US 20120291682A1

(19) **United States**

(12) **Patent Application Publication**

Goodwin

(10) **Pub. No.: US 2012/0291682 A1**

(43) **Pub. Date: Nov. 22, 2012**

(54) **METHOD OF FEEDING THREAD TO A SEWING MACHINE AND SEWING MACHINE THREAD FEED**

(75) Inventor: **David Goodwin**, Mansfield (GB)

(73) Assignee: **COATS PLC**, Uxbridge, Middlesex (GB)

(21) Appl. No.: **13/574,953**

(22) PCT Filed: **Jan. 28, 2011**

(86) PCT No.: **PCT/GB2011/000103**

§ 371 (c)(1), (2), (4) Date: **Jul. 24, 2012**

(30) **Foreign Application Priority Data**

Jan. 28, 2010 (GB) 1001367.0

Publication Classification

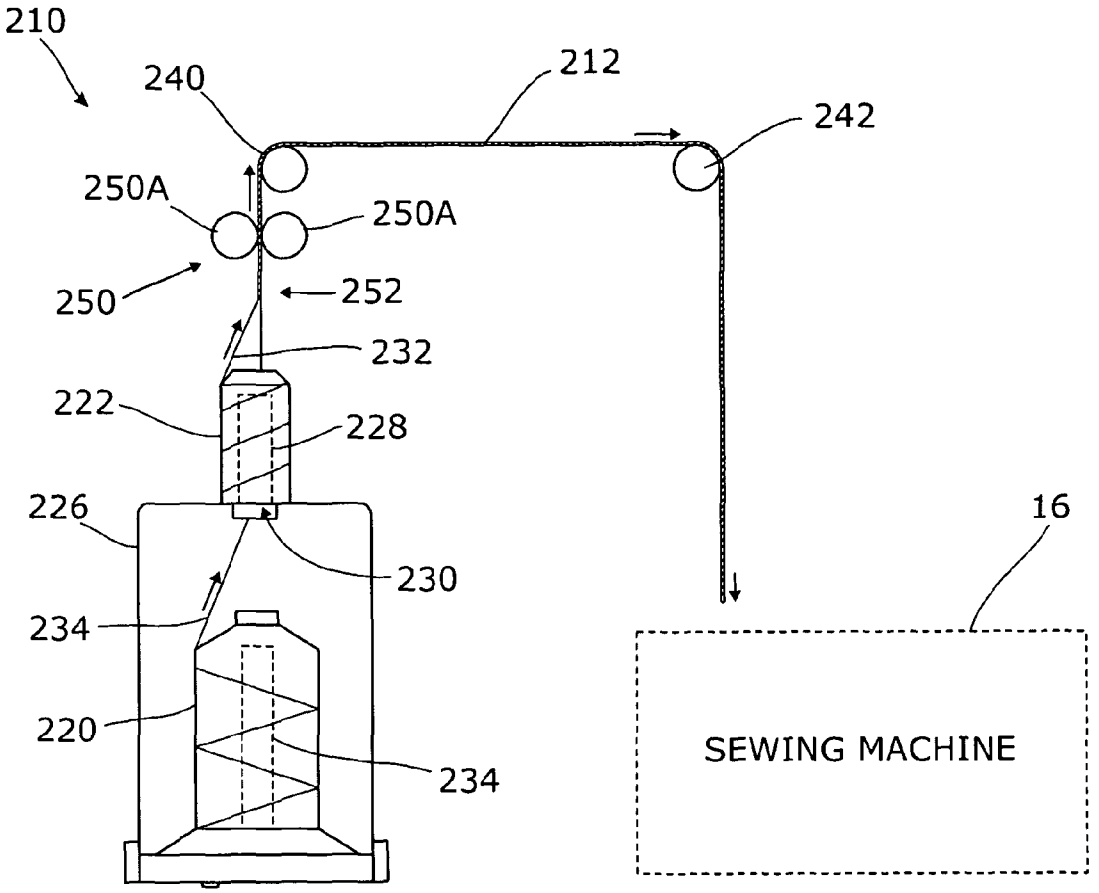
(51) **Int. Cl.**

D05B 59/00 (2006.01)
D02G 1/02 (2006.01)
D05B 47/00 (2006.01)

(52) **U.S. Cl.** **112/302**; 112/475.01; 112/254; 57/90

(57) **ABSTRACT**

A sewing machine thread feed for a supplying sewing thread to a sewing machine, the feed including: a guide mechanism for guiding sewing thread to a needle of the sewing machine; first and second spools carrying first and second filaments respectively, one of the spools carrying a low-melt filament and the other carrying a textile filament; first and second retention mechanisms for retaining the first and second spools respectively in position against force applied to them when filament is drawn off; the first and second filaments run from the first and second spools respectively to the guide mechanism; wherein the first filament runs from the first spool, through the centre of the second spool, so that the action of the second filament, when being drawn off the second spool, causes inter-winding of the first and second filaments to create composite sewing thread.



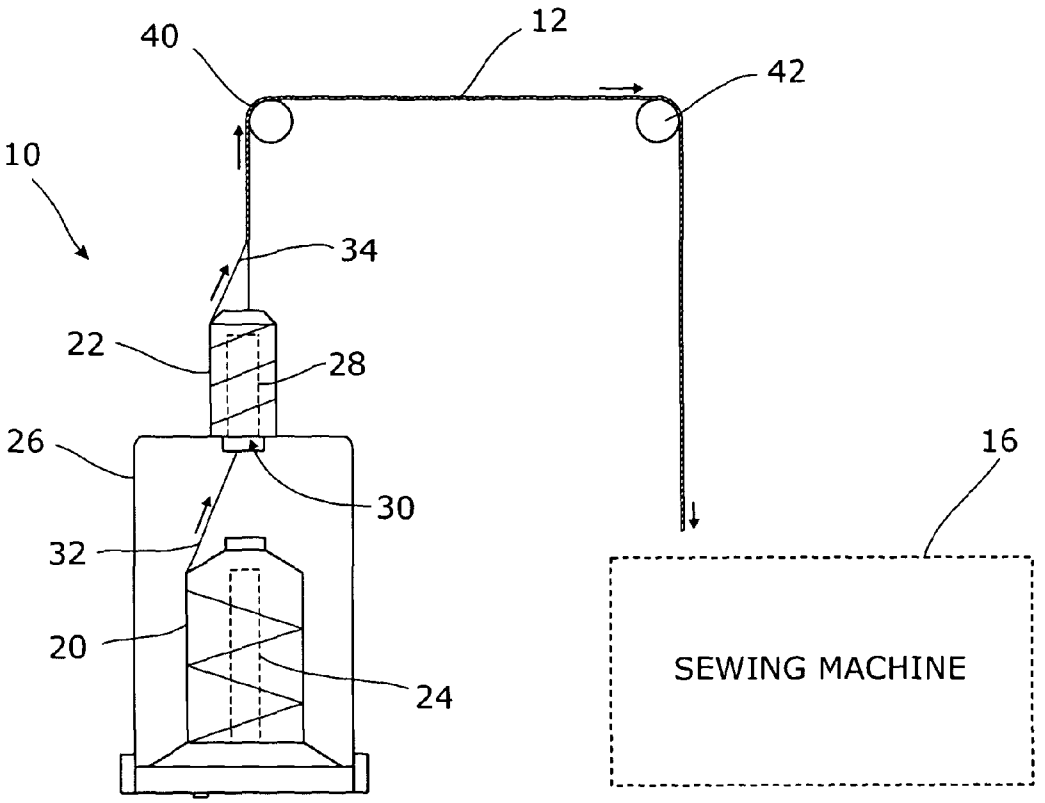


Fig. 1

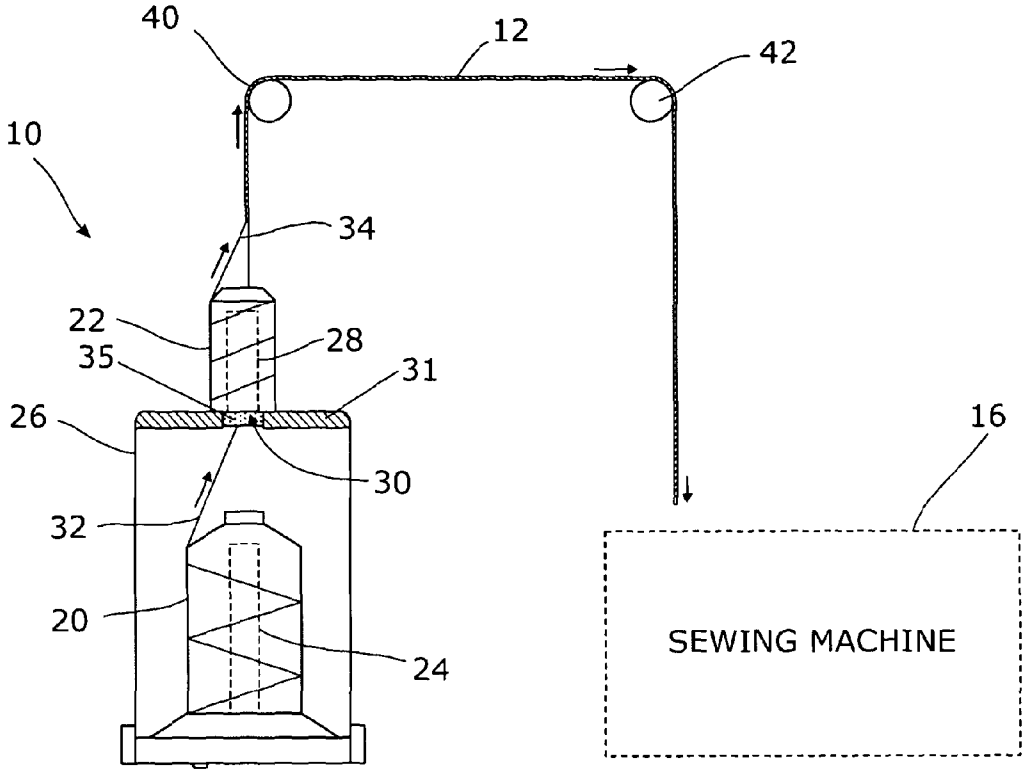

40
12
42
10
34
22
28
35
31
26
16
30
32
20
24
SEWING MACHINE

Fig. 2

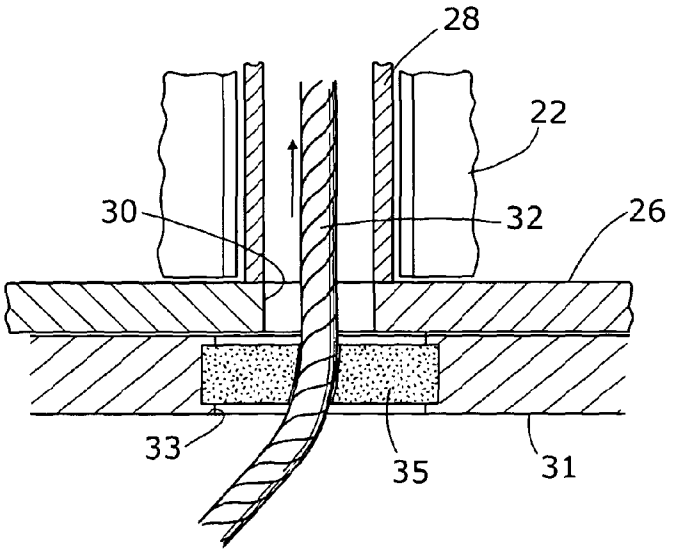

28
22
30
32
26
33
35
31

Fig. 3

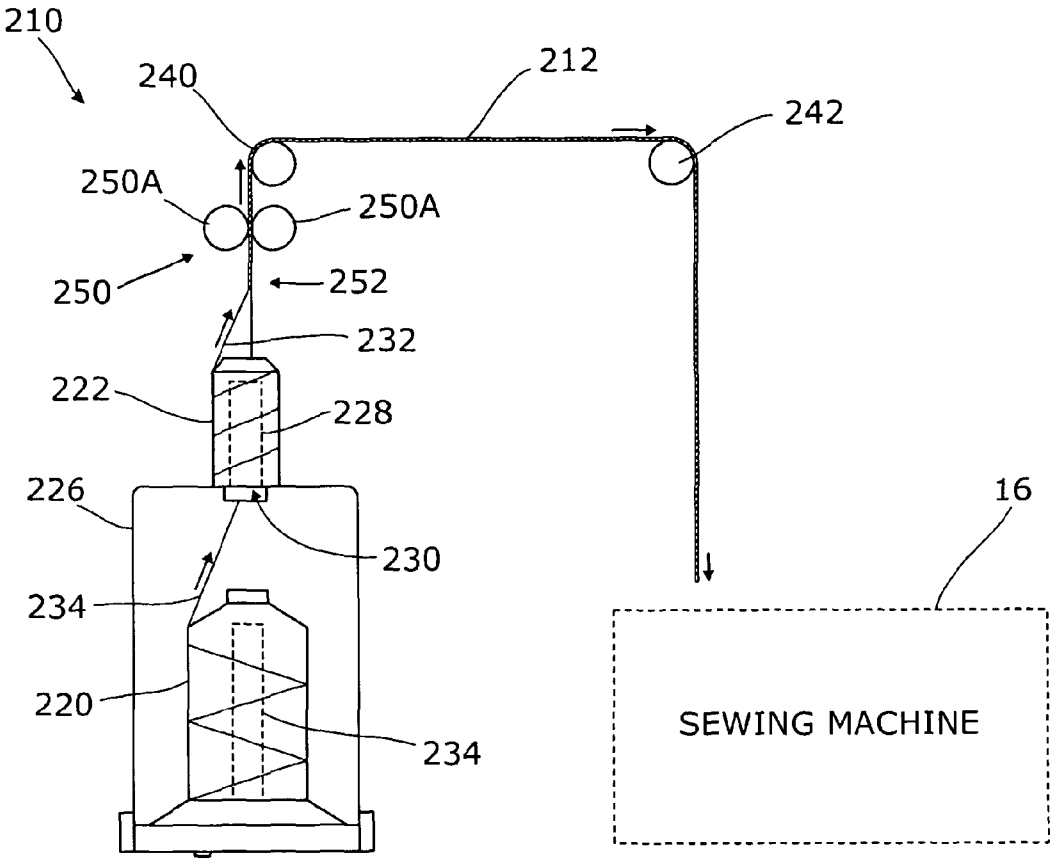

210
240
212
242
250A
250A
250
252
232
222
228
226
230
234
220
234
16
SEWING MACHINE

Fig. 4

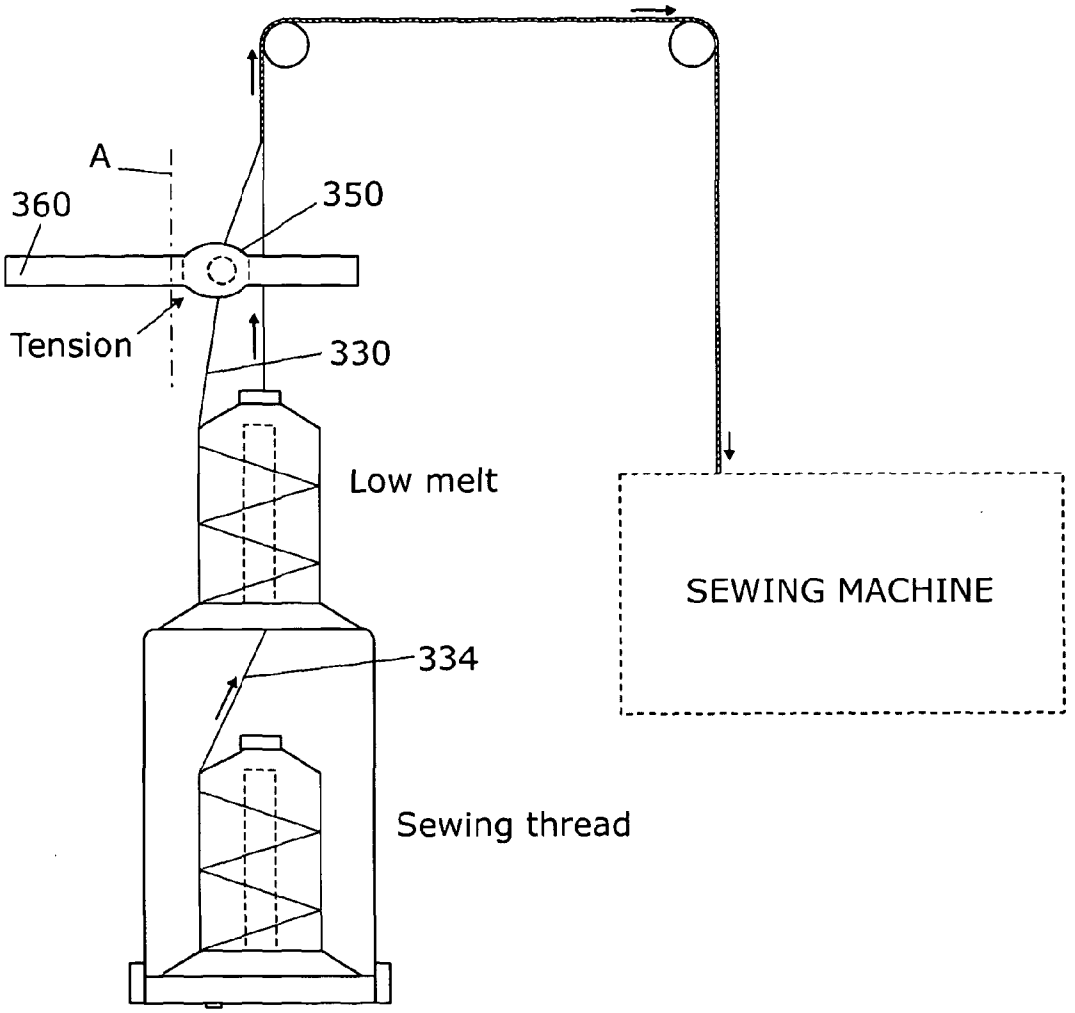

A
360
350
Tension
330
Low melt
SEWING MACHINE
334
Sewing thread

Fig. 5

METHOD OF FEEDING THREAD TO A SEWING MACHINE AND SEWING MACHINE THREAD FEED

BACKGROUND TO THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates generally to sewing, such as, for example, to the process of sewing and the creation of thread for sewing, including manners of feeding thread to a sewing machine. Sewing is one conventional manner in which fabrics can be joined together. Relatively recently, there have been significant developments in sewing technology. With the increasing use of materials in garments having a greater variety of characteristics, the desire for sewing threads having more widely varying characteristics has become apparent. For example, interest has been exhibited in gluing fabrics. This manner of attachment exhibits a number of potential benefits. One such benefit is that, when attaching elastic fabrics, if the right substance is used for the gluing, the seams will exhibit a similar degree of elasticity to that of the fabrics which are being attached.

[0003] 2. Description of Related Art

[0004] It is known to provide suitable adhesion of elastic fabrics by sewing a seam using a sewing thread which has adhesive properties. A composite sewing thread, which has a low-melting point nylon filament (though other materials, such as polyester, polypropylene, for example) twisted with a conventional polyester filament yarn is commercially available in spools which are pre-wound, ready for use. Once the seam is ironed the nylon melts and the two pieces of fabric are adhered by the combination of the conventional textile filament's retention action as a result of it having sewed the two pieces of fabric together and the nylon filament which, after melting, operates in a manner very much akin to a conventional glue.

SUMMARY OF THE INVENTION

[0005] Embodiments of the present invention provide, variously, methods of sewing, methods of feeding thread to a sewing machine, a thread feed for a sewing machine and a sewing machine.

[0006] According to one embodiment of the present invention there is provided a method of feeding thread to a sewing machine the method including the steps of: using the locomotive power of the sewing machine, drawing first and second filaments from first and second spools respectively; subsequent to drawing the filaments from the spools, interwinding the first and second filaments to create thread for use by the sewing machine; and feeding the composite, interwound thread to a stitching tool of the sewing machine.

[0007] A further embodiment of the present invention provides a sewing machine thread feed for supplying sewing thread to a sewing machine, the sewing thread including at least first and second filaments, the feed comprising: a guide mechanism for guiding sewing thread to a stitching tool of the sewing machine; first and second spools carrying first and second filaments respectively; first and second retention mechanisms for retaining the first and second spools respectively in position against force applied to them when filament is drawn off; the first and second filaments run from the first and second spools respectively to the guide mechanism; wherein the thread feed further comprises an inter-winding mechanism which, using motive power of the sewing machine causes inter-winding of the first and second filaments to create composite sewing thread.

BRIEF DESCRIPTION OF DRAWINGS

[0008] FIG. **1** is a side view of a first embodiment of thread feeding mechanism for a sewing machine according to a first embodiment of the present invention;

[0009] FIG. **2** is a side view of a modification of the embodiment of FIG. **1**;

[0010] FIG. **3** is a section through a detail of FIG. **2**;

[0011] FIG. **4** is a side view of a second embodiment of thread feeding mechanism for a sewing machine according to a further embodiment of the present invention; and

[0012] FIG. **5** is a side view of a modification of the embodiment of thread feeding mechanism of FIG. **3**

DESCRIPTION OF PREFERRED EMBODIMENTS

[0013] Referring now to FIG. **1**, a thread feeding mechanism **10** provides sewing thread **12** to a sewing machine **14**. The use of the term 'thread' herein is intended functionally. That is to say that any strand-like or fibril-like structure—henceforth referred to as a filament—which is used to sew fabric together shall be considered to be 'thread'. The term 'filament' used herein is intended to be understood to be used in a generic manner and is therefore sufficiently broad to encompass any fibril-like structure which is made either of a single strand or which may be made of one or more such strands or fibrils as the case requires. Thus a thread may comprise one or more filaments.

[0014] The sewing machine **16** is associated with a thread feed mechanism which may, in an alternative embodiment, be integrated with the machine. The thread feed mechanism provides thread to the sewing machine. Power to pull the thread through the feed mechanism is provided by the locomotive power of the sewing machine (regardless of the origin of that power, which may therefore be by manual actuation or electric motor, for example) in a manner known per se. That is to say that, as in the case of a conventional sewing machine, operation of the machine to perform sewing automatically also has the effect of drawing thread from what can generically be referred to as a thread store (such as a spool or a bobbin), through a suitable guide mechanism and to a needle (or other stitching tool such as, for example, a bobbin, a hook, a looper or a spreader, as the case may be) of the machine. The guide mechanism for the thread is therefore an element of the feed mechanism in that the latter additionally includes one or more thread stores.

[0015] In the present example, the feed mechanism comprises first and second spools **20**, **22** with the first spool **20** carrying low-melting point nylon filament **32** with a relatively high modulus of elasticity and the second spool **22** carrying conventional textile filament **34**. In the present example, both the low-melting point filament and textile filament could, if desired, be used for sewing by themselves. In the illustrated embodiment, the first and second spools **20**, **22** are mounted coaxially with each other. The first spool is mounted on a first spool carrier or retaining mechanism, provided in the illustrated embodiment by a spindle **24** located within a capsule **26** in a manner which preferably resists or, more preferably prevents relative rotation of the spool **20** and spindle **24**. The capsule **26** encloses the first spool **20** and carries the second spool **22** externally on its upper face. In the present example

the second spool **22** is carried on a second spool carrier or retaining mechanism provided by a second spindle **28**, mounted on the outside of the upper face of the capsule **26** and in register with an aperture **30**. The second spindle **28** serves to locate the second spool **22** but is not essential and a small locating spigot, for example, may be employed to provide a locating mechanism instead. In use, the low-melting point filament **32**, which is drawn off the first spool **20**, passes through the aperture **30** and the centre of the second spool **22** (and therefore, in the illustrated example, the centre of the second spindle **28** which has a bore running through its centre), and is fed to a stitching tool of the machine (such as a needle or other stitching tool such as a hook, a bobbin, a looper and a spreader, for example, as the case may be) of the sewing machine **14** via a thread guide mechanism which, in the present example, includes two guide wheels **40**, **42** (though may involve a considerably more sophisticated guide mechanism, as appropriate).

[0016] The second spool **22** is mounted on the capsule **26**—here using the second spindle **28**—once again preferably in a manner which resists or more preferably prevents relative rotation of the second spool **22** and retaining mechanism provided by the second spindle **28**. The second spool **22** carries a second filament **34**, which, in this example, is provided by a conventional textile filament (typically, though not necessarily polyester) of the kind ordinarily used as sewing thread. The textile filament **34** is similarly fed to the sewing machine **14** via the guides **40** and **42**.

[0017] In operation, the action of the textile filament **34**, as it is drawn off the second spool **22**, will be such that it automatically winds itself around the first filament **32** subsequent to the passage of the low-melting point filament through the centre of the second spool **22**. The result is the automatic inter-winding of the two filaments **32**,**34**, to create a composite sewing thread **12** for use on the machine **16** and which, when ironed or otherwise heated to the requisite temperature such that the nylon filament melts, will exhibit adhesive properties. The relatively higher elasticity of the low melting point filament **32** means that it will be more stressed (i.e. elastically extended) as a result of the 'drawing off' tension which is applied to it than is the case for the textile filament. This differential stressing aids the robustness of the inter-winding in subsequent handling operations and processing by the sewing machine. It should be appreciated that the enclosure of the spindle **24** providing the first spool carrier within the capsule **26** though advantageous under certain circumstances, is not, however, essential and that the primary function of the capsule **26** is to provide support for the first and second spool carriers in a spatial relationship such that thread from a spool mounted on the first carrier can be drawn through the second carrier and, therefore, a spool mounted on the second carrier. Preferably, though not essentially therefore, the first and second spool carriers are axially displaced and, more preferably, mounted coaxially with each other.

[0018] It will be apparent that, because, as mentioned above, in the present embodiment the textile filament carried on the second spool **22** can be provided by a conventional sewing thread, and may therefore be any colour in which such thread is ordinarily available and any thickness required for a particular sewing operation. Consequently, the composite thread supplied to the machine can likewise be any colour or thickness. When it is desired to perform a sewing operation with a composite, adhesive thread yet which has either a different colour or thickness to that of the textile filament which is, at that time, being used to form the composite thread then the textile filament **34** carried on the second spool **22** may simply and straightforwardly be replaced by another, suitably coloured filament having the requisite thickness. The result, therefore, is the ability to provide a composite thread for use by a sewing machine, effectively in situ and using the motive power (whether that be produced by manual actuation, such as by the use of a pedal, or electrical power, compressed air or any other means) of the sewing machine. Consequently, while the present embodiment has been illustrated by reference to a combination of a low-melting point filament and a textile filament, it is not limited to the production of such composite thread and constituent filaments of any suitable kind may be employed in accordance with this embodiment to produce a composite thread, with the nature of the constituent filaments being selected with reference to the desire end use of the composite thread. Thus, for example, where a composite thread was required which included a use of two, distinct colours, constituent filaments (for example each provided by commercially-available textile sewing thread capable of use on its own) having the requisite colours may be inter-wound to provide such bi-coloured thread. DAVID, CAN YOU THINK OF SOME OTHER EXAMPLES?

[0019] Referring now to FIGS. **2** and **3**, in a modification of the embodiment of FIG. **1** the capsule **26** additionally comprises a plastic tray **31** mounted to the inside of its upper end. The tray **31** has an aperture **33** which lies in register with the aperture **30**. The tray **31** carries a tensioning device, provided in the present embodiment by a deformable pad **35** located in the aperture **33**. The deformable pad **35** is, in the present example, provided by a foam pad.

[0020] In use the low-melt filament **32** is drawn through an aperture in the foam pad **35**. This serves to provide additional, relatively mild tension to the filament **32** as it is drawn through the centre of the second spool **22**. This aids handling of the inter-wound, composite thread **12**. Additionally, because the low-melt filament can have lively handling characteristics, the presence of the foam pad assist in the ameliorating of the impact of such characteristics upon the handling of the composite, inter-wound thread.

[0021] An alternative device to the foam pad can be provided by threading the low-melt filament **32** through two (or more) apertures in the upper end of the capsule **26**, before passing the filament though the centre of the spool **22**.

[0022] The embodiments described above use the feeding one filament through the centre of the spool on which a further filament is wound which thereby enables the orbital trajectory executed by the further filament during its unwinding process to cause inter-winding of the two filaments together. This provides a very simple and low-cost way of inter-winding two constituent filaments to create a composite thread. The use of this is not limited either to the creation of low-melting point thread, nor to its employment on a sewing machine, nor to the use of any particular source of motive power (whether provided by a sewing machine or otherwise). Thus, for example, this mechanism may equally find utility in a retail, or any other environment as an inexpensive and quick way of producing a composite thread (of whatever kind, i.e. whether low-melting point, multi-chromatic or otherwise) from selected constituent filaments (which may themselves be provided by thread usable by itself for sewing or any other suitable filament). Further, the use of this method and mechanism is not limited to the inter-winding of only two filaments and further filaments may be drawn sequentially through the

centre of a sequence of spools to create composite sewing threads of three, four or more constituent filaments in this manner.

[0023] Accordingly an embodiment of the present invention provides the creation of a composite sewing thread from two or more constituent filaments whereby one or more filaments are drawn off their respective spools, through the centre of spools carrying other filaments, so that the orbital trajectory of the other filaments during unwinding from their spools causes inter-winding of filaments to create composite thread. According to one embodiment there is provided a method of creating a composite thread comprising the steps drawing a first filament from a first spool, through the centre of a second spool which carries a second filament; drawing the second filament off the second spool; whereby the orbital trajectory executed by the second filament as it is drawn off the second spool causes inter-winding of the two filaments. Preferably, the first and second filaments are drawn off their respective spools at the same speed and preferably together with each other. Yet a further embodiment provides an apparatus for use in creating composite thread having first and second spool carriers, axially displaced from each other, wherein the second spool carrier comprises an aperture whereby filament drawn off a spool located on the first carrier can be fed through the centre of a spool on the second carrier and the second spool carrier is adapted to prevent rotation a spool mounted thereon. Preferably the first spool carrier is located within a frame, preferably provided by a capsule, and upon which is mounted the second spool carrier, with the two spool carriers preferably being axially displaced and, more preferably, coaxially mounted with each other.

[0024] Referring now to FIG. **4**, in an alternative embodiment, the positions of the low-melt filament spool and the textile spool are reversed, such that the first spool **220** is now carrying textile filament **234** on a first spindle **224** within the capsule **226**; and the second spool, **222**, mounted on the second spindle **228** (which is itself mounted on the upper side of the capsule **226**) now carries the low melt nylon filament **232**. Because of the reversal of the positions of the two spools relative to each other, the tension induced in the nylon, low-melting point filament may be less than in the first embodiment and, accordingly, a tensioning device which here is incorporated into the guide mechanism of the sewing machine is provided. In the present embodiment, the tensioning device **250** is provided by two pinch wheels **250**A, is interposed between the first pulley **240** and the point **252** at which the two filaments inter-wind with each other to create the composite inter-wound thread **12** though other suitable tensioning devices may be employed.

[0025] A modification of the embodiment in FIG. **4** is shown in FIG. **5**, where the tensioning device is interposed between the second spool **222** and the inter-winding point **352**. This operates to tension the nylon filament **332** as it winds around the textile filament **334** which is being drawn axially through the second spindle. The tensioning device **350** is mounted upon a rotating disc **360**. The disc is connected to the drive mechanism (not shown) of the sewing machine such that it rotates about an axis A and at a speed which corresponds to the speed of the machine and, therefore, the speed at which the filaments are drawn off their respective spools and, therefore, also the speed at which the composite inter-wound thread is fed to the machine. In this manner, the tensioning device imparts tension to the nylon filament as it is drawn off the second spool **222**, while also providing the inter-winding of the two filaments at a consistent rate per unit length of the thread.

[0026] It will be appreciated that, although the inter-winding of filaments in situ on a sewing machine using the motive power of the machine has been exemplified using the device illustrated in FIGS. **1** to **5**, whereby one filament is drawn through the centre of a spool containing another filament, this is not essential and alternative mechanisms may be employed to achieve the same result consistent with the embodiment of the present invention. For example, an appropriate, simple twisting device can be employed (similar to that shown in FIG. **5**), powered by the motive power of the sewing machine and preferably (though not essentially) geared to the speed of the machine, to operate to inter-wind constituent filaments without the need to draw one filament through the centre of a spool supporting another filament.

[0027] It is to be understood that the different features of the various embodiments of the invention as described above are not necessarily limited to their association with the embodiments in connection with which they were first described. Thus, aspects of embodiments such as modifications are generally applicable to other embodiments of the invention described herein.

1. A method of feeding thread to a sewing machine the method including the steps of: using the locomotive power of the sewing machine, drawing first and second filaments from first and second spools respectively;

subsequent to drawing the filaments from the spools, inter-winding the first and second filaments to create thread for use by the sewing machine; and

feeding the composite, inter-wound thread to a stitching tool of the sewing machine.

2. A method according to claim **1** further comprising the step of drawing the first filament through the centre of the second spool, whereby unwinding of the second filament from the second spool operates to inter-wind the first and second filaments.

3. A method according to claim **2** wherein the second spool is constrained from rotational motion about its axis and the action of drawing off the second filament creates an orbital trajectory for the second filament relative to the first filament thereby to inter-wind the first and second filaments.

4. A method according to claim **1** wherein the locomotive power of the machine operates to apply tension to the inter-wound, composite thread, thereby to drawing the first and second filaments off the first and second spools.

5. A method according to claim **1** wherein the first and second spools are disposed substantially coaxially with each other.

6. A method according to claim **1** wherein one of the first and second spools carries a relatively low-melting point filament and another of the first and second spools carries a textile filament.

7. A method according to claim **6** further comprising the steps of inducing tension in the low-melting point filament.

8. A method according to claim **7**, wherein the tension is induced in the low-melting point filament between a point at which the low-melting point filament is drawn off its spool and a point at which the low-melting point filament and textile filament inter-wind.

9. A sewing machine thread feed for supplying sewing thread to a sewing machine, the sewing thread including at least first and second filaments, the feed comprising:

a guide mechanism for guiding sewing thread to a stitching tool of the sewing machine; first and second spools carrying first and second filaments respectively,

first and second retention mechanisms for retaining the first and second spools respectively in position against force applied to them when filament is drawn off;

the first and second filaments run from the first and second spools respectively to the guide mechanism; wherein

the thread feed further comprises an inter-winding mechanism which, using motive power of the sewing machine causes inter-winding of the first and second filaments to create composite sewing thread.

10. A thread feed according to claim **9** wherein the first filament is run from the first spool, through the centre of the second spool, so that the action of the second filament, when being drawn off the second spool thereby provides the inter-winding mechanism.

11. A thread feed according to claim **10** wherein the first and second retention mechanisms comprise first and second spindles.

12. A thread feed according to claim **11** wherein the second spindle includes a bore through which the first filament can be drawn.

13. A thread feed according to claim **11** the second spindle retains the second spool in such a manner as to prevent relative rotation of the second spindle and second spool.

14. A thread feed according to claim **9** wherein the first and second spools are retained in positions which are axially displaced from each other.

15. A thread feed according to claim **14** wherein the first and second spools are retained substantially coaxially with each other.

16. A thread feed according to claim **9** comprising a capsule housing the first spool and having an aperture through which the first filament may be drawn.

17. A thread feed according to claim **16** wherein the capsule supports the second spindle and the bore in the second spindle lies in register with the aperture in the capsule through which the first filament is drawn.

18. A thread feed according to claim **17** wherein the second spindle is supported externally of the capsule.

19. A thread feed according to claim **18** wherein one of the spools carries a low-melt filament and the other carries a textile filament and wherein the low-melting point filament is carried on the first spindle.

20. A thread feed according to claim **18** wherein the capsule comprises a tensioning device to impart tension to the first filament prior to inter-winding of the first and second filaments.

21. A thread feed according to claim **20** wherein the tensioning device includes a pad of deformable material having an aperture through which the first filament is drawn.

22. A thread feed according to claim **21** wherein the deformable material is foam.

23. A thread feed according to claim **20** wherein the tensioning device comprises a pair of tensioning apertures through which the first filament is routed prior to being drawn through the bore in the second spindle.

24. A thread feed configured to perform a method according to claim **1**.

25. A sewing machine having a thread feed according to claim **9**.

* * * * *