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Gavere et al.

[11] **3,799,470**

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[54] **LONG YARDAGE TAPE CORE ASSEMBLY**

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[73] Assignee: **Minnesota Mining and Manufacturing Company,** St. Paul, Minn.

[22] Filed: **Sept. 11, 1972**

[21] Appl. No.: **287,989**

[52] **U.S. Cl.** ..... **242/68.5,** 242/68, 242/72 R

[51] **Int. Cl.** **B65h 75/02,** B65h 75/24

[58] **Field of Search** 242/68, 68.5, 72, 125, 242/125.1, 58, 1

[56] **References Cited**

UNITED STATES PATENTS

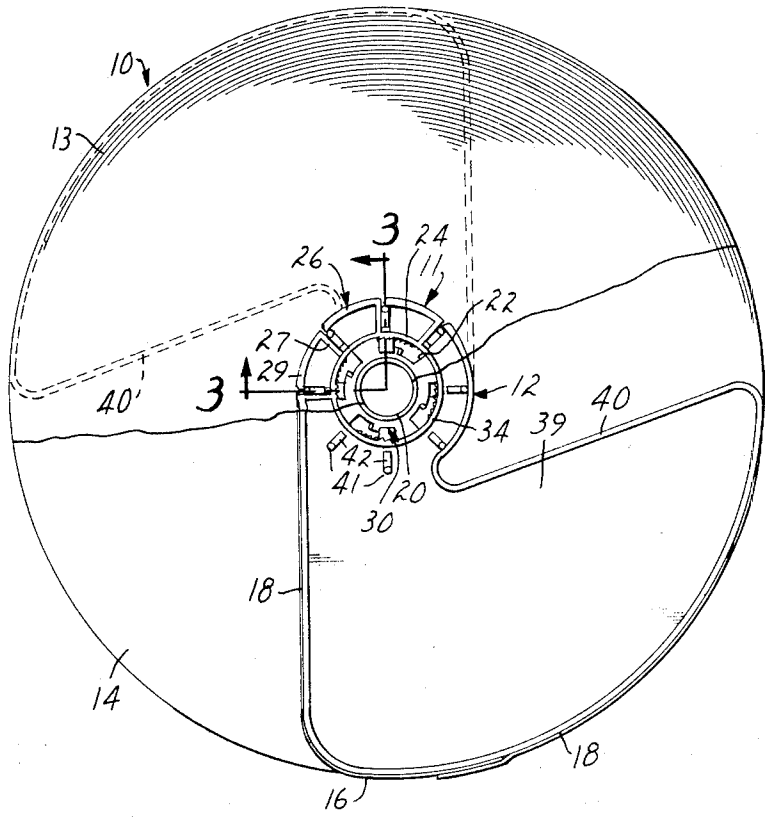
956,284 4/1910 Chaffe 242/125

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[57] **ABSTRACT**

An assembly fabricated for supporting a plurality of rolls of tape spliced together to form a continuous usable long yardage tape supply package. The assembly comprises a plurality of cores and connecting support members. The cores are formed to be inserted within a radially wound roll of tape and expanded to securely engage the inner convolutions. A support member is coupled to the core in an axially aligned position. The support member has a surface extending generally tangential to the surface of the core supporting the roll of tape. Upon this surface may be placed a length of tape which joins the inner convolutions of a first roll of tape to an outer convolution of a second adjacent roll of tape.

5 Claims, 6 Drawing Figures



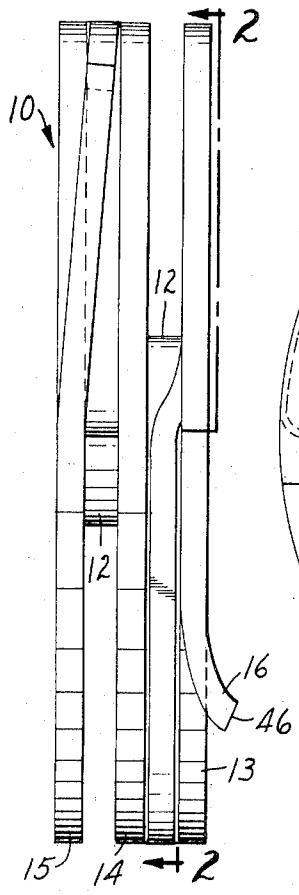


FIG. 1

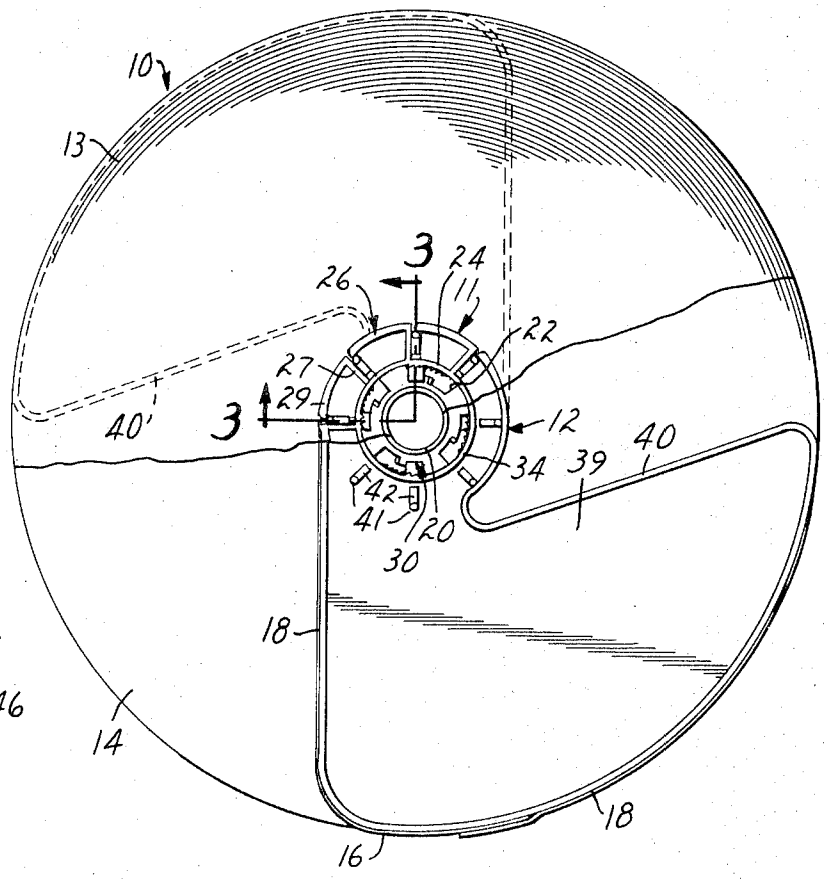


FIG. 2

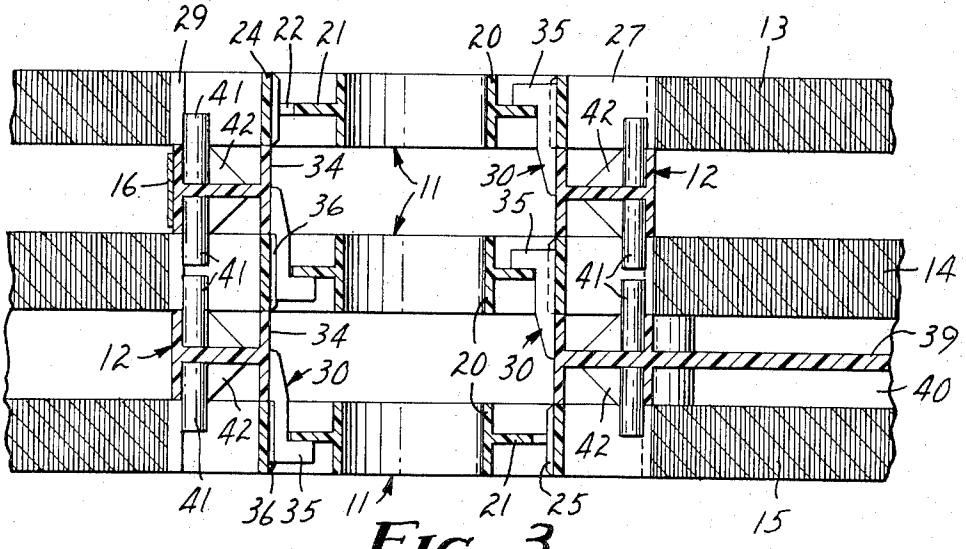


FIG. 3

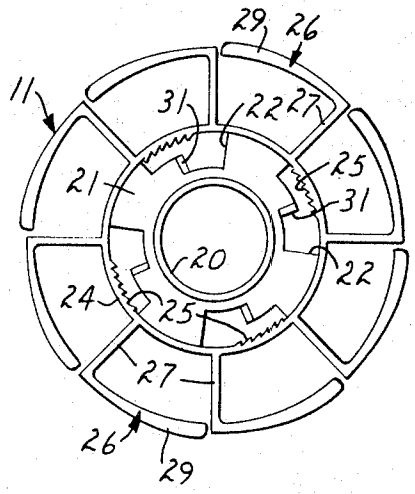


FIG. 4

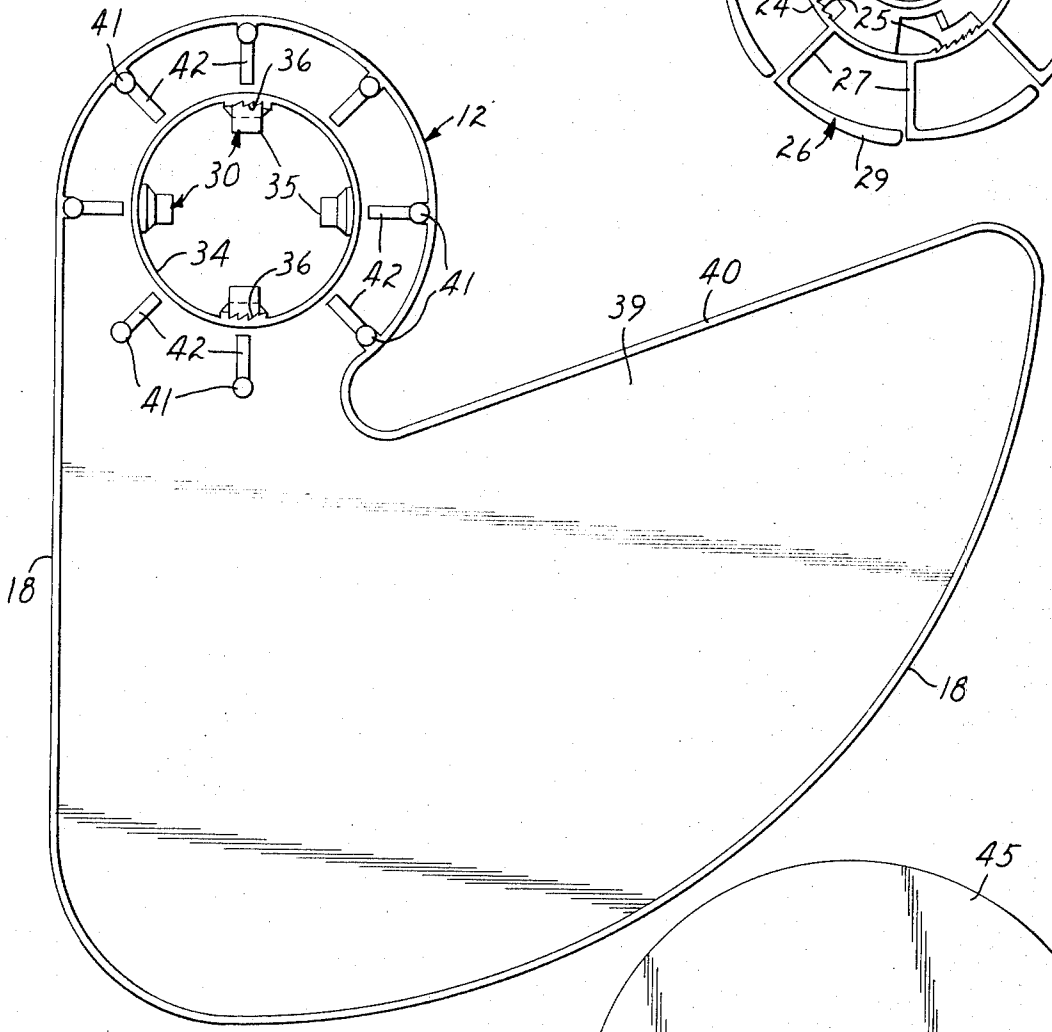


FIG. 5

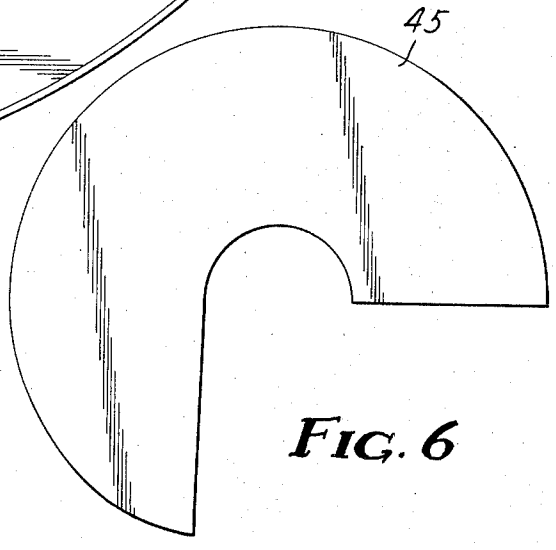


FIG. 6

LONG YARDAGE TAPE CORE ASSEMBLY

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to a tape support assembly designed to be easily assembled together with a plurality of rolls of radially wound tape to form a long yardage tape package.

The present invention comprises a novel core which may fit within a radially wound roll of tape and be expanded into snug fitting engagement with the inner convolutions of tape of the roll. Formed for connection to the core and for expanding the core into the roll is the support member which joins a pair of cores and has a surface upon which a length of adhesive tape is placed which connects the inner convolution from a first roll of tape to an outer convolution of the second roll of tape, which length is from one or both rolls and splied, such that the entire length of tape may be withdrawn without an interruption and without slack or over travel resulting as the tape is drawn from one roll and then the other.

This assembly provides a structure which is easily fabricated for carrying out the invention claimed in a copending application of Robert C. Mix, filed on the same date as this application and identified as Ser. No. 288,014, attorney docket No. 27,236.

The present invention makes the fabrication of the tape package facile in that the cores may be placed in the rolls of tape, then the support member is placed in position over the tape roll and core and with a slight amount of relative rotation the support member and core are locked together and the core has been expanded into contact with the inner colvolutions of the roll of tape. Successive rolls of tape, cores and support members may continue to be assembled to provide a tape package of the desired length. Each support member locks the adjacent cores together and expands them against the tape roll.

SUMMARY OF THE INVENTION

The present invention provides a long yardage tape support assembly and comprises a plurality of tape cores and tape support members. The tape support members are joined between adjacent tape cores and form a transition surface upon which a length of tape may be supported joining the inner convolutions on the first roll of tape to the outer convolutions on the second roll of tape. The tape cores are designed to be inserted into a roll of tape in place of a winding core and to be expanded to firmly support a roll of tape. The tape cores are also provided with members which will lock a tape core to a support member. The support members are formed with locking members cooperating with those in the tape cores and with cam members, such that upon movement relative to the core, will cause said cores to expand into engagement with the inner convolutions of a radially wound roll of tape. As used herein, the term "radially wound" describes a tape web spirally wound upon itself on a common radial plane from an axis or radii emanating from a single axis.

BRIEF DESCRIPTION OF THE DRAWING

The accompanying drawing illustrates a long yardage tape package having a tape support assembly constructed according to the present invention and discloses the several parts of the assembly as will be more fully described hereinafter with reference to the drawing wherein:

FIG. 1 is an elevational view of the long yardage tape package;

FIG. 2 is a sectional view taken along the lines 2—2 of FIG. 1;

FIG. 3 is an enlarged sectional view taken approximately along the lines 3—3 of FIG. 2;

FIG. 4 is an end view of a core forming a part of the package;

FIG. 5 is an end view of a tape support member forming another part of the package; and

FIG. 6 is a reduced size end view of a filler member of the package.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The long yardage tape support assembly of the present invention is utilized in forming a tape package generally designated **10**, comprises a plurality of axially aligned tape cores **11** and a number of tape support members **12** which are positioned between cores. In the package **10**, three rolls **13, 14, 15** of tape **16** are formed into one package. These tape rolls may typically comprise pressure-sensitive adhesive tape **15**, ½ inch in width and 720 yards in length. The tape may be a filament reinforced tape and as presented in the package of the present invention make up a continuous ½ inch by 2,160 yard package.

The package is constructed by removing the cores of the pre-slit radially wound rolls **13, 14** and **15** of tape, by withdrawing one or two of the inside wraps of tape from the roll, and then placing a core **11** within the center of the roll. A tape support member **12** is then placed adjacent the roll **13** and is secured to the tape core. The tape support member has a transition surface **18** upon which the tape pulled from the inside of the roll **13** is placed to splice it with the tape on the outer convolution of the second roll **14.** The surface **18** forms a transition surface for the tape from the end of the first roll **13** around the surface **18** to the next outermost convolution of the next roll without any slack developing in the tape as it is unwound. The transition surface **18** has an axial width greater than the axial dimension of the tape or the tape supporting surface of a core **11.** In the illustrated embodiment with ½ wide tape, the transition surface **18** on the tape support member **12** is five-eighths of an inch in axial dimension. The next roll of tape **14** is then placed with the core **11** thereof in axial alignment with the core of the roll **13** and against the tape support member to which it is locked. Another tape support member **12** is secured to the second core **11** and the third roll of tape with its core **11** is positioned in axial alighment to complete the package. The tape from the inside wraps of the first and second cores are spliced with the outside wraps on the second and third rolls of tape respectively, by an underlap splice, as illustrated in FIG. **2,** or other splicing process adaptable to the requirements of the customer/manufacturer.

The tape cores **11,** see FIG. **4,** comprise a cylindrical central hub **20** surrounded by a radially extending web **21.** The web **21** is provided with a plurality of circumferentially spaced key-hole type slots **22.** A cylindrical flange **24** surrounds the outer peripheral edge of the web **21** and the slots **22.** The inner cylindrical surface

of the flange 24 adjacent the slots 22 is formed with ratchet teeth 25 which pitch away from the large end of the slot, i.e., the beveled edge of each tooth slopes from the cylindrical surface away from the large end of the slot and other edge has a generally radial position. Supported from and surrounding the outer cylindrical surface of the flange 24 is a tape supporting surface. The tape supporting surface is formed by a plurality of L-shaped members 26 affording a discontinuous cylindrical surface with each discontinuity being adapted such that at least a portion of each support surface portion being radially movable to engage and support the inner convolution of a wound roll of tape. The members 26 comprise a radially extending leg or support 27 and a cantilever supported circumferentially extending leg 29 which has an increased radial dimension at its free end defining a cam following inner surface opposite the tape support surface thereof.

The slots 22 formed in the web 21 of the core 11 accept a locking member 30 from the tape support member 12. Adjacent the enlarged portion of the slot 22 is a beveled surface 31 which will direct the head or short leg of the locking member 30 onto the surface of the web 21, drawing the tape support member 12 and the hub 11 in juxtaposed position.

The tape support member 12, as shown in FIGS. 3 and 5, is formed with a circular flange 34 on the inner peripheral edge of which are positioned four locking members 30. The diametrically opposed locking members extend in similar directions and in a direction opposite the other set of locking members. The locking members 30 are L-shaped as best shown in FIG. 3 and extend from the flange 34 in an axial direction. On the free end of the locking members 30 are hooks or heads 35 which extend through the slots 22 and radially projecting axially extending ribs 36 are formed on the outer radial surface to cooperate with the teeth 25 to hold the parts together. The heads 35 of the locking members 30 engage the side of the webs 21 axially opposite the tape support member 12 and the teeth 36 engage the teeth 25 on the inner cylindrical surface of the flange 24 after insertion of the members 30 through the slots 22 and relative rotation of the parts moving the heads 35 over the beveled surfaces 31. Surrounding the cylindrical flange 34 is a web 39 which supports an outer peripheral flange 40. The web 39 has a fan shape. The portion of the web surrounding the cylindrical flange 34 supports on each side a plurality of circumferentially spaced and axially extending parallel rods 41. Each rod on each axial side of the web 39 is reinforced with a gusset plate 42. The rods 41 are adapted to slide axially into the adjacent cores 11 beneath the legs 29 forming the discontinuities of the tape support surface of the cores. Upon relative rotation then of the tape support member 12 relative to the core 11 the rods 41 will urge the legs 29 radially outward into engagement with the inner convolution of the roll of tape.

The outer periphery of the flange 40 of the tape support member 12 defines the transition surface 18 as hereinbefore recited. This surface 18 extends tangential to the arcuate portion of flange 40 surrounding the flange 34 and is thus tangential to the tape supporting surface of the core 11 as defined by the outer cylindrical surfaces of each of the members 26. The tangential surface then joins an arcuate surface having a center coaxial with the center of the flange 34 and of the adjacent cores 11 to position the arcuate surface adjacent the outer convolution of a roll of tape, thus letting a length of tape join the inner convolution on one roll of tape and extend therefrom along the surface 18 and onto the outer convolution of the next adjacent roll of the tape.

In assembling a tape package 10 according to the present invention the inner cores of the pre-slit radially wound rolls are removed and the inside wrap or two of tape is pulled out to make a splice to the adjoining roll. A core 11 is inserted into the center of the wound roll. A tape support member 12 is then placed in position to insert the locking members 30 through the openings 22 in the web 21 of the core 11. The tape support member is then rotated through a slight angle to allow the ribs 36 to engage the ratchet teeth 25 on the inner cylindrical surface of the flange 24. The rods 41 simultaneously urge the legs 29 into firm supporting engagement with the tape roll 13. A fill or packing member 45, as shown in FIG. 6 and which may be formed of ⅝ inch corrugated paper, is then placed about the tape support member 12 to form a substantially complete supporting surface above the first roll of tape 13. The next roll of tape 14, with a length of tape withdrawn from the center of the roll 13 and a core 11 inserted into the roll 14, is placed on the first support member 12. The roll 14 and the core is then rotated and the second set of locking members 30 on the tape support member 12 secure the core to the first tape support member 12. The outer tape convolution is then unwound and smoothly and evenly placed over the surface 18 to join the tape length from the first roll 13 of tape. A second tape support member 12 is then locked to the core 11 of the second roll 14 of tape. The inner wrap of tape is placed along the tape transition surface 18 of the second tape support member. A packing member 45 is placed on the second roll 14 and the third roll 15 of tape 16 is placed upon the package. This roll and core are rotated to lock the third core 11 to the second tape support member 12. The outer convolution is unwound and the end is placed over the end of tape from the second roll in another underlap splice on the transition surface 18 to join the second tape roll 14 and this third roll 15. The three roll package is then completed. Packages of a greater number of rolls can be formed by continuing to add the support members and rolls of tape.

The customer receiving the package can place the cores 11 on a support shaft. The packing members will be removed and the tape can be unwound smoothly and continuously from the entire package by withdrawing an edge 46 on the outer convoluted surface of the roll 13. The underlap splices permit the tape 16 from one roll to lift the end of the tape from the second roll and peel it off the transition surface 18. Since the splices are disposed on the surface 18 the adhesive is not contaminated. The tape at the splice is usable in the tape applications and it is unnecessary, except in some specific applications, to cut the splice away. The entire length of tape is thus considered to be usable and no interruption in the tape feed needs to be made.

The cores 11 and support members 12 can be molded and a suitable material is medium impact polystyrene.

Having disclosed the present invention with reference to the preferred embodiment shown in the accompanying drawing, it is understood that structural modi-

fications may be made without departing from the spirit of the invention as set forth in the appended claims.

What is claimed is:

1. A fabricated long yardage tape support assembly comprising:

a plurality of axially aligned tape cores, each said tape core including a hub, a web surrounding and supported by said hub, a flange on said web, and means supported by said flange defining a tape supporting surface surrounding said flange, said means defining said tape supporting surface including a plurality of surfaces spaced circumferentially and extending circumferentially about the common axis of said tape cores and movable radially to engage and support an inner convolution of a wound roll of tape,

tape support means disposed axially between adjacent ones of said cores for forming a transition surface for a length of tape which surface is generally tangential to said tape supporting surface of one core and extends outwardly from said one core to allow a said length of tape to join the outer convolution of a roll of tape on a next adjacent core, and

locking means for locking said cores and tape support means together in a rigid assembly, said locking means comprising cooperating engageable members on said core and on said tape support means.

2. A tape support assembly according to claim 1 wherein said tape support means comprises a circular flange, means supported by said flange defining said transition surface and a support for said transition surface, and axially projecting pins for engaging said means defining said tape supporting surface of a said core for moving said plurality of surfaces radially outward upon relative rotational movement of said core and said tape support means.

3. A tape support assembly according to claim 1 wherein said means defining said tape supporting surface of a said core comprises a plurality of circumferentially L-shaped members spaced each having one leg extending radially from said flange and the other leg extending circumferentially, said other leg having an increased radial dimension near its free end to define a cam following radially inner surface such that upon engagement with a relatively movable cam the short leg may be forced radially outward.

4. A tape support assembly according to claim 3 wherein said tape support means comprises a plurality of circumferentially spaced, radially positioned, axially extending pins engageable with said cam following radially inner surfaces of said L-shaped members such that relative rotational movement of said tape support means and a core to move said pins from a position adjacent said one leg toward the free end of said other leg biases said other leg radially outwardly.

5. A tape support assembly according to claim 1 wherein said locking means comprises an opening in said web and ratchet teeth on said flange at said opening of said cores, a plurality of L-shaped members having the longer leg extending axially from said tape support means and the shorter leg extending generally radially, said shorter leg forming a hook to extend through said opening and engage said web of a said core and said longer leg having teeth engageable with said ratchet teeth, such that relative rotational movement of said core and said tape support means places said shorter leg in engagement with said web and said ratchet teeth in engagement with the teeth of said longer leg.

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