobbin **64**, with the body **67** lowermost, is dropped into the bobbin case **32** until the outer circumferential edge of the inside surface **82** of the plate **81** rests on an annular ledge **92** (FIG. 2) formed on the bobbin case **32**, it being noted that the inner diameter of the ledge **92** is smaller than the diameter of the plate **81**. Then the arm **52** is lowered to the solid line position shown in FIG. 2. Even though the bobbin **64** may not be exactly centered in the bobbin case **32**, the semispherical bearing **61** will enter the offset semispherical depression **88** and thereby shift the bobbin **64** until it is properly centered.

As best seen in FIGS. 1 and 6, the outside surface **83** of the circular plate **81** is formed with indicia in the form of three concentric rings **96**, **97** and **98**, which may be printed in a selected color or engraved on the surface **83** in any suitable manner. Because the plate **81** is formed of clear plastic, the sewing machine operator can use the rings **96**, **97** and **98** to determine approximately how much thread is wound on the bobbin.

In operation, the loop taker **24** and the improved plastic bobbin **64**, which bobbin forms the subject of this invention, function in a general manner similar to the functioning of the loop taker and bobbin shown and described in the United States Patent No. 3,115,855, supra, therefore it will be sufficient to state that, when the disc **47** and the rod **51** are in their lowered position (as shown in dash-dash lines in FIG. 2), the bobbin **64** functions in much the same manner as the bobbin of any lock stitch machine functions that is the bobbin passes through a thread loop cast off by the needle. When the disc **47** and the rod **51** are in their raised position (as shown by solid lines in FIG. 2) the pin **49** enters the groove **78** and engages the abutment **79** and links the bobbin to the cup-shaped member **26** and rotation of the cup-shaped member **26** causes the beak **25** to engage and wrap thread around the bobbin **64** in such a way that the first turn of thread is wedged into the notch **91** thereby securing the thread to the bobbin **64**. Additional rotations of the cup-shaped member **26** and the bobbin **64** places additional turns of thread on that portion of the bobbin **64** formed by the hubs **70** and **90**. This may be continued until a desired amount of thread is wound on the bobbin **64**.

The new and improved bobbin **64** has many advantages not found in previous known bobbins. For example—

(*a*) Both parts **67** and **68** of of the two piece bobbin are made of plastic. Because of this the bobbin parts can be accurately and inexpensively manufactured.

(*b*) The circular groove **78** and the abutment **79** and its cam face permit placing the bobbin **64** on the annular disc **47** without regard to registration of the pin **49** with the abutment **79**.

(*c*) The semispherical depression **88** assures that the bobbin **64** will be properly centered whenever the bearing **61** of the arm **52** is lowered into the depression **88**. As previously stated, the bobbin **64** will always be properly centered even though it may have been placed off center in the bobbin case **32** before the arm **52** is lowered.

(*d*) The threaded stud **80** and threaded hole **74** provide a means for easy and rapid assembly, disassembly, and reassembly of the bobbin **64**.

(*e*) Because the bobbin **64** can easily be disassembled, the owner of the sewing machine can separate the two parts of the bobbin and thereby remove and save, in coiled form, any excess thread that may have been wound on the bobbin.

(*f*) The groove **85**, formed in the flange part **68**, receives the end **75** of the hub **70** thereby permitting both the threads of the stud **80** and the threads of the hole **74** to be long enough to provide a strong and durable connection between the two parts **67** and **68**.

(*g*) The indicia **96**, **97** and **98**, which is formed on the clear plastic flange part **68**, makes it possible for a sewing machie operator to determine approximately how much thread is wound on the bobbin.

(*h*) The cylindrical aligning surfaces **75'** and **85'** assure concentricity of the parts **67** and **68**.

Having thus set forth the nature of this invention, what is claimed herein is:

1. A two-part bobbin adapted for use with a sewing machine having a loop taker, said sewing machine being of the class wherein the bobbin can be wound without removing it from the loop taker, said bobbin comprising a body part having a first annular hub portion provided with a concentrically located threaded hole, a reduced diameter end formed on said hub portion, a flange part, a threaded stud formed on said flange part and being of such size and shape as to engage said threaded hole, the base of said threaded stud being surrounded by a second annular hub portion integral with said stud and defining a cylindrical groove surrounding said stud and said groove being of such size as to receive the said reduced diameter end of the first hub portion on said body part, said hub portions being of substantially equal outer diameters and providing a winding surface for winding thread thereon.

2. A two-part bobbin adapted for use with a sewing machine having a loop taker, said sewing machine being of the class wherein the bobbin can be wound without removing it from the loop taker, said bobbin comprising a flange part, and a body part, one of said parts having a first annular hub portion provided with a concentrically located threaded hole, a reduced diameter end formed on said hub portion, the other of said parts having a threaded

stud of such size and shape as to engage said threaded hole, the base of said threaded stud being surrounded by a second annular hub portion integral with said stud and defining a cylindrical groove surrounding said stud and said grove being of such size as to receive the said reduced diameter end on said first hub portion, said hub portions being of substantially equal outer diameters and providing a winding surface for winding thread thereon.

3. A bobbin especially adapted for use with a sewing machine having a loop taker, said sewing machine being of the class wherein the bobbin can be wound without removing it from the loop taker, said bobbin comprising a first part having a circular plate and a plane surface extending perpendicularly to the axis of said bobbin, a second part having a circular plate and a plane surface extending perpendicularly to the axis of said bobbin, a bevel formed on one of said plane surfaces, an externally threaded member carried on one of said parts, and an internally threaded member carried on the other of said parts, the said two threaded members joining to bring said two plane surfaces and said bevel adjacent to one another to form an annular thread gripping groove such that the innermost annular portion of the bevel on the one part joins the plane surface on the other part to grip the thread.

4. A two-part bobbin comprising a body part having a first annular hub portion provided with a concentrically located threaded hole, a reduced diameter end formed on said hub portion and having an accurately formed external cylindrical surface, a flange part, a threaded stud formed on said flange part and being of such size and shape as to loosely engage said threaded hole, the base of said threaded stud being surrounded by a second annular hub portion integral with said stud and defining a cylindrical groove surrounding said stud and said groove having an accurately formed internal surface of such size as to accurately receive the said external surface of said reduced diameter end of the first hub portion on said body part, said hub portions being of substantially equal outer diameters and providing a winding surface for winding thread thereon.

5. A two-part bobbin comprising a transparent plastic

body part having a circular plate and said circular plate having on one side thereof a cylindrical hub provided with a mating surface and a concentrically located threaded hole, a reduced diameter end formed on said cylindrical hub and having an accurately formed external cylindrical surface, the other side of said body part having a circular groove a portion of the circumference of which is partly filled with a face cam having an axially extending abutment, a transparent plastic flange part having a circular plate which is larger in diameter than the circular plate of the said body part, a threaded stud formed on one side of said flange part and being of such size and shape as to loosely engage said threaded hole on said body part, the base of said threaded stud being surrounded by an annular hub having a mating surface and said annular hub being formed integral with said stud and defining a cylindrical groove surrounding said stud and said annular hub having an accurately formed internal surface of such size as to accurately engage the external surface of said reduced diameter end of the hub on said body part, the other side of said flange part being formed with a semi-spherical bearing depression.

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