July 2, 1935. C. K. DUNLAP 2,006,797

THREAD CORE

Filed April 17, 1934

FIG. 2.

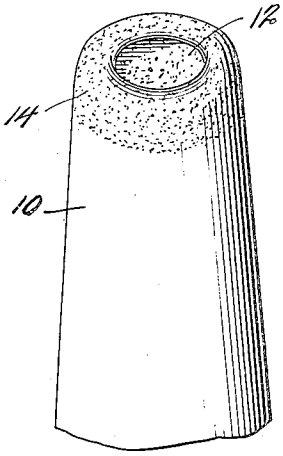


FIG. 1.

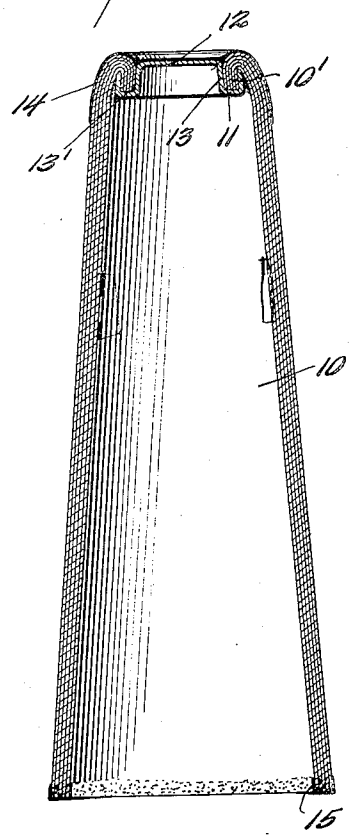


FIG. 3.

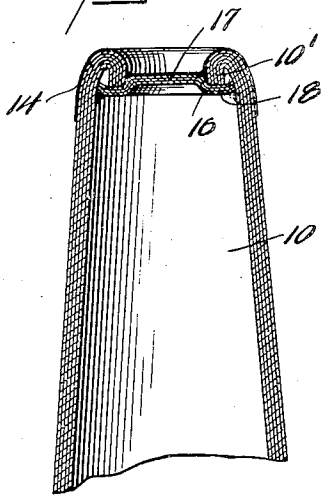


FIG. 4.

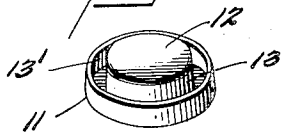
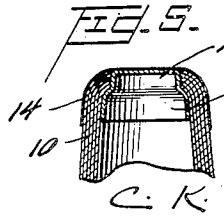


FIG. 5.



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THREAD CORE

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Application April 17, 1934, Serial No. 721,038

5 Claims. (Cl. 242—122)

The present invention relates to cores for thread packages and particularly to tubular cores of paper, preferably slightly conical such as are used in large numbers in the textile industry as supports for packages or windings of silk, rayon, cotton, or other thread.

The type of paper core most commonly used is formed by winding a sheet or blank of paper on a mandrel until a cylindrical or slightly conical tube is built up, the wall of the tube being several plies in thickness. Generally the tube is trimmed to the exact length desired while still on the mandrel upon which it has been formed and while the paper is still soft by reason of the presence of the unhardened adhesive which is employed to secure the several plies or laminations together. Short sections are removed from the ends of the tubular body by cutting knives so that the tube end surfaces lie in parallel planes, the tube being open at both ends. After removal of the core or tube from the mandrel, it is permitted to dry, and subsequent to the drying operation one end of the tube is subjected to a rounding and polishing operation as by forcing the same against a rapidly rotating die or to a rounding operation performed in some other manner, as by burning away such portions of the end as are necessary to insure that a perfectly smooth surface results. It will be appreciated that in unwinding a package of thread from a core such as just described, the thread is continuously removed by being drawn axially from the core and that it is essential that that end of the core past which the thread moves as it is being unwound shall be quite smooth so as not to catch the thread and cause breakage.

A paper tube constructed by a winding operation as just described possesses, after it has been dried, a very substantial mechanical strength, quite sufficient under ordinary circumstances for the purpose intended. In use, however, tubes of this kind are generally surrounded by a highly humidified atmosphere such as exists in textile mills, and the moisture of the atmosphere tends to penetrate, and does so penetrate, the paper laminations of the thread core, which naturally tends to soften the paper and to weaken the core. In every case where the paper fibers of the core have been distorted at one end in the polishing operation, the action of the moisture upon such distorted fibers is such as to cause the fibers to swell and to tend to return to the positions which they originally occupied, thus nullifying the effect of the polishing operation and causing the end of the core to become roughened and form obstructions to the free withdrawal of the thread.

Various methods have heretofore been suggested for preventing the swelling of the distorted fibers at the polished ends of tubular paper thread cores such as coating with enamel, capping with metal, and the like. The present invention contemplates a thread core of novel character in which means is provided for strengthening the end of the core past which the thread is drawn as a thread package mounted on the core is unwound. The improved core comprises, in addition to the open-ended paper tube, a separately formed and applied reinforcing and supporting member, which may be of metal or fibrous material and which is inserted within the tube and caused to engage the inner wall thereof closely adjacent the end. The added reinforcing member preferably comprises a central disc-like portion, which forms a closure for the end of the tube, and an annular flange integral with the disc which engages the inner wall of the tube in such manner that the added member is firmly secured in position. The tube end is greatly strengthened radially by the added member, which member in its preferred form also comprises a seal for the tube end. It is not easily dislodged and in fact cannot accidentally become dislodged by reason of the fact that it is wholly enclosed within the tube.

The supporting member is particularly advantageous when applied to open-ended tubes, one end of which has been inturned during the polishing operation. In such case the supporting and reinforcing member is so designed, constructed, and applied as to embrace and enclose the inturned end surface of the tube and to seal off this surface and render it inaccessible to water vapor. It will be appreciated that water penetrates more readily into the fibers at the tube ends than it does through the side wall surfaces because of the manner in which the fibers are disposed in the original formation of the paper sheet from which the tube is formed. By effectively sealing off the end surfaces of the tube or core, the rate of penetration of water into the fibers of the paper is therefore greatly retarded. Preferably I seal off both end surfaces of the tube, one such annular surface being sealed by the application of the member just referred to and the other by a coating operation, as by dipping in paraffin or the like. A tube so constructed, and especially when waterproof paste has been utilized to secure its various laminations together, will retain its mechanical strength to a remarkable degree, even

when surrounded by a highly humidified atmosphere for a long period of time.

It is frequently desirable to apply to that end of the tube past which the thread passes in an unwinding operation a coating of lacquer or enamel and, in accordance with the present invention, this practice may be continued, the polished or rounded end of a tube constructed as just described being given a final coating, the lacquer or enamel presenting a smooth shiny surface to the thread and likewise preventing the direct penetration of moisture into the underlying paper fibers. As a final step, therefore, a tube constructed in accordance with this invention may be given the lacquer or enamel coating, the disc-like closure at the tube end also being coated in such operation. By reason of its presence, the lacquer does not penetrate into the interior of the tube, and it is found that considerably less lacquer is required to coat the end of a tube so constructed than is required in the coating of the end of an ordinary open-ended tube. The reinforcing and supporting structure likewise provides a surface upon which an identifying label may be placed.

Various forms of the invention are contemplated, and several forms are illustrated in the accompanying drawing by way of example. One skilled in the art will readily perceive the applicability of the invention in the fabrication of tubes or cores which vary somewhat in shape and construction from those actually shown.

In the drawing:

Figure 1 is an axial section through a paper core having the novel reinforcing and supporting element positioned at one end;

Figure 2 is a perspective view of the upper end of the core so constructed;

Figure 3 is a partial axial section through a core to which a somewhat different form of reinforcing device has been applied;

Figure 4 is a perspective view of one form of reinforcing member; and

Figure 5 is an axial section through one end of a somewhat different type of core and to which a modified form of reinforcing element has been applied.

As previously set forth, the body of the paper core indicated at **10** is preferably formed by winding a sheet of paper on a mandrel, the wall of the tube or core being several plies in thickness, the various plies being secured together by a suitable paste, desirably a waterproof paste. After the ends of the core thus wound have been trimmed off, it is allowed to dry. After being dried, the small end of the tube, which is preferably slightly conical as shown, is pressed against a rapidly rotating polishing die, the end of the tube being distorted and inturned as shown in Figures 1 and 3.

Next the reinforcing member, indicated generally at **11**, is applied, this member being inserted through the large end of the core and pressed into the position shown. The reinforcing member comprises a central disc-like part **12** and a flange **13** which may be designated a grooved annular element since it is so formed as to have an annular groove **13'** adapted to receive the inturned annular edge **10'** of the tube. Preferably I apply a suitable glue or paste either to the reinforcing member **11** or to the annular edge **10'** of the tube before member **11** is positioned, as shown in Figure 1, in order that this member may be positively secured in position. In some instances, however, the application of glue is not necessary as the frictional engagement of the tube and reinforcing member is sufficiently great to prevent displacement of such member. If glue or paste is used, it is preferably of waterproof nature so that the inturned edge **10'** of the paper tube is not only enclosed by the metallic supporting member but is coated with a layer of waterproof glue. At all events it is effectively sealed off from the atmosphere, and penetration of water into the fibers at this point is entirely prevented. Subsequently the end of the tube may be dipped in lacquer or enamel, and a coating of this substance is indicated at **14**. Obviously, where the disc **12** is imperforate, the lacquer coats the outside face of the disc and no lacquer penetrates within the tube. In order that the opposite end surface of the tube also be made resistant to the penetration of water, it may be coated with a suitable water-resistant coating material, such for instance as paraffin, a paraffin coating being indicated at **15** in Figure 1.

A thread core thus constructed is very durable and rugged, the member **11** greatly strengthening the small end of the core and likewise sealing off the surface of the inturned edge against water penetration. It likewise prevents return of the inturned edge to its original position if sufficient moisture should penetrate through the wall of the tube to create a tendency for it to do so. It has been found that the coating of lacquer is in itself not sufficient to prevent straightening out of the distorted paper fibers under the influence of moisture, the lacquer being frequently broken or fractured under such conditions and where no supporting and reinforcing member is provided. In some instances a reinforcing member of hard paper or other fiber may be utilized as distinguished from a sheet metal member such as indicated at **11**. A paper or fiber sealing and supporting member is indicated at **16**, this member also preferably comprising a central disc-like portion **17** and an annular flange **18** integral therewith, the annular flange engaging the end surface of the inturned portion of the tube. Where a member **16** of paper or fabric is used, it is preferably held in position by a strong paste or adhesive applied in generous quantities.

In Figure 5 a form of tube is disclosed in which the polishing or rounding operation is so conducted that the end of the tube is inturned but not so fully as in the case of the tube shown in Figures 1, 2, and 3. In such case a cup-shaped sealing and supporting member such as indicated at **20** may be applied. The lower part of flange **21** of this member may be expanded slightly to engage the wall of the tube just below the inturned end so as to frictionally or positively lock the member in the position shown, or if desired it may be secured in position by a suitable adhesive. The upper part of flange **21** is generally cylindrical and fits snugly against the annular end surface of the tube, as shown. The end of the tube and the outer surface of the sealing and supporting member are preferably coated with enamel. Other forms of the invention may be readily devised in adapting the same to tubes of different forms and constructions. Preferably the central portion of each of the supporting members is imperforate, but this is not essential in all cases.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A core for thread packages comprising a

paper tube having an inturned annular edge portion at one end and a separately formed annular element secured within the tube, said element having a groove formed therein, the annular edge of the tube being positioned within said groove, for the purpose set forth.

2. In a core for thread packages, in combination, a paper tube having an annular inturned edge portion at one end, a separately formed annular element secured within the tube and engaging said edge, and an imperforate disc secured to said element and closing the tube.

3. A core for thread packages comprising, in combination, a paper tube having an annular inturned portion at one end, a separately formed annular element secured within the tube and extending around and engaging the end surface of said inturned edge, and an imperforate disc formed integral with said element and closing the tube, said disc being disposed closely adjacent the tube end.

4. A core for thread packages comprising a paper tube having an inturned annular end portion, a member within the tube and extending transversely thereof, said member being imperforate and having a portion which has continuous sealing engagement with the wall of the tube and a portion which has continuous sealing engagement with the edge surface of said inturned end portion.

5. A core for thread packages comprising a paper tube having an inturned annular end portion, an imperforate member within the tube and positioned adjacent said inturned end, said member having a substantially cylindrical portion which has continuous sealing engagement with the wall of the tube and a second substantially cylindrical portion of reduced diameter integral therewith which has continuous sealing engagement with the edge surface of said inturned end portion.

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