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DESCRIPTION

Description

BACKGROUND

[0001] The invention relates generally to power-driven conveyors and more particularly to conveyor belts with detachable accessories.

[0002] For versatility, replaceability, or manufacturability, conveyor belts often include accessories that can be attached to and detached from the belts. Examples include sideguards, holddown tabs, flights, and roller assemblies. The accessories in modular conveyor belts are often retained by hinge rods used to interconnect the belt modules together at hinge joints. In that case installation or removal of the accessory requires partial disassembly of the belt.

[0003] CN 101 553 418 discloses a gapless side guard for use with a modular belt having modules connected to one another by pivot rods.

[0004] WO 2013/137719 A1 discloses a module for a modular conveyor, comprising a body part extending transversely to a direction, having a substantially closed, flat top surface and a bottom. On the top surface, a receiving provision is provided for coupling a mounting frame. The receiving provision is provided with one or more stop elements projecting relative to the top surface, with each stop element provided with a flange. The mounting frame is provided with one or more wings, with each wing configured to engage under a respective flange upon placement of the mounting frame on the receiving provision. The receiving provision and the mounting frame are configured for placement of the mounting frame on the module and removal from the module, respectively, in an insertion direction which is directed substantially transversely to the directions.

[0005] WO 2013/137719 A1 relates to an assembly of a module and a mounting frame for a modular conveyor, wherein the module comprises a body part extending transversely to a direction, having a substantially closed flat top surface and a bottom, wherein the body part at the front and rear, viewed in the direction, is provided with coupling elements and wherein the coupling elements of the module are couplable to coupling elements of similar modules successive in the direction, and wherein a receiving provision is provided for coupling the mounting frame, wherein the receiving provision comprises a quick coupling.

SUMMARY

[0006] A conveyor belt module embodying features of the invention comprises a module body and an accessory according to the subject-matter of claim 1.

[0007] In another aspect, a conveyor belt embodying features of the invention is defined in claim 12.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

FIG. 1 is an exploded view of a portion of a conveyor belt module and a plug-in sideguard embodying features of the invention;

FIG. 2 is an enlarged view of the side edge of the conveyor belt module of FIG. 1;

FIGS. 3A and 3B are axonometric views of the sideguard of FIG. 1 viewed from opposite sides;

FIGS. 4A and 4B are top plan views of the side edge of the conveyor belt module of FIG. 1 showing the sideguard in unlocked and locked positions;

FIG. 5A and 5B are axonometric views of the conveyor belt module of FIG. 1 looking obliquely down and up at the module;

FIG. 6 is a top plan view of a portion of a conveyor belt constructed of belt modules as in FIG. 1;

FIG. 7A is an axonometric view of another version of the plug portion of an accessory, such as a sideguard; and FIG. 7B is an axonometric view of the mating socket portion of the conveyor belt module;

FIG. 8A is an axonometric view of yet another version of the plug portion of an accessory; and FIG. 8B is an axonometric view of the mating socket portion of the conveyor belt module; and

FIG. 9A is an axonometric view of a threaded version of the plug portion of an accessory; and FIG. 9B is an axonometric view of the mating threaded socket portion of the conveyor belt module.

DETAILED DESCRIPTION

[0009] A portion of a conveyor belt module and accessory embodying features of the invention is shown in FIG. 1. The module 10 includes a module body 12 having a top side 14 and an

opposite bottom side 15 across the body's thickness. A socket 16 in the module body 12 opens onto the top and bottom sides 14, 15 of the module body. An accessory 18, a sideguard in this example, has a plug 20 that is sized to mate with and plug into the socket 16 in the module body 12.

[0010] The socket 16, shown in more detail in FIG. 2, is bounded by a wall 22-shown in this version as a circular cylindrical wall. But the wall could have another shape, such as polygonal, for example. A lug 24 extends radially outward from the wall 22 into the socket 16. In this example, the socket 16 has a rim 26 recessed slightly below the top side 14 of the module body 12. The rim 26 forms a ledge in which two detents 28 are formed diametrically opposite each other across the socket 16. In this example, the socket 16 is located at a side edge 30 of the module 10.

[0011] As shown in FIGS. 3A and 3B, the accessory 18 has a sideguard appendage 32 upstanding from a circular base 34. The plug 20 extends downward from the base 34 away from the appendage 32. The base 34 has a greater diameter than the cylindrical plug 20. The plug 20 has a flat bottom 36 at one end. Protrusions, such as tabs 38, extend radially outward from the plug 20 at its top end 37 and downward from the base 34. The tabs 38 interlock with the detents 28 (FIG. 2) in the module body 12 to lock the accessory 18 in place. Thus, plug structure-the tabs 38-and socket wall structure-the detents 28-coact to form a locking mechanism for locking the fully inserted plug 20 in the socket 16. The plug 20 has an outer surface 40-circular cylindrical in this version - to mate with the shape of the socket 16. A slot 42 is recessed into the outer surface 40. The slot 42 has an initial portion 44 that extends from an entrance 45 at the bottom 36 of the plug 20 toward the top 37. The initial portion 44 of the slot 42 opens into a wider terminal portion 46 that extends to a blind end 48 that is circumferentially offset from the entrance 45 to the slot 42. The two portions 44, 46 form a dogleg-in this example a 90°dogleg. A recess 50 in the outer surface 40 of the plug 20 opposite the slot 42 accommodates the end of a hinge rod connecting the belt module to an adjacent belt module.

[0012] The terms "top" and "bottom" as they relate to the plug and the belt module are not meant to be limited to a specific spatial orientation. They are used in reference to the orientations in the drawings to help explain features of the invention. As it relates to the plug 20, the term "top" means the side of the plug to which the appendage 32 is attached. The term "bottom" means the side opposite the "top." As it relates to the belt module, the term "top" means the normal article-conveying side of the module, and the term "bottom" means the opposite side.

[0013] As shown in FIG. 1, the plug 20 and its mating socket 16 allow the accessory 18 to be rotated, or twisted, about a twist axis 52 perpendicular to the plane of the module 10 into a locked position. First, the lug 24 is aligned vertically with the entrance 45 of the slot 42. Next, the plug 20 is inserted into the socket 16. The lug 24 advances through the entrance 45 and the initial portion of the slot 42 until the lug is received in the wider terminal portion of the slot. When the plug 20 is fully inserted, the tabs 38 (FIG. 3A) are received in a first depression 57 in the detents 28 (FIG. 2). This position is an unlocked position of the plug 20. Then the

accessory 18 is rotated as indicated by the arrow 54 until the lug 24 is at the blind end of the terminal portion of the slot 42. Plug structure-the lug 24-and socket wall structure-the slot 42-coact to form a guide mechanism for guiding the plug 20 during insertion into and extraction from the socket 16. As the plug 20 is rotated, its tabs 38 ride up ramp faces 56 (FIG. 2) of the detents 28 toward bumps 55. The slot and detents help guide the lug and tabs. When the lug 24 reaches the end of the slot 42, the tabs 38 drop off the bumps 55 into second depressions 58 (FIG. 2) locking the plug 20 in place in the module body 12. With the slot 42 and detents 28 dimensioned as shown in FIGS. 1 and 2, the accessory 18 has to be twisted through a twist angle of about 30° in the module body 12 from its unlocked position in FIG. 4A to its fully inserted, locked position in FIG. 4B.

[0014] As shown in FIG. 5A, the base 34 sits on the recessed rim 26 when the accessory 18 is in its locked position. The base 34 is flush with the top side 14 of the module body 12. FIG. 5A also shows one of the tabs 38 in the locking depression 58 of the detent 28. When the accessory is locked, the relative positions of the slots, lugs, tabs, and detents-geometry-ensure that the appendages are registered. As shown in FIG. 5B, the bottom 36 of the fully inserted and locked plug 20 is flush with the bottom side 15 of the module body 12. The accessory 18 is detached by twisting, or rotating, the plug 20 in the opposite direction from that shown by the arrow 54 in FIG. 1. The tabs 38 scale the steep blocking faces 60 (FIG. 2) of the bumps 55 onto the tops of the ramp faces 56 to unlock the accessory 18. As the twisting continues, the tabs 38 move to the first detent depressions 57. When the tabs 38 are in the first depressions 57, the lug 24 is aligned with the entrance 45 to the slot 42 in the unlocked position. The plug 20 can then be withdrawn from the socket 16.

[0015] FIG. 6 shows a section of a conveyor belt 62 constructed of belt modules 10 as in FIG. 1. The belt modules 10 have hinge eyes 64, 65 along opposite ends. Hinge rods 66 extending through aligned openings in the hinge eyes 64 interconnect the modules 10 together to form the conveyor belt 62. The locked sideguard appendages 32 have two laterally offset panels 68, 69, which allow the sideguards of adjacent modules to overlap without interference.

[0016] FIGS. 7A and 7B show a slightly different version of a plug 20' and a socket 16'. In this version the plug 20' has four slots 70 to accommodate four lugs 72 protruding radially outward from the cylindrical wall 22' of the socket 16'. And the dogleg slots 70 have detents 74 along their terminal portions 76 to lock the lugs 72 at the ends 78 of the terminal slot portions. In this version the plug's slots 70 and the wall's lugs 72 constitute both an insertion-extraction guide mechanism for the plug 20' and a locking mechanism for locking the fully inserted plug in the socket 16'. Additional tabs and detents as in FIG. 5A are optional.

[0017] FIGS. 8A and 8B show yet another socket-plug configuration. In this version the plug 20" has a lug 80 protruding radially outward from the plug's outer surface 40". The socket 16" has a dogleg slot 82 in its cylindrical wall 22" sized to receive the lug 80. Plug structure-the lug 80-and socket wall structure-the slot 82-coact to form a guide mechanism for inserting and extracting the plug 20". The rim 26" of the socket 16" has at least one tab 84 that engages at least one detent 86 at the top of the plug 20" on the underside of the base 88 on which an

accessory appendage (not shown) is mounted. Socket rim structure-the tab 84-and plug structure-the detent 86-coact to form a locking mechanism for locking the fully inserted plug 20" in the socket 16". As in the other versions, the lug 80, slot 82, tab 84, and detent 86 are positioned so that the detent 86 locks the plug 20" in place when the lug 80 is at the terminal end of the slot 82.

[0018] FIGS. 9A and 9B shows a threaded socket-plug configuration in which both the outer surface 90 of the plug 92 and the wall 94 of the socket 95 are threaded. In this example the wall 94 has an internal thread 96 with a root forming a helical recessed track in the wall, and the outer surface 90 of the plug 92 has an external thread 98 with the thread crest forming a helical protrusion to be received in the socket thread 96. Together the two engaged threads 96, 98 form a guide mechanism guiding the plug 92 during insertion into and extraction from the socket 95. Only one pair of mating threads is shown, but there could be more than one. Like the lug-and-slot versions, the screw-in threaded plug 92 is twisted into place in the socket 95. Although not shown, the plug 92 and the socket 95 could include coating structure forming a locking mechanism, such as a detent, to lock the fully inserted plug in place. As an alternative, the socket could have an external thread engaging an internally threaded plug. In this version the plug 92 is rotated about 180° for full insertion or extraction. In all the example versions shown, the plugs had to be rotated, or twisted, about their twist axes a twist angle of 180° or less for full insertion. The twist angle is determined by the circumferential extent of the recessed track-internal thread root or slot-in the socket wall or in the outer surface of the plug. But the tread pitches could be decreased to provide more wraps around the socket wall and the plug. In that case, the twist angle would exceed 180°, but the attachment would be more secure.

[0019] Although the invention has been described in detail in reference to a few versions, other versions are possible. As another example, appendages other than sideguards-holddowns, flights, lane dividers, high-friction inserts, hooks, guides, to name a few-could be attached to the plugs.

REFERENCES CITED IN THE DESCRIPTION

Cited references

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- CN101553418 [0003]
- WO2013137719A1 [0004] [0005]

PATENTKRAV

1. Transportbåndsmodul (10), der omfatter:

et modullegeme (12), der indbefatter:

5 en første side (14) og en modstående anden side (15);

en væg (22; 22'; 22"; 94), der afgrænser en holder (16; 16'; 16"; 95), der åbner ind i den første side (14);

en kant (26) omkring holderen ved dens åbning ind i den første side;

et tilbehør (18), der indbefatter:

10 en tap (20; 20'; 20"; 92), der er dimensioneret til at svare til holderen (16; 16'; 16"; 95), hvilken tap (20; 20'; 20"; 92) har en udvendig flade mellem en første ende og en anden ende omkring en akse;

et vedhæng (32), der strækker sig udefter fra den første ende af tappen (20; 20'; 20"; 92);

15 en føringsmekanisme dannet af den første samvirkende struktur på tappen (20; 20'; 20"; 92) og væggen (22; 22'; 22"; 94) for roterende at føre tappen (20; 20'; 20"; 92) fra en ulåst position ind i en låst, helt indført position i holderen (16; 16'; 16"; 95), når tappen (20; 20'; 20"; 92) roteres gennem en drejevinkel;

20 en låsemekanisme dannet af en anden samvirkende struktur på tappen (20; 20'; 20"; 92) og kanten (26) for at låse tappen (20; 20'; 20"; 92) i holderen (16; 16'; 16"; 95) i den låste, helt indførte position; hvor enten:

25 a) låsemekanismens anden samvirkende struktur omfatter en flig, der strækker sig radialt udefter fra den udvendige flade ved den første ende af tappen, og en spærre på kanten, der går i indgreb med tappen, når tappen er helt indført i holderen, for at tilvejebringe to positioner for tappen: den låste, helt indførte position og den ulåste position, således at tilbehøret kan fjernes fra modullegemet;

30 b) hvor låsemekanismens anden samvirkende struktur omfatter en flig, der strækker sig radialt udefter fra den udvendige flade ved den første ende af tappen og en spærre på kanten, der går i indgreb med tappen, når tappen er helt indført i holderen, for at tilvejebringe to positioner for tappen: den låste, helt indførte position og den ulåste position, således at tilbehøret kan fjernes fra modullegemet, og hvor spærren indbefatter første og anden fordybninger i kanten adskilt af en bule med en rampeflade, der strækker sig fra den første fordybning, og en stejl flade, der strækker sig fra rampefladen til den anden fordybning; eller

35

c) låsemekanismens anden samvirkende struktur omfatter en flig, der strækker sig opetter fra kanten, og en spærre ved toppen af tappen, som går i indgreb med tappen, når

tappen er helt indført i holderen for at tilvejebringe to positioner for tappen: den låste, helt indførte position og en ulåst position, således at tilbehøret kan fjernes fra modullegemet.

2. Transportbåndsmodul ifølge krav 1, hvor føringsmekanismens første samvirkende struktur omfatter:

(a1) et forsænket spor, der er dannet i den udvendige flade af tappen og strækker sig omkring den udvendige flade mod den første ende af tappen fra en indgang ved den anden ende, og

(b1) et fremspring, der strækker sig radialt indefter fra modullegemets væg ind i holderen; eller

(a2) et forsænket spor, der er dannet i modullegemets væg og strækker sig omkring væggen mod den anden side af modullegemet fra en indgang ved den første side, og

(b2) et fremspring, der strækker sig radialt udefter fra den udvendige flade af tappen.

3. Transportbåndsmodul ifølge krav 1 hvor føringsmekanismens første samvirkende struktur omfatter:

(a1) et øje, der strækker sig radialt indefter fra modullegemets væg ind i holderen, og

(b1) en spalte med en skarp bøjning, der er dannet i den udvendige flade af tappen og har en startdel, der strækker sig mod den første ende af tappen fra en indgang ved den anden ende til en endedel, der strækker sig til en blind ende periferisk forskudt for indgangen;

eller

(a2) et øje, der strækker sig radialt udefter fra den udvendige flade af tappen, og

(b2) en spalte med en skarp bøjning, der er dannet i modullegemets væg og har en startdel, der strækker sig mod den anden side af modullegemet mod en indgang ved den første side til en endedel, der strækker sig til en ende periferisk forskudt for indgangen;

hvor tappen indføres i holderen ved lade indgangen til spaltens startdel flugte med øjet, skubning af tappen dybere ind i holderen med øjet modtaget i startdelen, indtil øjet modtages i spaltens endedel, og rotation af tappen omkring aksens drejevinkel, således at øjet er ved den blinde ende af spaltens endedel i den låste, helt indførte position.

4. Transportbåndsmodul ifølge krav 1, mulighed c), hvor spærren indbefatter første og anden fordybninger i kanten adskilt af en bule med en rampeflade, der strækker sig fra den første fordybning, og en stejl flade, der strækker sig fra rampefladen til den anden fordybning.

5. Transportbåndsmodul ifølge krav 3, hvor tilbehøret endvidere indbefatter en spærre på endedelen af spalten for at låse øjet mod enden af endedelen.
6. Transportbåndsmodul ifølge krav 3, og som endvidere omfatter en flerhed af øjer og 5 en flerhed af spalterne med skarpe bøjninger.
7. Transportbåndsmodul ifølge krav 1, hvor tilbehøret endvidere indbefatter en basis ved toppen af tappen, hvor basen sidder på kanten, når tappen er i den låste, helt indførte position i holderen; eller hvor modullegemet strækker sig i en retning for båndets bevægelse 10 fra en første ende til en anden og indbefatter hængselsøjer langs den første ende for at modtage en hængselsstang, og hvor tilbehøret endvidere indbefatter en forsænkning dannet i den udvendige flade af tappen, hvor forsænkningen flugter med hængselsøjerne for at modtage enden af en hængselsstang, når tappen er i den låste, helt indførte position.
8. Transportbåndsmodul ifølge krav 2, hvor det forsænkede spor omfatter et 15 spiralføremet indvendigt gevind (96) og fremspringet omfatter gevindtoppen af et spiralføremet udvendigt gevind (98).
9. Transportbåndsmodul ifølge krav 1, hvor holderen åbner ind i den anden side og 20 den anden ende af tappen flugter med den anden side, når tappen er i den låste, helt indførte position i holderen; eller hvor holderen er placeret ved en sidekant af modullegemet.
10. Transportbåndsmodul ifølge krav 1, hvor den udvendige flade af tappen og væggen, 25 der afgrænser holderen, definerer cirkelformede cylindere.
11. Transportbåndsmodul ifølge krav 1, hvor vedhængen er en sideskærm (32).
12. Transportbånd (62), der omfatter en flerhed af transportbåndsmoduler som i et 30 hvilket som helst af de foregående krav.

DRAWINGS

Drawing

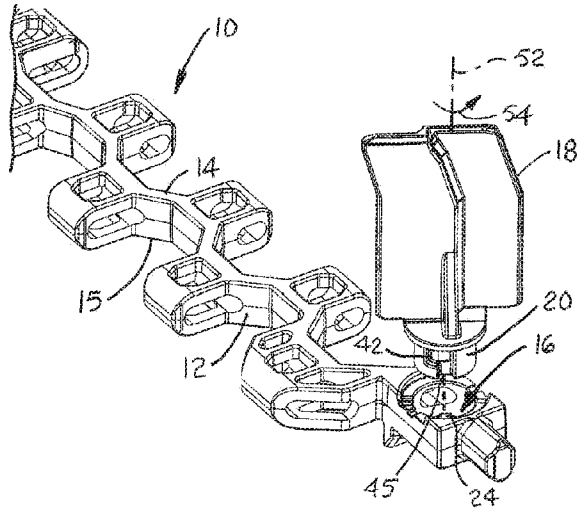


FIG. 1

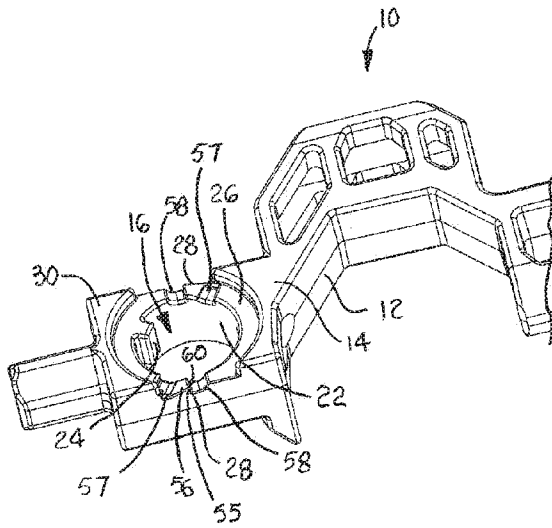


FIG. 2

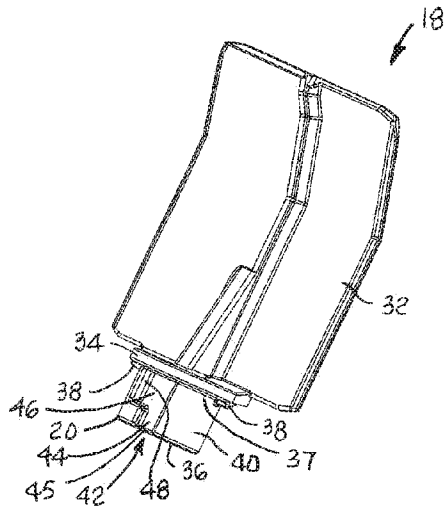


FIG. 3A

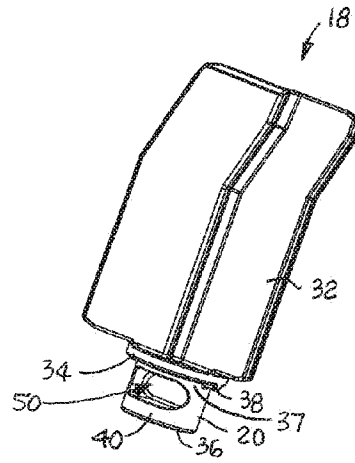


FIG. 3B

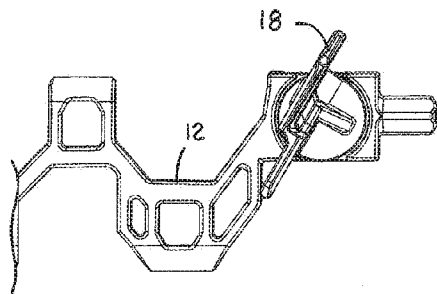


FIG. 4A

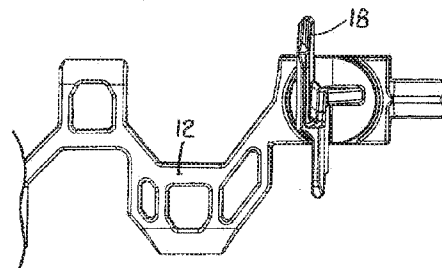
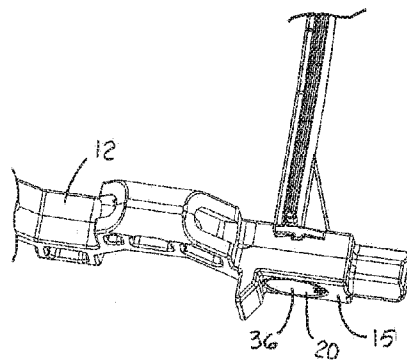
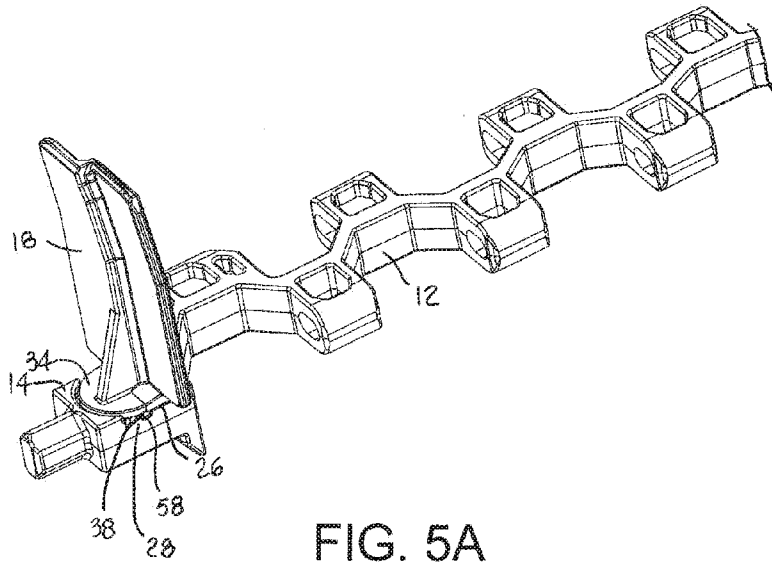


FIG. 4B



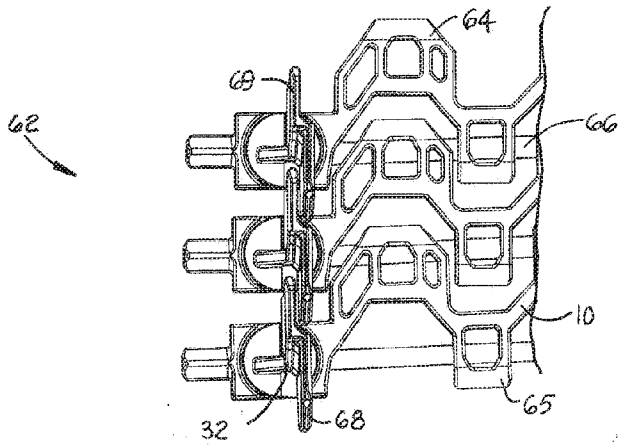


FIG. 6

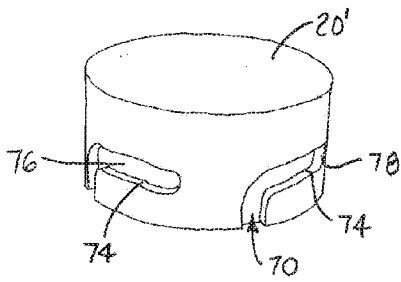


FIG. 7A

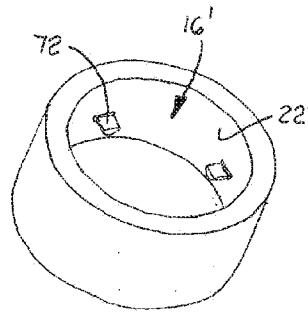


FIG. 7B

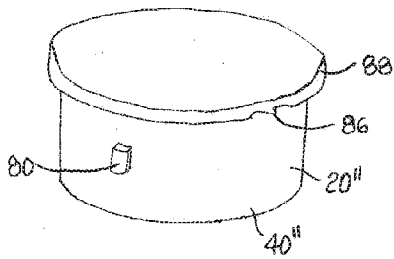


FIG. 8A

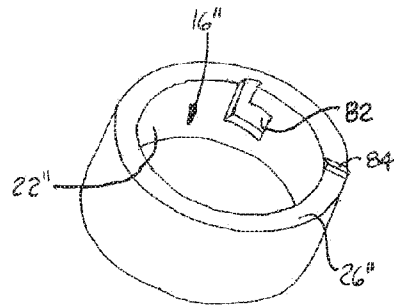


FIG. 8B

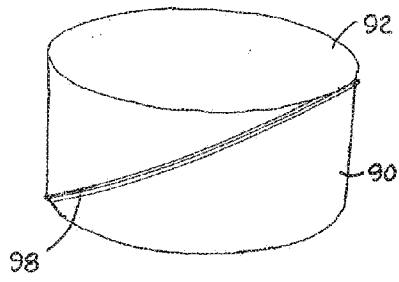


FIG. 9A

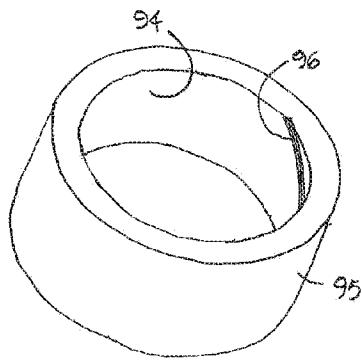


FIG. 9B