Nov. 12, 1968 A. FREEDMAN ET AL 3,410,078

THREAD

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FIG. 1

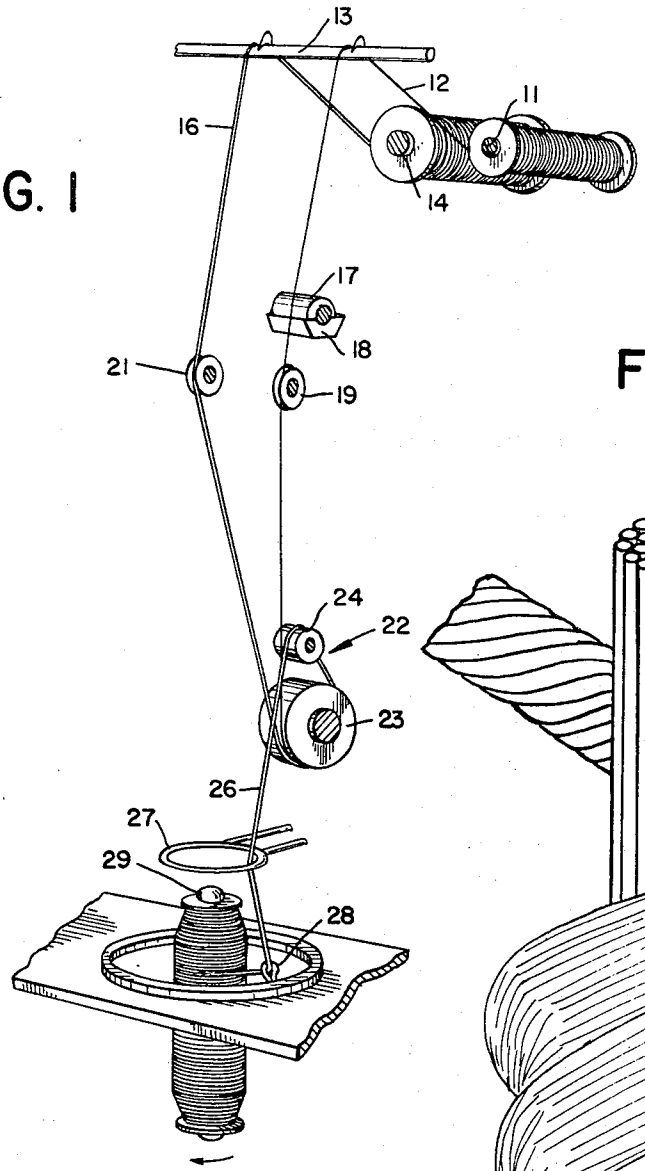
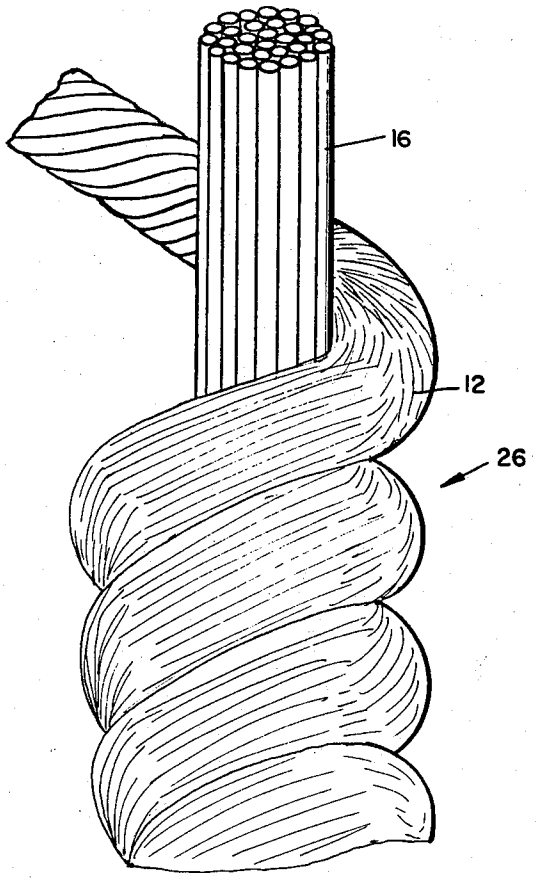


FIG. 2



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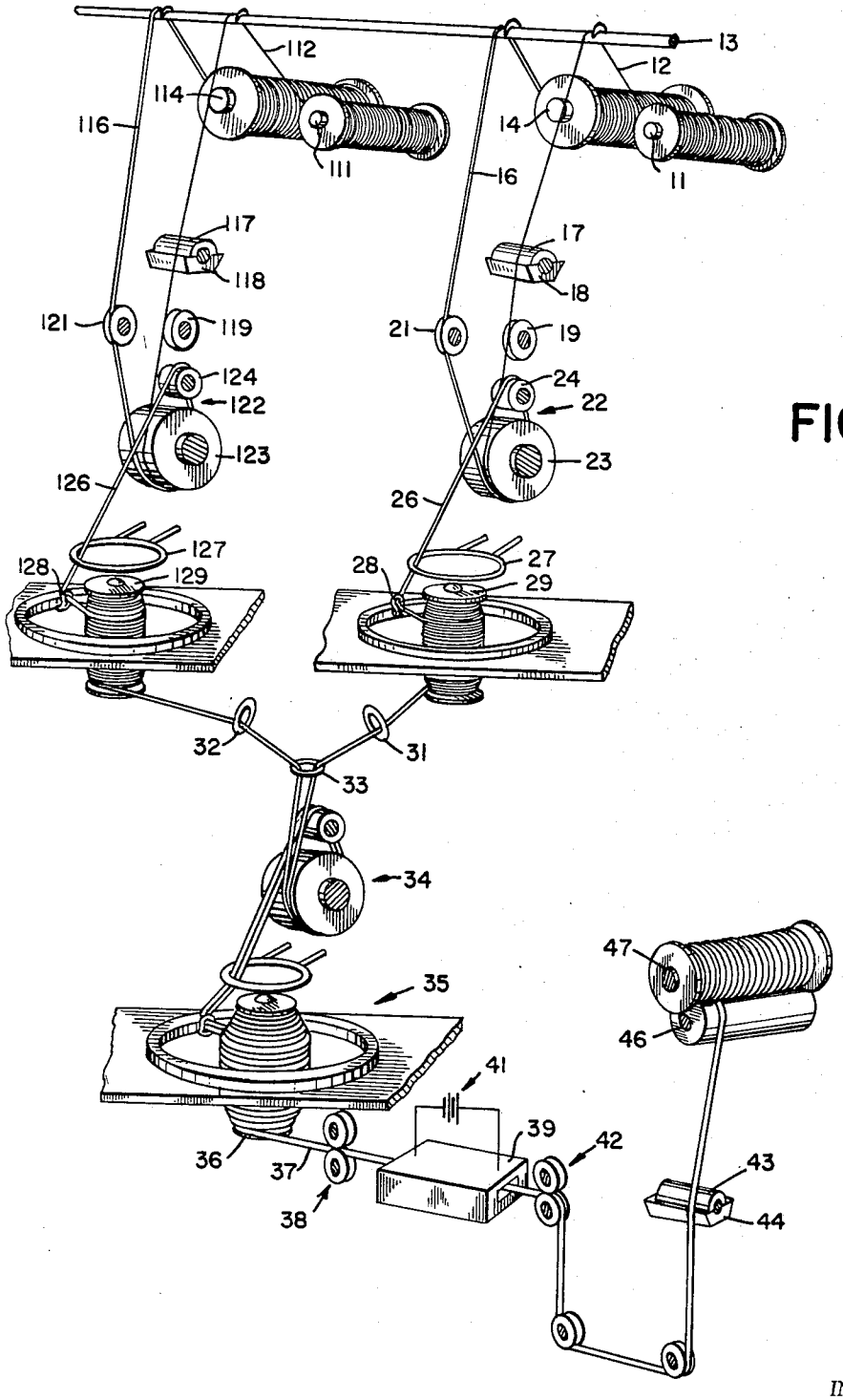


FIG. 3

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THREAD

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ABSTRACT OF THE DISCLOSURE

A sewing thread having an inelastic, continuous core which has no twist wrapped with a staple fiber thread. The staple fiber thread is wrapped about the core in the direction opposite to the direction of twist in the staple fiber thread in its initial as delivered condition. Also, two of such wrapped yarns twisted together.

This invention relates to a novel thread and more particularly to a thread provided with ac ore and sheath of different materials.

Heretofore, it has been found highly desirable for many purposes to use a strong thread consisting of continuous filament yarn such as nylon, silk, rayon, polyester fibers or the like. However, continuous filament yarns lack ultraviolet and chemical resistance and do not possess the elasticity required for certain applications. Furthermore, continuous filament yarns do not expand in the presence of moisture to seal needle holes as is particularly desirable in sewing together materials for awnings, tarpaulins, tents, umbrellas and other coverings. In addition, continuous filament yarns are not adapted for use in high speed sewing operations for the reason that the build-up of needle heat can cause melting of the continuous filament yarn. Continuous filament yarns may also slip back through a stitching pattern as a result of their smooth surface and relative inelasticity. As a consequence, despite the many highly desirable characteristics of continuous filament yarns their use is oftentimes limited.

It is therefore one of the primary objects of this invention to provide a thread which has all of the desirable characteristics of continuous filament yarns and none of the deficiencies thereof.

It is a further object of this invention to provide a thread which possesses high tensile strength together with ultraviolet and chemical resistance and elasticity.

Another object of the present invention is to provide a thread which may be effectively used in high speed sewing operations without any damage to the thread and which does not slip back through the stitching pattern.

Still another object of the present invention is to provide a thread which, while very strong, is nevertheless possessed of the characteristic of expanding in the presence of moisture to seal needle holes and make the resultant product as waterproof as possible.

The invention comprises a thread having a core of continuous filament yarn which is enwrapped by a thread of staple fiber, as for example, cotton. The continuous filament yarn, according to the present invention as illustrated and described herein, consists of a bundle of untwisted fibers, although, it will be understood that this description is purely for illustrative purposes as the continuous filament may be provided with a twist of from zero to a limited number of twists while still producing the desired result.

The present invention provides a unique and highly desirable thread produced by utilizing a staple fiber which is provided with a Z-twist or an S-twist before being wound upon the filament yarn. The direction of twisting of the staple fiber upon the continuous filament yarn is in the opposite direction from the twist given the staple fiber prior to winding. In addition, the staple fiber may be given a silicone coating just prior to being wound upon the continuous filament yarn core.

The invention will be described in greater detail in connection with the drawings in which:

FIG. 1 illustrates diagrammatically the formation of the combination thread of this invention;

FIG. 2 is an enlarged view of a fragment of the thread produced by the apparatus of FIG. 1, in accordance with this invention; and

FIG. 3 shows a compound machine for making a two-ply thread similar to the single-ply thread of FIG. 2.

The apparatus of FIG. 1 includes a cone **11** of thread **12**, of a staple fiber such as cotton, other natural fibers, or material which acts like natural or staple fibers. The thread **12** is twisted with either a Z-twist or an S-twist prior to being wound upon the cone **11**. As it is unwound from the cone, the thread **12** passes over a pulley which is simply illustrated in the form of a bar **13**.

Adjacent the cone **11** is another cone **14** upon which is wound a continuous filament yarn **16**, such as Dacron or nylon, or other relatively endless yarn. This yarn will be hereinafter referred to as the core material, since it is the center of the thread to be formed in accordance with this invention. Furthermore, in accordance with the present invention, it is provided with no twist or substantially no twist such as a very limited twist. The core material **16** is unwound from the cone **14** and passes over the same pulley **13** as the fiber **12**.

After passing over the pulley **13**, the fiber **12** comes in contact with a rotating drum **17** whose surface passes through a container **18** of silicone coating liquid. The liquid is carried by the drum and applied to the surface of the fiber **12**. Thereafter the fiber **12** passes into a tensioning device **19**.

The core material **16**, on the other hand, is not coated with the silicone material, but passes directly into a tensioning device **21**.

A Godet **22** comprising a large roller **23** and a smaller roller **24** is disposed below the tensioning devices **19** and **21**. The core material **16** and the fiber **12** are wound together on the Godet and pass off of the Godet as a single fiber **26** into the top ring **27** of a twisting device. Thereafter the fiber **26** passes through a twisting ring **28** and on to a spindle **29**.

Prior to being wound on the spindle **29**, fiber **12** is wound about the core material **16** in the manner shown in FIG. 2. Initially, as aforesaid, the fiber **12** is twisted with an S-twist or a Z-twist. In either case the fiber **12** is wrapped over the core material in such fashion as to completely encase the core material **16** with a layer of fiber **12**. Specifically, in accordance with the present invention, in the event the fiber **12** was originally provided with an S-twist, it is wound about the core material with a Z-twist movement, which is the situation shown for illustrative purposes in FIG. 2. In the event the fiber was originally provided with a Z-twist it is wound about the core material with an S-twist movement. Twisting the fiber about the core material in a direction opposite to the twist of the original fiber, it has been discovered, causes the fiber to completely encase the core material and a thread is thereby provided which has all of the desirable characteristics of both the staple fibers and the continuous filament yarn in a unique and novel combination thread.

The twisting of the fiber **12** upon the core material **16** may or may not put turns into the core material. The resultant thread may be made with relatively high integrity or it may be made with lesser integrity by using tensioned core material **16**, particularly Dacron, and un-

tensioned ends of cotton for the thread **12** run through the same twisting spindle and Godet.

While FIG. 2 shows only a single-ply material, i.e., a thread having one core bundle and one wrapping bundle, it may, under certain conditions, be desirable to provide a multi-ply thread in which two or more of the combination threads shown in FIG. 2 are twisted together to form a thicker, stronger, more complex thread. A machine for producing such a multi-ply thread is shown in FIG. 3, in which there are two cones **11** and **111** on which the staple fiber threads **12** and **112** are wound. Alongside the cones **11** and **111** are two cones **14** and **114** on which are wound the core material **16** and **116**. Both the threads **12** and **112** and the core materials **16** and **116** pass over a pulley **13**, after which the staple fibers **12** and **112** are silicone coated on rollers **17** which are run within silicone baths **18** and **118**. The coated fibers then enter tensioning members **19** and **119**, while the core material enters tensioning members **21** and **121** close by. The core material **21** and the fiber **19** are then wound upon a Godet **22**, while the core material **121** and the fiber **119** are wound upon a similar Godet **122**. Thereafter the combined fibers **26** and **126** from the Godets **22** and **122**, respectively, are twisted to form threads as shown in FIG. 2 and wound upon spindles **29** and **129**.

In order to produce a two-ply thread, the combination threads from the spindles **29** and **129** pass through tensioning devices **31** and **32** to a Godet **33** and from thence to a winding apparatus **34**, including a spindle **36** where the two combination threads are wound together to form a two-ply combination thread.

After being wound upon the spindle **36** the combination thread of the present invention indicated generally by the reference character **37**, passes around rollers **38** and through a heating chamber **39** which is electrically heated by current from a source **41**. The thread is then passed around rollers **42** and over the drum **43** which is rotating in a silicone bath **44**. There is thereby provided an additional coat of silicone material to the two-ply thread although it will be understood that this step is not essential to the present invention. Thereafter the two-ply thread passes over rollers **46** and is wound upon the cone **47**.

While the invention has been described in detail in connection with the method of manufacture thereof, it will be understood that it is in no way limited to the specifics set forth. The description is merely for illustrative purposes and should not be construed to limit the invention or the scope of the appended claims.

We claim:

1. A combination sewing thread comprising a core material of relatively inelastic, endless, continuous filament yarns having substantially no twist and enwrapped by a stable fiber thread having an initial twist in one direction said staple fiber thread being wrapped around said yarns in the opposite direction from said initial twist.

2. A combination sewing thread comprising a core material of relatively inelastic, endless, continuous filament yarns having no twist and enwrapped by staple fiber thread having an initial twist in one direction, said staple fiber thread being wrapped around said yarns in the opposite direction from said initial twist.

3. A combination sewing thread comprising a core material of substantially inelastic continuous filament yarns having substantially no twist and enwrapped by cotton thread having an initial twist in one direction said cotton thread being twisted on said core material in the opposite direction from said initial twist.

4. A combination sewing thread comprising a core material of substantially inelastic continuous filament yarns having substantially no twist; and a staple fiber thread wrapped around said core material, said stple fiber thread having an initial twist in one direction, said staple fiber thread being wrapped around said core material in the opposite direction from said intial twst.

5. A combination sewing thread comprising a core material of substantially inelastic continuous filament yarns having substantially no twist; a staple fiber htread wrapped around said core material, said staple fiber thred having one direction of twist prior to being wrapped around said core material and being wrapped in the opposite direction; and a layer of silicone on said staple fiber thread.

6. A combination, sewing thread comprising a core of tensioned Dacron fibers having substantially no twist; and a wrapping thread wrapped around said Dacron fibers in one direction, said wrapping thread comprising untensioned cotton fibers having an initial twist in the opposite direction.

7. A combination sewing thread comprising a core material of polyester fibers having substantially no twist and a thread of natural cotton wrapped around said core material in one direction, said cotton having an initial twist in the opposite direction.

8. A combination sewing thread comprising first and second plies, said first ply comprising a first core of substantially inelastic continuous filament yarns having initially, substantially no twist; a first staple fiber thread wrapped around said core material, said staple fiber thread having initially one direction of twist prior to being wrapped around said core material and being wrapped around said core material in the opposite direction; said second ply comprising a second core material of substantially inelastic continuous filament yarns having substantially no twist; and a second staple fiber thread wrapped around said core material and having initially one direction of twist prior to being wrapped around said second core material and being wrapped in the opposite direction around said second core material, said first and second plies being twisted together.

9. The process of forming a combination sewing thread comprising the steps of enwrapping a staple fiber thread twisted in one direction around a substantially inelastic continuous filament yarn by twisting said staple fiber thread around said yarn in a direction opposite to the direction of twist of said staple fiber thread.

10. The process of claim **9** comprising the additional step of coating said staple fiber thread with silicone prior to wrapping said staple fiber thread around said continuous filament yarns.

11. The process of forming a combination sewing thread comprising the steps of enwrapping a staple fiber thread twisted in one direction around a substantially inelastic continuous filament yarn having substantially no twist by twisting said staple fiber thread around said yarn in a direction opposite to the direction of twist of said staple fiber thread.

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