Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2225103 C 2008/04/15

(11)(21) 2 225 103

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(22) Date de dépôt/Filing Date: 1998/01/28

(41) Mise à la disp. pub./Open to Public Insp.: 1998/08/06

(45) Date de délivrance/Issue Date: 2008/04/15

(30) Priorité/Priority: 1997/02/06 (US08/796,773)

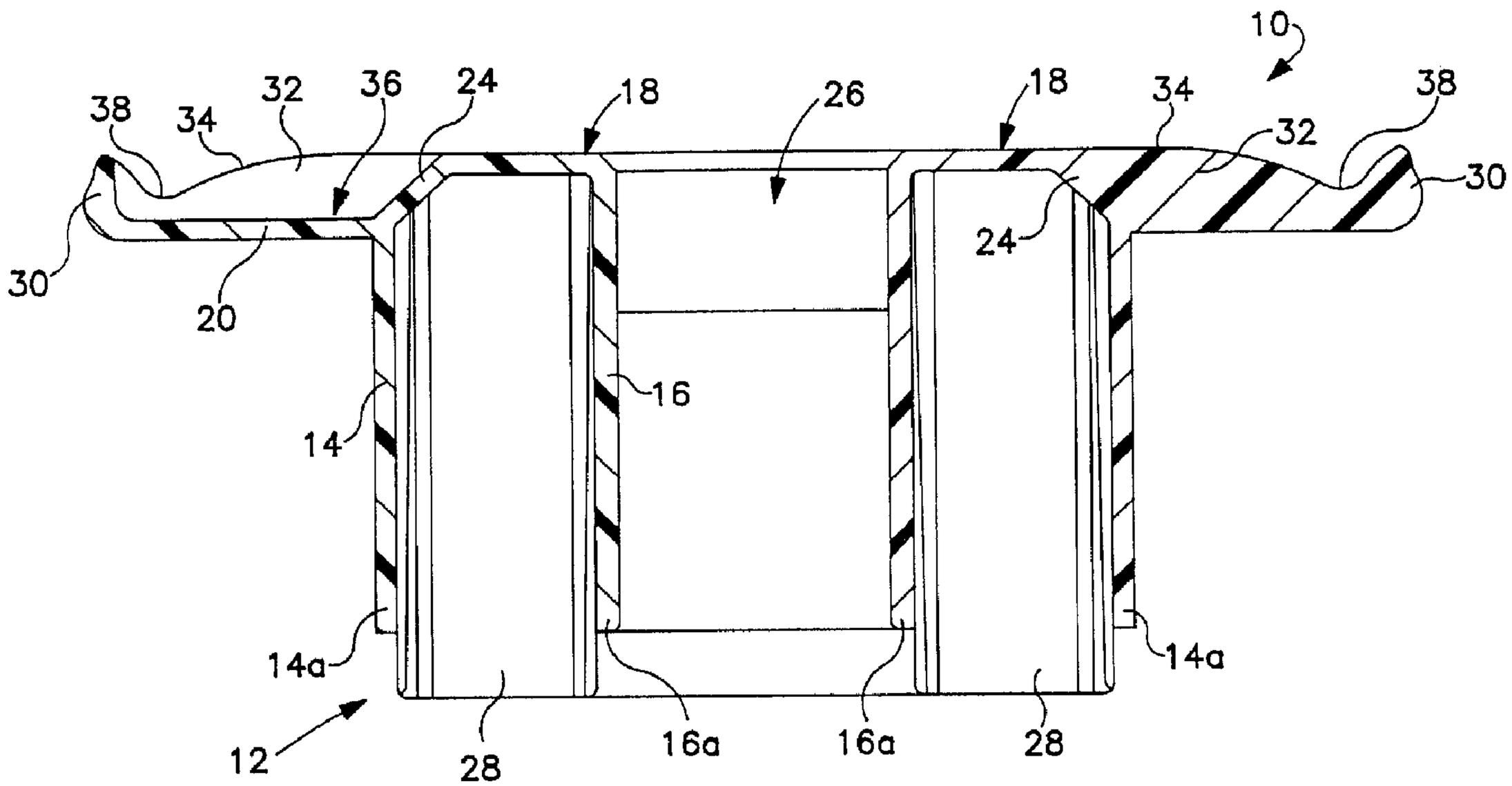
(51) Cl.Int./Int.Cl. *B65H 75/18* (2006.01), *B65H 75/14* (2006.01), *B65H 75/22* (2006.01)

(72) Inventeurs/Inventors:
DESROSIERS, VICTOR J., US;
AHRBERG, JOSEPH, US;
WILKINSON, JAMES, US

(73) Propriétaire/Owner:
SONOCO DEVELOPMENT, INC., US

(74) Agent: BORDEN LADNER GERVAIS LLP

(54) Titre : DEVIDOIR COMPRENANT DES SAILLIES DE SOUTIEN RADIALES SUR LA BRIDE
(54) Title: SPOOL HAVING RADIAL SUPPORT RIBS ON THE FLANGE



(57) Abrégé/Abstract:
The present invention relates to a reel for high speed winding or dereeling of cable, wire, or the like. The reel comprises hub having a cylindrical wall defining an outer barrel surface and an axial end wall suitable for the application of labels or indicia and a disk-shaped flange extending radially from the cylindrical wall adjacent the end wall. The flange has a radially extending rib disposed on the outer surface of the flange. The connection between the rib and axial end wall being within the radial extent of the cylindrical wall. In one form of the invention the hub further comprises an inclined wall connecting the cylindrical wall and the axial end wall, the rib being attached to the inclined wall.

Abstract

The present invention relates to a reel for high speed winding or dereeling of cable, wire, or the like. The reel comprises hub having a cylindrical wall defining an outer barrel surface and an axial end wall suitable for the application of labels or indicia and a disk-shaped flange extending radially from the cylindrical wall adjacent the end wall. The flange has a radially extending rib disposed on the outer surface of the flange. The connection between the rib and axial end wall being within the radial extent of the cylindrical wall. In one form of the invention the hub further comprises an inclined wall connecting the cylindrical wall and the axial end wall, the rib being attached to the inclined wall.

SPOOL HAVING RADIAL SUPPORT RIBS ON THE FLANGE

Background of the Invention

The invention pertains to a reel for holding wire, cable, or the like. In particular, the invention relates to a reel having a connection between the hub and flange which eliminates the direct transfer of force along the reinforcing ribs of the flange, preventing fracture of the flange at the connection.

Summary of the Invention

The present invention relates to a reel for high speed winding or dereeling of cable, wire, or the like. The reel comprises hub having a cylindrical wall defining an outer barrel surface and an axial end wall suitable for the application of labels or indicia and a disk-shaped flange extending radially from the cylindrical wall adjacent the end wall. The flange has a radially extending rib disposed on the outer surface of the flange. The connection between the rib and axial end wall being within the radial extent of the cylindrical wall. In one form of the invention the hub further comprises an inclined wall connecting the cylindrical wall and the axial end wall, the rib being attached to the inclined wall.

According to one aspect of the present invention there is provided a molded thermoplastic reel for retaining a coiled elongated strand, the molded thermoplastic reel comprising: an outer annular wall; an inner annular wall defining an inner hollow surface, the inner wall and the outer wall being coaxial and radially spaced from one another; and an axial end wall terminating in an angled portion,

the end wall connecting the inner wall to the outer wall, with the angled portion of the end wall communicating with the outer wall; a disc-shaped flange extending radially outward from and integrally formed with the outer annular wall, the flange having an outer surface positioned axially inward on the reel from the end wall; and a plurality of radially extending stiffening ribs disposed on the outer surface of the flange, the ribs extending radially inwardly to a position inward of the outer wall.

According to a further aspect of the present invention there is provided a reel comprising: a pair of disc-shaped flanges, each in combination with the axial end wall, as defined herein, wherein the inner annular wall and the outer annular wall extend the length of the reel, with the outer annular wall defining the barrel surface of the reel.

According to another aspect of the present invention there is provided a reel comprising: a central hub, the central hub having a cylindrical wall defining an outer barrel surface, the cylindrical wall extending the length of the central hub, the hub also having a pair of axial end walls at opposite ends of the barrel surface; a pair of annular flanges extending radially outward from and integrally formed with the barrel surface adjacent each axial end wall, each flange positioned axially inward from a corresponding end wall, each flange having an inwardly facing surface and defining with the barrel surface a strand winding area, each flange also having an outwardly facing surface; a pair of inclined annular walls, the inclined walls forming an integral connection between the cylindrical wall and the axial end walls, the connection with the axial end wall being radially inward and axially outward of the cylindrical wall; a plurality of radially extending stiffening ribs comprising uppermost and lowermost surfaces, the lowermost surface of the stiffening ribs disposed on and integrally formed with the outwardly facing surface of each of the flanges, the uppermost surface of the stiffening ribs terminating at the connection between the inclined annular wall and the cylindrical wall; a plurality of radially extending ribs integrally formed with and extending inwardly from the inclined annular walls, the ribs being angularly offset from the stiffening ribs; and the hub, flanges, ribs and inclined walls formed from a thermoplastic material.

According to a still further aspect of the present invention there is provided a molded thermoplastic spool for retaining a coiled elongated strand, the spool comprising: a central core, the core having an inner cylindrical wall defining a hollow space, an outer cylindrical wall positioned coaxially with the inner wall and

defining a wire supporting surface, the cylindrical wall extending the length of the central core, and a plurality of radial support ribs extending longitudinally between the inner cylindrical wall and the outer cylindrical wall, the space between the support ribs and the inner and outer walls being hollow; two axial end walls, one of the end walls attached to the inner wall at each end thereof, the end walls forming a planar surface which extends radially outwardly from the inner wall and perpendicular to the longitudinal axis; two radially extending support flanges, one flange positioned at each end of the central core, the flanges being attached to the outer cylindrical wall and extending perpendicular to the longitudinal axis and the wire support surface, the support flanges having an outwardly facing surface substantially parallel to the axial end walls; and a plurality of upstanding flange ribs integrally formed with and projecting axially away from the outwardly facing surface of the flange, the flange ribs extending radially inward from substantially the peripheral edge of the flange to at least the peripheral edge of the axial end wall and radially inwardly of the outer cylindrical wall of the central core and terminate radially outward of the inner cylindrical wall of the central core, the flange ribs securing the axial end wall to the outer cylindrical wall.

According to another aspect of the present invention there is provided a reel comprising: a central hub, the central hub comprising: an outer cylindrical wall defining an outer barrel surface; and an inner cylindrical wall defining a hollow shaft along a central longitudinal axis, the inner and outer cylindrical walls extending the length of the central hub, the inner and outer cylindrical walls being coaxial and radially spaced from one another; a pair of axial end walls at opposite ends of the barrel surface, the inner cylindrical wall defining a central opening within the axial end walls; a pair of annular flanges extending radially outward from and integrally formed with the barrel surface adjacent each end wall, each flange also having an outwardly facing surface with integral ribs disposed thereon; a pair of inclined annular walls the inclined walls forming, at opposite ends of the central hub, an integral connection between the outer cylindrical wall, the axial end walls, the adjacent flange and its corresponding flange ribs; a plurality of radially extending core ribs disposed on and integrally formed with the inwardly facing surface of at least one of the axial end walls and an inclined annular wall, the core

ribs disposed along the longitudinal axis, radially inward of the outer cylindrical wall of the central hub, and radially outward of the inner cylindrical wall of the central hub; the hub, flanges, core and integral ribs, and inclined walls formed from a thermoplastic material.

According to a further aspect of the present invention there is provided a reel comprising: a central hub, the central hub having a cylindrical wall defining an outer barrel surface, the cylindrical wall extending the length of the central hub, the hub also having a pair of axial end walls at opposite ends of the barrel surface; a pair of annular flanges extending radially outward from and integrally formed with the barrel surface adjacent each end wall, terminating at an axially outward extending flange lip, each flange having an outwardly facing surface; a plurality of radially extending ribs disposed on and integrally formed with the outwardly facing surface of each of the flanges; a pair of inclined annular walls, the inclined walls forming an integral connection between the cylindrical wall, the axial end walls and the ribs at each end of the hub; the top surface of each rib, in the area adjacent the inclined annular walls, is coplanar with the outwardly facing surface of the flanges, each rib gradually tapers toward the outwardly facing surface of the flange as it extends radially outwardly to a low point at a position radially inwardly of the flange lip; the rib continues to extend radially outwardly while tapering upwardly and away from the outwardly facing surface of the flange, integrally forming with the flange lip; and the hub, flanges, ribs and inclined walls formed from a thermoplastic material.

Additional features and advantages of the invention will become apparent to those skilled in the art upon consideration of the following detailed description of the preferred embodiment exemplifying the best mode of carrying out the invention as presently perceived. The detailed description particularly refers to the accompanying drawings.

Brief Description of the Drawings

Figure 1 shows a plan view of one-half of a reel according to one embodiment of the present invention;

Figure 2 is a cross-section of the reel half taken along the line 2-2 in

Figure 1;

Figure 3 is an enlarged fragmentary cross-section of a reel according to a second embodiment of the present invention; and

Figure 4 is an enlarged fragmentary cross-section of a reel according to a third embodiment of the present invention.

Detailed Description of the Drawings

In the drawings, where like numerals identify similar elements, there is shown a form of the invention which is presently preferred. In Figures 1 and 2 there is shown one-half of a reel which is generally designated by the numeral 10. A complete reel, on which wire, cable, yarn, or the like can be wound, is formed by joining two reel halves in an end-to-end manner, as described below in more detail.

Each reel half 10 includes a hub or central core 12 having an outer annular wall 14 and a concentric inner annular wall 16. The outer surface of the outer wall 14 functions as the barrel winding surface of the reel when the reel is assembled. An axial end wall 18 connects the inner annular wall 16 to the outer annular wall 14. A disk-shaped flange 20 extends radially from the outer annular wall 14 adjacent the axial end wall 18.

The reel half 10 is preferably fabricated as a unitary structure from a durable and strong, yet lightweight material, such as medium/high impact styrene. Of course, it is understood that the reel may be fabricated from any suitable material and could be formed as a multi-part assembly without departing from the scope of the present invention.

As best seen in Figure 2, the end wall 18 includes an inner planar disk-shaped portion and terminates in an angled portion 24. The disk-shaped portion extends radially from the inner annular wall 16 and provides a suitable surface for the application of labels or indicia (not shown). The angled portion 24 extends radially from the disk-shaped portion and connects with the outer annular wall 14.

The angled portion 24 is depicted as having an angle of 45° from the vertical. For a reel having a flange diameter of 630 mm, this angle provides sufficient area on the disk-shaped portion for the application of labels or indica while avoiding the high stress concentration geometry of conventional reels, as described below. Of course, for reels having a larger flange diameter (and a proportionately larger barrel diameter), the angle of the angled portion 24 can be increased and disc-shaped portion would still provide a suitable surface for the application of labels or indicia.

The inner annular wall 16 forms a shaft 26 by which the reel may be rotatably mounted on a support, axle, spindle, or the like, while cable or wire is wound or unwound from the reel at high speed. The end wall 18 is beveled at the entrance of the shaft 26 to facilitate receiving the axle or spindle.

A plurality of spaced internal ribs 28 (only two shown) extend radially between the outer annular wall 14 and the inner annular wall 16. The ribs 28 reinforce the reel by increasing its strength without substantially increasing its weight. Each internal rib 28 extends axially through the length of the hub 12 and protrudes past the edges 14a and 16a of the outer and inner annular walls 14 and 16, respectively. The protruding end of each internal rib 28 has a slight outwardly and convexly curved edge for facilitating frictional engagement with the outer annular wall of another half of the reel (not shown) to which the reel half 10 will be joined, as described below.

As best seen in Figure 1, a plurality of U-shaped recesses 42 are evenly spaced around the periphery of the central hub 12. The recesses 42 are formed in the end wall 18 of the central hub 12 in the vicinity of the angled portion 24. Each recess 42 includes a bottom wall 44, which is coplanar with the flange 20, and a upstanding wall 46, which extends around the periphery of the U-shaped recess 42, joining the bottom wall 44 and the end wall 18. As such, each recess 42 can be considered to be an extension of the flange 20 which extends radially inside the space defined by the inner wall 16 and the outer wall 14 of the central hub 12.

Each recess 42 is provided with a bore 48 formed in the bottom wall 44. A fastener, such as a bolt (not shown), can be received in each bore 40 for joining two reel halves.

A complete reel is formed as follows. Two reel halves 10 are connected so that the edges 14a and 16a of each reel half are adjacent each other. The protruding ends of the internal ribs 28 of each reel half 10 extend within the space formed between the inner and outer annular walls 14 and 16 of the other reel half. The reel halves are rotatably aligned so that each bore 48 of one of the reel halves is aligned with a bore of the other reel half. A suitable fastener, such as a bolt, is positioned in each bore 48 of one of the reel halves so it extends through the region between the inner and outer annular walls 14 and 16 of each reel half and protrudes through the aligned bore in the other reel half. The reel halves are then secured together by securing a complementary fastener, such as a nut (not shown), on the protruding end of each bolt.

The bolted construction of the reel enhances the possibility of reuse because damaged components can be easily replaced and all parts can be recycled. It is understood, however, that the two reel halves also may be joined by any suitable means known to those skilled in the art, such as adhesives, depending upon the size and the loading requirements of the reel. It will also be noted that the geometry of recesses 42 can be altered or the recesses eliminated altogether depending upon the geometry of the end wall 18 or the desired aesthetic requirements of the reel.

The flange 20 extends radially from the axial end of the outer annular wall 14 at the point where the outer wall meets the angled portion 24 of the end wall 18. The flange 20 includes an upturned outer peripheral wall 30 which extends around the circumference thereof. The inner face of flange 20 is a smooth planar surface. The flange 20 assists in the high speed winding and dereeling of the reel retaining a cable wound on the barrel 14.

It is necessary that the flange 20 be sufficiently stiff and rigid to minimize the deflection of the flange during high speed winding and dereeling, reducing

the possibility of trapping wire therein. Therefore, the outer face 36 of the flange 20 has a plurality of ribs 32 spaced evenly therearound to increase the stiffness of the flange 20 while maintaining a relatively low overall weight of the reel. The ribs 32 reinforce the flange 20 against the considerable compressive forces generated during the winding of a cable on the barrel 14 or caused when the flange 20 impacts a hard surface (such as when the reel is dropped) and which act on the flange 20.

Each rib 32 extends radially from the peripheral wall 30 of the flange 20 to the angled portion 24 of the end wall 18 except where a rib, such as rib 40, would intersect with a recess 42. The angled connection between the ribs 32 and the angled portion 24 allows the flange 20 to deflect when the flange impacts a hard surface, such as when the flange is dropped, and eliminates the direct transfer of force along the ribs 32 to the connection between the flange 20 and the barrel 14, reducing the probability of failure therebetween. Conventional reels typically have a transverse connection between the flange, the end wall, and the outer annular wall which is prone to catastrophic failure, since the impact force is transmitted directly by the flange rib to the connection between the flange and the outer annular wall.

It has been found that the angle of the angled portion 24 can range from 45° to 90° from vertical and still eliminate the direct transmission of force by the flange rib to the connection between the flange and the outer annular wall. The larger the angle the more effective the connection is at preventing catastrophic failure. However, an angle of less than 90° is chosen to assure that there is a suitable surface for the application of labels or indica on the disk-shaped portion of the axial wall 18.

The contour of each rib 32 is best seen in Figure 2. The top surface 34 of each rib 32 is coplanar with the disk-shaped portion in the vicinity of the angled portion 24 of the end wall 18. The rib 32 gradually tapers toward the outer face 36 in the direction toward the peripheral wall 30, until it reaches a low point 38. The rib 32 then tapers away from the outer face 36 until it meets

with the top edge of the peripheral wall 30. In this way the rib 32 is able to increase the strength of the flange 20 while maintaining a low relative weight.

The ribs 40 are similar to the ribs 32 except that the ribs 40 taper into the outer face 36 of the flange 20 before reaching the bore 48 and the bight of the upturned wall 46. This construction also eliminates the conventional transverse connection between the flange and barrel.

An intermediate rib 50 is provided between each rib 32 and 40. The rib 50 extends from the top edge 38 of the peripheral wall 30 and tapers toward the outer face 36 of the flange 20 at approximately a 45°angle (similar to the outermost part of rib 32 shown in Figure 2). The ribs 50, thus, serve to strengthen and stiffen the peripheral wall 30.

In Figure 3 there is illustrated a second embodiment of the present invention. The reel half 10' is similar to reel half 10 except that the end wall 18' of the central portion 12' includes only a disk-shaped portion which extends from the inner annular wall 16' to the location of the outer annular wall 14'. The relatively large disk-shaped portion is suitable for the application of labels or indicia.

The end wall 18' is not directly attached to the outer wall 14'. Instead, an opening 58 is formed between the outer wall 14' and the end wall 18'. This embodiment conforms to the situation where the angle of the flange connection is 90° from vertical. In this embodiment, however, the angled portion 24 has been replaced with the internal extension 54 of the rib 32', as described below.

The flange 20 extends radially from the axial end of outer wall 14'. Each rib 32' extends radially from the peripheral wall 30 to the outer wall 14' and includes a portion 54 which extends within the space between the inner and outer walls 14' and 16. The top surface 34 of the rib 32' is coplanar with the disc shaped portion. It is also contemplated that the portion 54 could also extend to the inner wall 16', as shown in phantom.

In Figure 4 there is illustrated a third embodiment of the present invention. The reel half 10'' is similar to reel half 10 except that the end wall

18'' of the central portion 12'' includes an angled portion 24'' which has a reduced cross-sectional thickness. The outer wall 14'' includes a portion which extends past the flange 20''. The angled portion 24'' extends between the disk-shaped portion of the end wall 18'' and the portion 14b of the outer wall 14. The reduced thickness of the angled portion 24'' reduces the overall weight of the reel.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification, as indicating the scope of the invention.

CLAIMS:

1. A molded thermoplastic reel for retaining a coiled elongated strand, the molded thermoplastic reel comprising:

an outer annular wall;

an inner annular wall defining an inner hollow surface, the inner wall and the outer wall being coaxial and radially spaced from one another; and

an axial end wall terminating in an angled portion, the end wall connecting the inner wall to the outer wall, with the angled portion of the end wall communicating with the outer wall;

a disc-shaped flange extending radially outward from and integrally formed with the outer annular wall, the flange having an outer surface positioned axially inward on the reel from the end wall; and

a plurality of radially extending stiffening ribs disposed on the outer surface of the flange, each rib having a low point, the ribs extending radially inwardly to a position inward of the outer wall.

2. The reel according to claim 1, wherein the angle of the angled portion is between about 45° and about 90° from vertical.

3. The reel according to claim 2, wherein the thickness of the angled portion is less than the thickness of the outer annular wall and the axial end wall.

4. The reel according to claim 2, wherein the plurality of ribs extend inwardly to a position radially outward of the inner annular wall.

5. The reel according to claim 4, wherein the plurality of the ribs are integrally formed with the flange and the axial end wall.

6. The reel according to claim 1, wherein the plurality of ribs extend radially inward of the inner annular wall and are attached to the inner annular wall.

7. The reel according to claim 1, wherein the plurality of the radially extending ribs are uniformly spaced around the surface of the flange.

8. The reel according to any one of claims 1 to 7, wherein the coiled elongated strand is a cable or a wire.

9. A reel as defined in any one of claims 1 to 8, wherein the reel comprises:

a pair of the disc-shaped flanges, each in combination with the axial end wall, wherein the inner annular wall and the outer annular wall extend the length of the reel, with the outer annular wall defining the barrel surface of the reel.

10. A reel comprising:

a central hub, the central hub having a cylindrical wall defining an outer barrel surface, the cylindrical wall extending the length of the central hub, the hub also having a pair of axial end walls at opposite ends of the barrel surface;

a pair of annular flanges extending radially outward from and integrally formed with the barrel surface adjacent each axial end wall, each flange positioned axially inward from a corresponding end wall, each flange having an inwardly facing surface and defining with the barrel surface a strand winding area, each flange also having an outwardly facing surface;

a pair of inclined annular walls, the inclined walls forming an integral connection between the cylindrical wall and the axial end walls, the connection with the axial end wall being radially inward and axially outward of the cylindrical wall;

a plurality of radially extending stiffening ribs comprising uppermost and lowermost surfaces, the lowermost surface of the stiffening ribs disposed on and integrally formed with the outwardly facing surface of each of the flanges, the uppermost surface of the stiffening ribs terminating at the connection between the inclined annular wall and the cylindrical wall;

a plurality of radially extending ribs integrally formed with and extending inwardly from the inclined annular walls, the ribs being angularly offset from the stiffening ribs; and

the hub, flanges, ribs and inclined walls formed from a thermoplastic material.

11. The reel according to claim 10, wherein the angle of the inclined walls is between about 45° and about 90° from vertical.

12. The reel according to claim 11, wherein the thickness of the inclined walls is less than the thickness of the cylindrical wall and the axial end wall.

13. The reel according to claim 10, wherein the hub further comprises an inner annular wall positioned radially inward of and extending coaxially within the barrel surface of the cylindrical wall, and wherein the stiffening ribs extend radially inward of the cylindrical wall while terminating radially outward of the inner annular wall.

14. A molded thermoplastic spool for retaining a coiled elongated strand, the spool comprising:

a central core, the core having an inner cylindrical wall defining a hollow space, an outer cylindrical wall positioned coaxially with the inner wall and defining a wire supporting surface, the cylindrical wall extending the length of the central core, and a plurality of radial support ribs extending longitudinally between the inner cylindrical wall and the outer cylindrical wall, the space between the support ribs and the inner and outer walls being hollow;

two axial end walls, one of the end walls attached to the inner wall at each end thereof, the end walls forming a planar surface which extends radially outwardly from the inner wall and perpendicular to the longitudinal axis;

two radially extending support flanges, one flange positioned at each end of the central core, the flanges being attached to the outer cylindrical wall and extending perpendicular to the longitudinal axis and the wire support surface, the support flanges having an outwardly facing surface substantially parallel to the axial end walls; and

a plurality of upstanding flange ribs integrally formed with and projecting axially away from the outwardly facing surface of the flange, the flange ribs extending radially inward from substantially the peripheral edge of the flange to at least the peripheral edge of the axial end wall and radially inwardly of the outer cylindrical wall of the central core and terminate radially outward of the inner cylindrical wall of the central core, the flange ribs securing the axial end wall to the outer cylindrical wall.

15. A spool as claimed in claim 14 further comprising two angled walls, each angled wall integrally formed with one of the axial end walls and the corresponding flange, the flange ribs also integrally formed with the angle walls.

16. A spool as claimed in claim 15, wherein the angled walls are formed at an angle of 45° degrees with respect to the longitudinal axis.

17. A spool as claimed in claim 15, wherein the peripheral edges of the axial end walls are radially inward of the position of the outer wall of the central core.

18. A spool as claimed in claim 14, wherein the flange ribs extend radially inward of the peripheral edge of the axial end walls while terminating radially outward of the inner cylindrical wall.

19. A spool as claimed in claim 18 further comprising two angled walls, each angled wall integrally formed with one of the axial end walls and the corresponding flange, the flange ribs also integrally formed with the angle walls.

20. A spool as claimed in claim 19, wherein the thickness of the angle walls is relatively less than the thickness of the inner and outer walls of the central core.

21. A reel comprising:

a central hub, the central hub comprising:

an outer cylindrical wall defining an outer barrel surface; and

an inner cylindrical wall defining a hollow shaft along a central longitudinal axis, the inner and outer cylindrical walls extending the length of the central hub, the inner and outer cylindrical walls being coaxial and radially spaced from one another;

a pair of axial end walls at opposite ends of the barrel surface, the inner cylindrical wall defining a central opening within the axial end walls;

a pair of annular flanges extending radially outward from and integrally formed with the barrel surface adjacent each end wall, each flange also having an outwardly facing surface with integral ribs disposed thereon;

a pair of inclined annular walls the inclined walls forming, at opposite ends of the central hub, an integral connection between the outer cylindrical wall, the axial end walls, the adjacent flange and its corresponding flange ribs;

a plurality of radially extending core ribs disposed on and integrally formed with the inwardly facing surface of at least one of the axial end walls and an inclined annular wall, the core ribs disposed along the longitudinal axis, radially inward of the outer cylindrical wall of the central hub, and radially outward of the inner cylindrical wall of the central hub;

the hub, flanges, core and integral ribs, and inclined walls formed from a thermoplastic material.

22. A reel comprising:

a central hub, the central hub having a cylindrical wall defining an outer barrel surface, the cylindrical wall extending the length of the central hub, the hub also having a pair of axial end walls at opposite ends of the barrel surface;

a pair of annular flanges extending radially outward from and integrally formed with the barrel surface adjacent each end wall, terminating at an axially outward extending flange lip, each flange having an outwardly facing surface;

a plurality of radially extending ribs disposed on and integrally formed with the outwardly facing surface of each of the flanges;

a pair of inclined annular walls, the inclined walls forming an integral connection between the cylindrical wall, the axial end walls and the ribs at each end of the hub;

the top surface of each rib, in the area adjacent the inclined annular walls, is coplanar with the outwardly facing surface of the flanges, each rib gradually tapers toward the outwardly facing surface of the flange as it extends radially outwardly to a low point at a position radially inwardly of the flange lip; the rib continues to extend radially outwardly while tapering upwardly and away from the outwardly facing surface of the flange, integrally forming with the flange lip; and

the hub, flanges, ribs and inclined walls formed from a thermoplastic material.

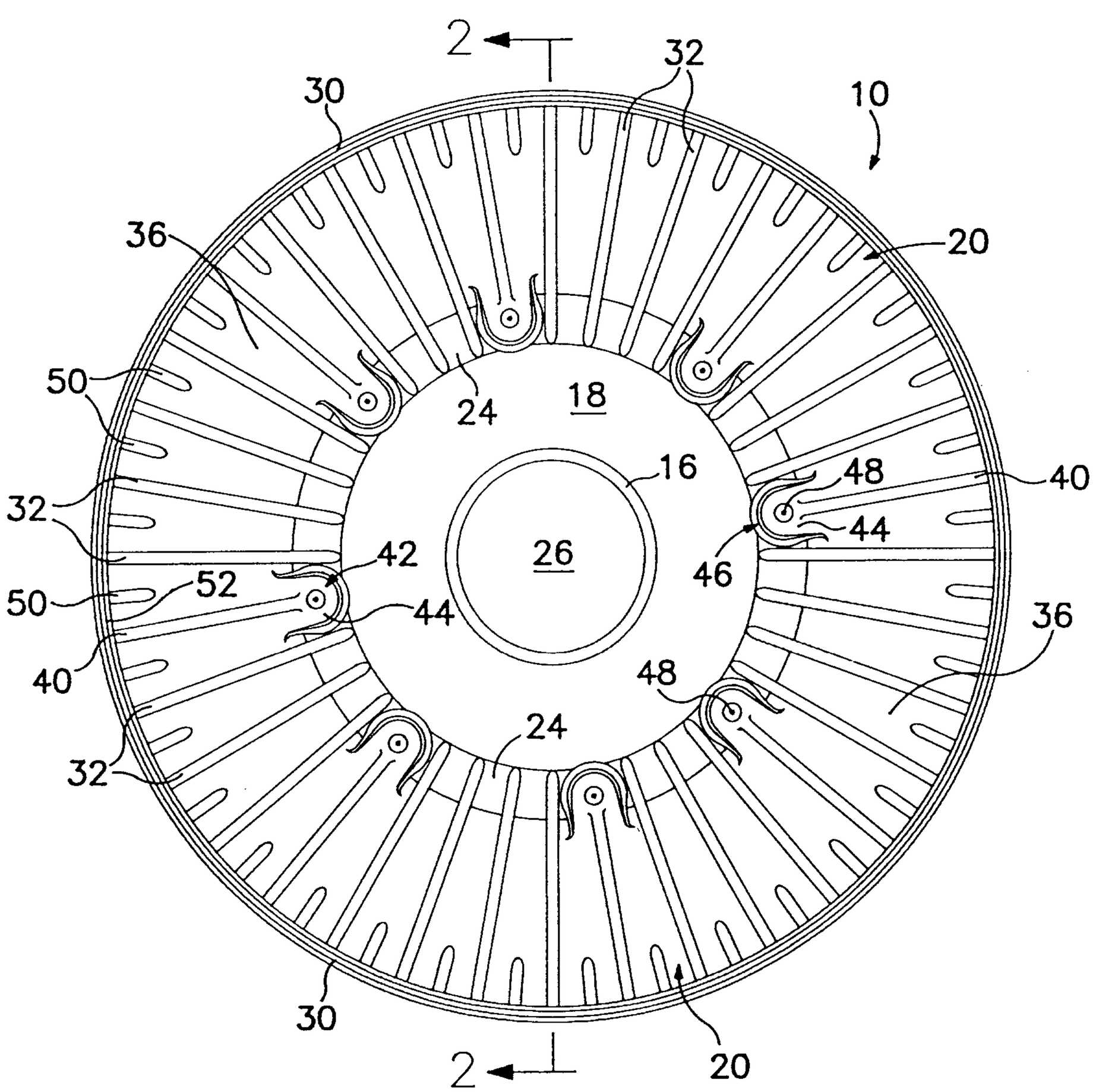


FIG. 1

Scott & Aylen

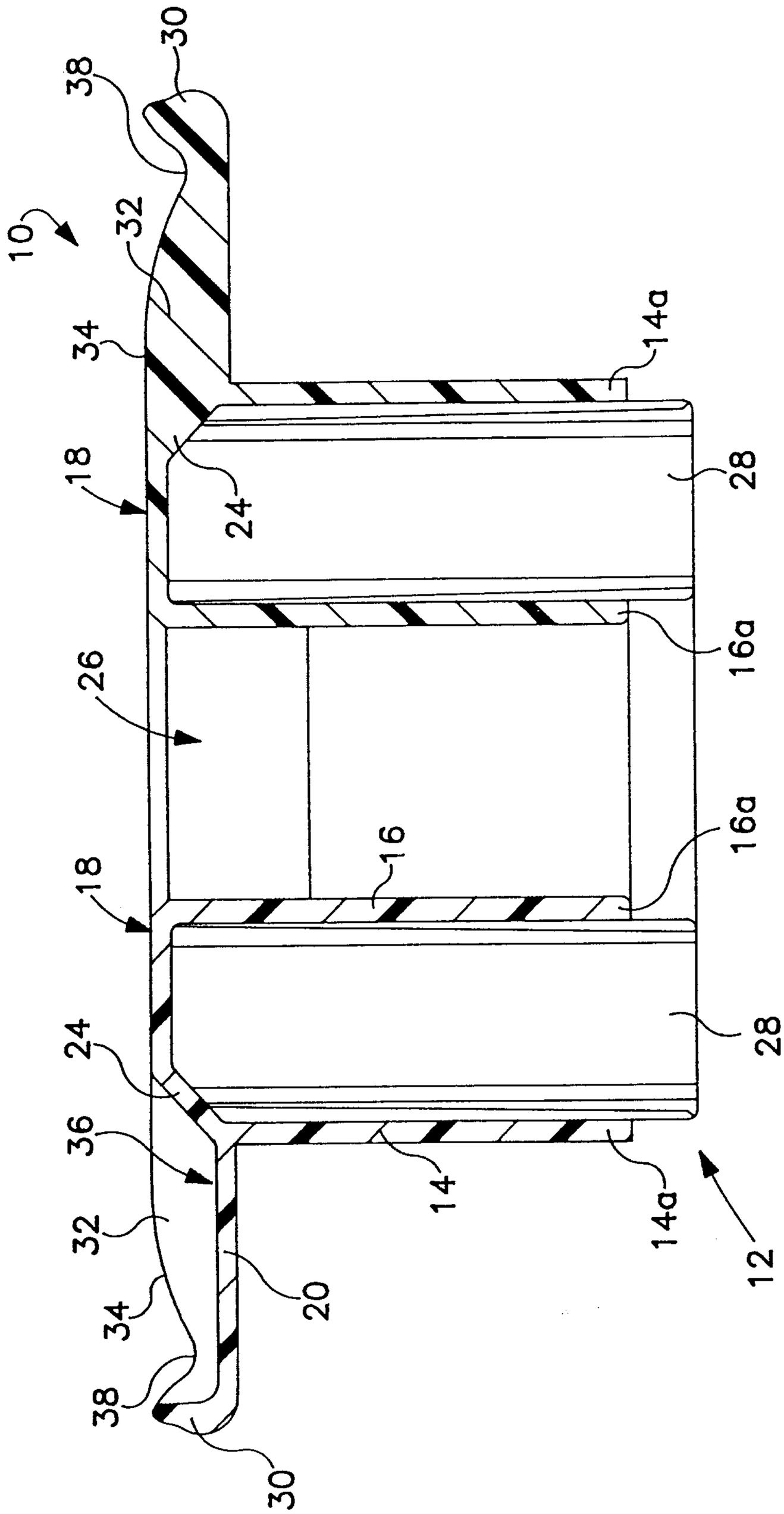


FIG. 2

Scott & Aylen

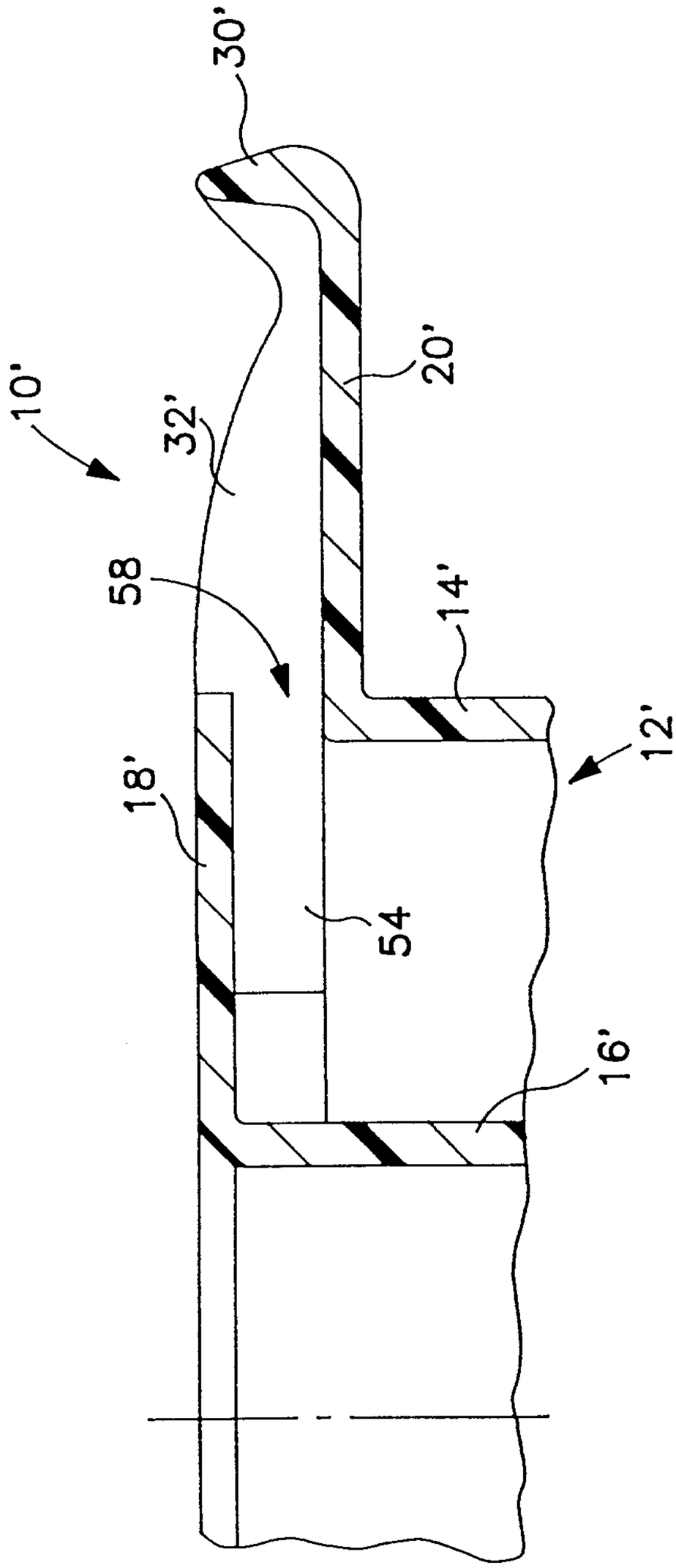


FIG. 3

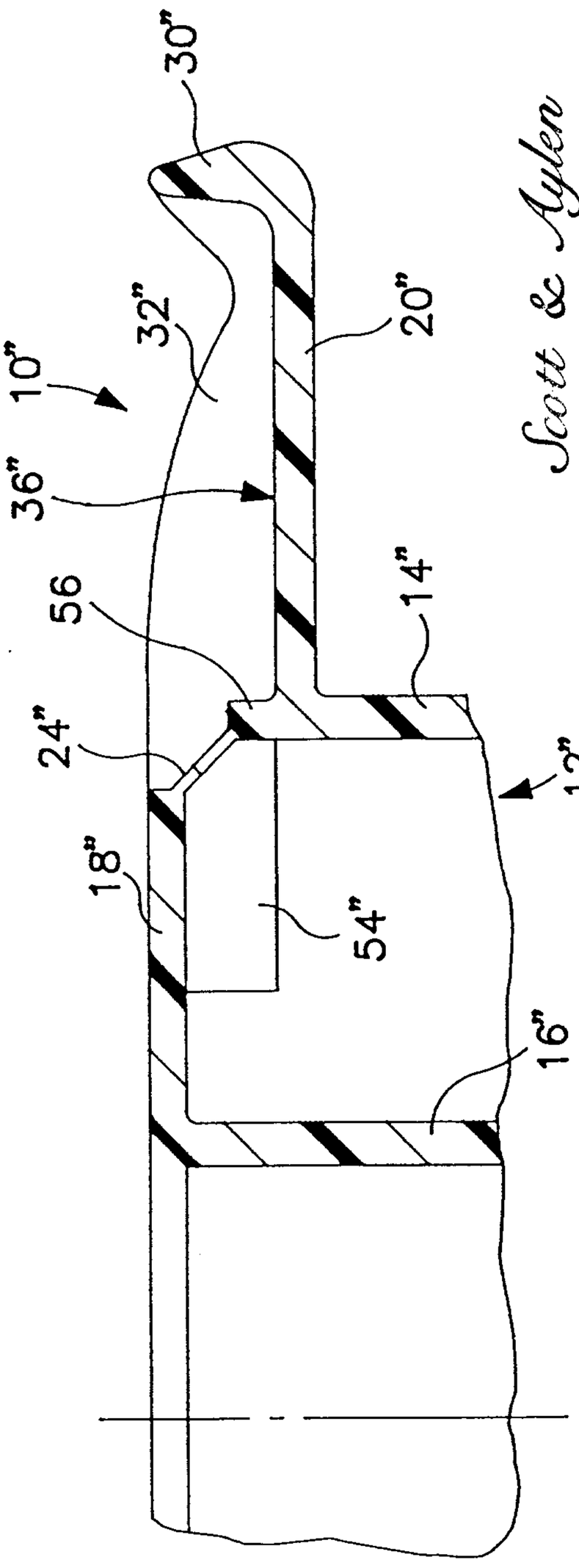
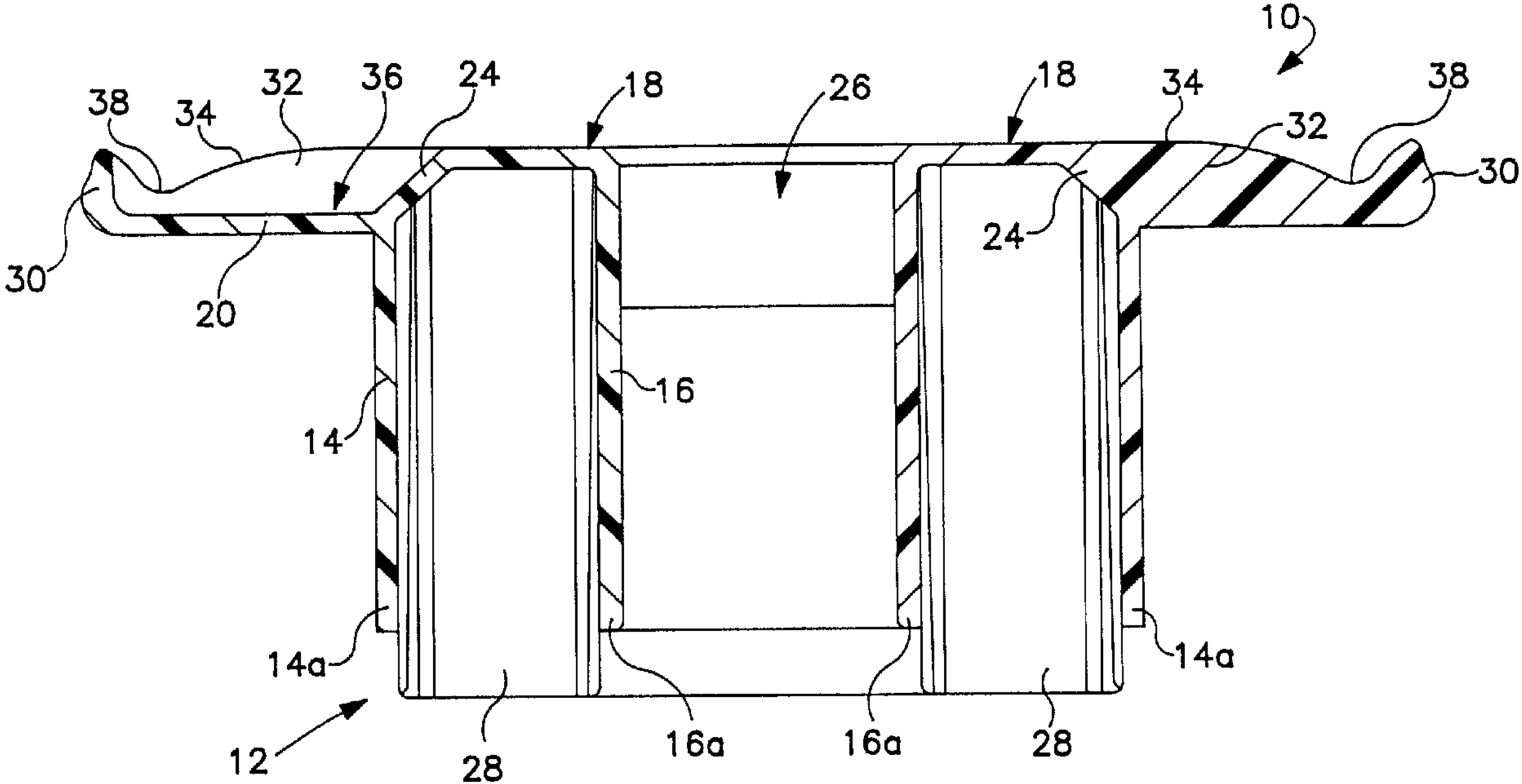


FIG. 4


10
38
34
32
36
24
18
26
18
34
32
38
30
30
24
20
16
14
14a
14a
12
28
16a
16a
28