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(54) **A CORE FOR RECEIVING SHEET MATERIAL**

KERN ZUR AUFNAHME EINES BAHNENMATERIALS

MOYEU ADAPTÉ POUR RECEVOIR UN MATÉRIAU EN FORME DE FEUILLES

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Description

[0001] This invention relates to a core for receiving sheet material.

[0002] Cores for receiving sheet material are well known. The sheet material may be, for example, paper used in the printing industry, or plastics film or cardboard used in the packaging industry. The sheet material is wound on the core to form a reel. The reels are usually bulky and heavy, requiring handling by machines.

[0003] The cores may be made of cardboard or a metal such for example as aluminium. Even with metal cores such for example as aluminium, it is difficult to produce the cores with sufficient strength and rigidity when the cores are of a substantial diameter, for example more than 200mm (8 inches). During use of the reels on machines such for example as printing machines, it is essential that the cores maintain their shape and accuracy. The cores usually comprise a tube, a first end member which extends into a first end of the tube, and a second end member which extends into a second end of the tube, as shown by e.g. US 1,858,753. The tube can be made to be made more rigid by increasing the tube wall thickness. However, increasing the wall thickness of a metal tube such for example as aluminium increases the weight of the tube and desirably the weight of the tube should be kept to as minimum. Also, the internal dimensions of the tube should be such that chucks of handling machines are able to enter into the core via the first and the second end members. The handling tends to require that wall thicknesses are between 15 - 17mm. The first and the second end members are usually made of a plastics material and these become increasingly difficult to mould with increasing tube diameters. The plastics material tends to shrink unevenly after moulding, and then it does not maintain the required shape for the end members.

[0004] It is an aim of the present invention to reduce the above mentioned problems.

[0005] Accordingly, the present invention provides a core for receiving sheet material, which core comprises a tube, a first end member which extends into a first end of the tube, and a second end member which extends into a second end of the tube, and the core being such that the tube is formed of a plurality of part circular tube portions which are connected together along longitudinally extending edges, and the first and the second end members are each formed of a plurality of part circular end member portions which are connected together along longitudinally extending edges.

[0006] With the tube being made of the part circular tube portions, and the first and the second end members being made of the part circular end member portions, it is possible to make cores having diameters greater than 200mm, whilst maintaining high tolerance requirements and high core stiffness requirements. Whilst the core of the present invention is such that its diameter is preferably larger than 200mm, the core may have a smaller diameter if desired.

[0007] In a first embodiment of the invention, the core may be one in which the longitudinally extending edges on the part circular tube portions have engaging formations for engaging adjacent longitudinally extending edges, and in which the engaging formations on the part circular tube portions extend inwardly of the tube.

[0008] The engaging formations on the longitudinally extending edges of the part circular tube portions may be connected together by any suitable and appropriate means including, for example, welding, screw fasteners, rivets or clips.

[0009] Advantageously, the strengthening formations on the part circular tube portions form strengthening splines which extend from an inner surface of the tube.

[0010] The core may be one in which the part circular tube portions each has a longitudinally extending groove comprising a base wall, a pair of side walls and a top wall, and in which the longitudinal extending grooves at the first and the second ends of the tube are for receiving the first and the second end members respectively. Preferably there is only one of the grooves in each of the part circular tube portions. However, if desired, there may be more of the grooves, for example two or three of the grooves in each of the part circular tube portions.

[0011] Usually, the longitudinally extending grooves will not extend the full length of the tube. Usually, the longitudinally extending grooves will only extend longitudinally inwardly from the first and the second ends of the tube for a distance slightly longer than the length of the first and the second end members that are in the tube.

[0012] In the first embodiment of the invention, the longitudinally extending edges of the part circular end member portions may be dove tail joint formations whereby the part circular end member portions are connected together by dove tail joints. Other connecting means may be employed for connecting the longitudinally extending edges of the part circular end member portions.

[0013] In a second embodiment of the present invention, the core may be one in which the longitudinal edges on the part circular tube portions are welded together, and in which the part circular tube portions are each provided on their inner surface with a plurality of longitudinally extending strengthening formations.

[0014] The longitudinally extending strengthening formations are preferably T-shaped in cross section. Other cross sectional shapes may be employed.

[0015] Preferably, the tube has forty-eight of the longitudinally extending strengthening formations. More or less than forty-eight of the longitudinally extending strengthening formations may be employed.

[0016] In the second embodiment of the invention, the first and the second end members may have finger formations which locate in or between the longitudinally extending strengthening formations on the part circular tube portions.

[0017] Preferably, the tube is made of aluminium. Other metals may be employed. Depending upon the required diameter of the core, the tube may also be made

of plastics materials.

[0018] The first and the second end members are preferably made of a plastics material. Other materials may however be employed if desired. The first and the second end members are preferably constructed to be re-usable but they may be constructed to be disposable if desired.

[0019] The core may include a radio frequency identification tag. The use of the radio frequency identification tag enables the location of the core to be tracked from manufacture through to winding of the core to produce a reel, through to use of the reel, and return of the core for reuse purposes. The radio frequency identification tag may be formed as part of the first or the second end member.

[0020] Embodiments of the invention will now be described solely by way of example and with reference to the accompanying drawings in which:

Figure 1 is an end view of a tube forming part of a first core for receiving sheet material;

Figure 2 is an end view of a part circular tube portion forming part of the tube shown in Figure 1;

Figure 3 is a side view of a part circular end member portion forming part of a first end member which fits into a first end of the tube shown in Figure 1 to form a core;

Figure 4 is a section through part of the tube shown in Figure 1 and the part circular end member portion shown in Figure 3;

Figure 5 is an end view of another first end member for fitting into a first end of a tube (not shown) having a plain bore;

Figure 6 is an end view of one of the part circular end member portions forming the first end member shown in Figure 5;

Figure 7 is a side view of the first end member shown in Figure 5;

Figure 8 is an end view of a second tube forming part of a second core for receiving sheet material;

Figure 9 is an end view of a part circular tube portion forming part of the tube shown in Figure 8;

Figure 10 is a side view of a part circular end member portion forming part of a first end member which extends into a first end of the tube shown in Figure 8 to form the second core;

Figure 11 is an end view of the part circular end member portion shown in Figure 10;

Figure 12 is a section through the part circular end member portion shown in Figure 10 and the tube shown in Figure 8;

Figure 13 shows a completed core for receiving sheet material;

Figure 14 is an exploded view of the core shown in Figure 13; and

Figure 15 is an end view of a second end member which extends into a second end of the tube shown in Figure 14.

[0021] Referring to Figures 1 - 4, there are shown parts of a core for receiving sheet material. The illustrated parts of the core are a tube 2 shown in Figures 1 and 2, and a part circular end member portion 4 forming part of a first end member which extends into a first end of the tube 2. The completed core (not shown) also comprises a second end member which is the same as the first end member, and which extends into a second end of the tube 2 which is opposite the first end of the tube 2.

[0022] As shown in Figures 1 and 2, the tube is formed of a plurality of part circular tube portions 6. More specifically, there are six of the part circular tube portions 6. The part circular tube portions 6 are connected together along longitudinally extending edges 8.

[0023] The longitudinally extending edges 8 on the part circular tube portions 6 have engaging formations 18 for engaging adjacent longitudinally extending edges 8. The engaging formations 18 on the part circular tube portions 6 extend inwardly of the tube 2 and therefore inwardly of the formed core. The engaging formations 18 on the longitudinally extending edges 8 of the part circular tube portions 6 may be connected together by any suitable and appropriate connection means, for example welding.

[0024] As can best be appreciated from Figure 1, the engaging formations 18 on the part circular tube portions 6 form strengthening splines 20 which extend from an inner surface 22 of the tube 2.

[0025] As can also be seen from Figures 1 and 2, the part circular tube portions 6 each has a longitudinally extending groove 24. Each longitudinally extending groove 24 comprises a base wall 26, a pair of side walls 28 and a top wall 30. The base walls 26 of the part circular tube portions 6 define in the tube 2 a reduced diameter portion 32. The longitudinally extending grooves 24 do not extend the full length of the tube 2. More specifically, the longitudinally extending grooves 24 only extend longitudinally inwardly from the first and the second ends of the tube 2 for a distance slightly longer than the length of the first and the second end members that are inserted in the tube 2 to form the completed core.

[0026] Referring now to Figures 3 and 4, it will be seen that the part circular end member portion 4 has a part 31 which fits into the groove 24 shown in Figures 1 and 2. The part circular end member portion 4 also has an abutment 33 for abutting against the end of the tube 6.

[0027] Referring now to Figures 5, 6 and 7 there is shown another first end member 35 which is formed of a plurality of part circular end member portions 10. More specifically, there are four of the part circular end member portions 10. The part circular end member portions 10 are connected together along longitudinally extending edges 12. As shown in Figure 7, the first end member 35 comprises an insert portion 14 which goes into the first end of the tube, and a flange portion 16 which abuts against the first end of the tube and which is of the same diameter as the tube. The insert portion 14 is plain and it goes into a plain bore of the tube.

[0028] As shown in Figures 5 and 6, the longitudinally

extending edges 12 of the part circular end member portions 10 have dove tail joint formations whereby the part circular end member portions 10 are connected together by dove tail joints 34. As can best be appreciated from Figure 6, the dove tail joints 34 are formed by one end of each part circular end member portion 10 having a male part 36 of the dove tail joint 34 and the other end of the part circular end member portion 10 having a female part 38 of the dove tail joint 34.

[0029] Referring now to Figures 8 - 12, there are shown parts of a second core for receiving sheet material. The second core comprises a tube 40 and first and second end members (not shown). The first and second end members are each formed of a plurality of part circular end member portions 42. The first end member extends into a first end of the tube 40. The second end member extends into a second end of the tube 40.

[0030] As shown in Figures 8 and 9, the tube 40 is formed of a plurality of part circular tube portions 44. The part circular tube portions 44 are connected together along longitudinally extending edges 46 by welding.

[0031] The part circular tube portions 44 are each provided on their inner surface 48 with a plurality of longitudinally extending strengthening formations 50. The longitudinally extending strengthening formations 50 are T-shaped in cross section. There are forty-eight of the longitudinally extending strengthening formations 50.

[0032] As shown in Figures 10 - 12, the first and the second end members are each formed of the plurality of part circular end member portions 42. These part circular end member portions 42 have an inset portion 52 for insertion between the strengthening formations 50. The part circular end member portions 42 also have an abutment member 54 for abutting against the end of the tube 40.

[0033] Referring now to Figures 13, 14 and 15, there is shown a core 58 for receiving sheet material. The core 58 comprises a tube 60, a first end member 62 which extends into a first end 64 of the tube 60, and a second end member 66 which extends into a second end 68 of the tube 60. The tube 60, the first end member 62 and the second end member 66 have been shown in outline only and they could be of the constructions shown in Figures 3 and 4, or 5 - 7 or 10 - 12. As can be appreciated from Figure 14, the first and the second end members 62, 66 are of the same construction. Thus in Figures 3 and 4, 5 - 7 and 10 - 12, the first and the second end members are of the same construction. -

[0034] In the drawings, the tubes are made of aluminum. Other materials may be employed if desired. Also, the first end members and the second end members are made of a plastics material, but other materials may be employed if desired. The plastics material may be polypropylene.

[0035] It is to be appreciated that the embodiments of the invention described above with reference to the accompanying drawings have been given by way of example only and that modifications may be effected. Thus,

for example, part circular tube portions and the part circular end member portions may be shaped differently than shown and they may be connected together differently than shown. The first or the second end member may be provided with a radio frequency identification tag. The cores of the present invention may be provided with any suitable and appropriate type of sheet material including paper for the printing industry, plastic film for the packaging industry, waxed carton cardboard for the packaging industry, paper for toilet rolls or kitchen rolls, plastics material for use as cling film, and plastics material for use in the formation of rubbish bags.

15 Claims

1. A core (58) for receiving sheet material, which core (58) comprises a tube (60), a first end member (62) which extends into a first end (64) of the tube (60), and a second end member (66) which extends into a second end (68) of the tube (60), and the core (58) being **characterized in that** the tube (60) is formed of a plurality of part circular tube portions (6,44) which are connected together along longitudinally extending edges (8,46), and the first and the second end members (62, 66) are each formed of a plurality of part circular end member portions (4,10,42) which are connected together along longitudinally extending edges (12).
2. A core according to claim 1 in which the longitudinally extending edges (8) on the part circular tube portions (6) have engaging formations (18) for engaging adjacent longitudinally extending edges (8), and in which the engaging formations (18) on the part circular tube portions (6) extend inwardly of the tube.
3. A core according to claim 2 in which the engaging formations on the longitudinally extending edges (8) of the part circular tube portions (6) are connected together by welding, screw fasteners, rivets or clips.
4. A core according to claim 2 or claim 3 in which the engaging formations (18) on the part circular tube portions (6) form strengthening splines (20) which extend from an inner surface (22) of the tube.
5. A core according to any one of the preceding claims in which the part circular tube portions each has a longitudinally extending groove (24) comprising a base wall (26) a pair of side walls (28) and a top wall (30), and in which the longitudinally extending grooves (24) at the first and the second ends of the tube are for receiving the first and the second end members respectively.
6. A core according to claim 5 in which the longitudinally extending grooves (24) do not extend the full length

of the tube.

7. A core according to claim 6 in which the longitudinally extending grooves (24) only extend longitudinally inwardly from the first and the second ends of the tube for a distance slightly longer than the length of the first and the second end members that are in the tube. 5
8. A core according to any one of the claims 2 - 7 in which the longitudinally extending edges (12) of the part circular end member portions (10) have dove tail joint formations (36, 38) whereby the part circular end member portions (10) are connected together by dove tail joints (34). 10
9. A core according to claim 1 in which the longitudinal edges on the part circular tube portions (44) are welded together, and in which the part circular tube portions (44) are each provided on their inner surface (48) with a plurality of longitudinally extending strengthening formations (50). 15
10. A core according to claim 9 in which the longitudinally extending strengthening formations (50) are each T-shaped in cross section. 20
11. A core according to claim 9 or claim 10 in which the tube has forty-eight of the longitudinally extending strengthening formations (50). 25
12. A core according to any one of claims 9 - 11 in which the first and the second end members have finger formations which locate in or between the longitudinally extending strengthening formations (50) on the part circular tube portions (44). 30
13. A core according to any one of the preceding claims in which the tube (60) is made of aluminium. 35
14. A core according to any one of the preceding claims in which the core (58) is larger than 200mm in diameter. 40
15. A core according to any one of the preceding claims in which the first and the second end members (62, 66) are made of a plastics material. 45
16. A core according to any one of the preceding claims and including a radio frequency identification tag. 50

Patentansprüche

1. Kern (58) zur Aufnahme von flächigem Material, der ein Rohr (60), ein erstes Endelement (62), das sich in ein erstes Ende (64) des Rohrs (60) erstreckt, und ein zweites Endelement (66), das sich in ein zweites

Ende (68) des Rohrs (60) erstreckt, umfasst, **dadurch gekennzeichnet, dass** das Rohr (60) aus mehreren teilkreisförmigen Rohrabschnitten (6, 44) gebildet ist, die entlang sich in Längsrichtung erstreckenden Rändern (8, 46) miteinander verbunden sind, und das erste und das zweite Endelement (62, 66) jeweils aus mehreren teilkreisförmigen Endelementabschnitten (4, 10, 42) gebildet sind, die entlang sich in Längsrichtung erstreckenden Rändern (12) miteinander verbunden sind.

2. Kern nach Anspruch 1, wobei die sich in Längsrichtung erstreckenden Ränder (8) an den teilkreisförmigen Rohrabschnitten (6) Eingriffsausbildungen (18) haben, um benachbarte sich in Längsrichtung erstreckende Ränder (8) in Eingriff zu nehmen, und wobei sich die Eingriffsausbildungen (18) an den teilkreisförmigen Rohrabschnitten (6) innerhalb des Rohrs erstrecken.
3. Kern nach Anspruch 2, wobei die Eingriffsausbildungen an den sich in Längsrichtung erstreckenden Rändern (8) der teilkreisförmigen Rohrabschnitte (6) durch Schweißen, Schraubbefestigungen, Nieten oder Klammern miteinander verbunden sind.
4. Kern nach Anspruch 2 oder 3, wobei die Eingriffsausbildungen (18) an den teilkreisförmigen Rohrabschnitten (6) Verstärkungskeile (20) bilden, die sich von einer Innenfläche (22) des Rohrs erstrecken.
5. Kern nach einem der vorhergehenden Ansprüche, wobei die teilkreisförmigen Rohrabschnitte jeweils eine sich in Längsrichtung erstreckende Nut (24) haben, die eine Basiswand (26), ein Paar Seitenwände (28) und eine obere Wand (30) umfasst, und wobei die sich in Längsrichtung erstreckenden Nuten (24) am ersten und zweiten Ende des Rohrs zur Aufnahme des ersten bzw. zweiten Endelements dienen.
6. Kern nach Anspruch 5, wobei die sich in Längsrichtung erstreckenden Nuten (24) sich nicht über die volle Länge des Rohrs erstrecken.
7. Kern nach Anspruch 6, wobei die sich in Längsrichtung erstreckenden Nuten (24) sich in Längsrichtung nach innen vom ersten und zweiten Ende des Rohrs nur über eine Strecke erstrecken, die etwas länger als die Länge des ersten und des zweiten Endelements ist, die im Rohr sind.
8. Kern nach einem der Ansprüche 2 - 7, wobei die sich in Längsrichtung erstreckenden Ränder (12) der teilkreisförmigen Endelementabschnitte (10) Schwalbenschwanzverbindungs-ausbildungen (36, 38) haben, so dass die teilkreisförmigen Endelementabschnitte (10) über Schwalbenschwanzverbindungen (34) miteinander verbunden sind.

9. Kern nach Anspruch 1, wobei die Längsränder an den teilkreisförmigen Rohrab schnitten (44) zusammen geschweißt sind und wobei die teilkreisförmigen Rohrab schnitte (44) jeweils an ihrer Innenfläche (48) mit mehreren sich in Längsrichtung erstreckenden Verstärkungsausbildungen (50) versehen sind. 5
10. Kern nach Anspruch 9, wobei die sich in Längsrichtung erstreckenden Verstärkungsausbildungen (50) jeweils einen T-förmigen Querschnitt haben. 10
11. Kern nach Anspruch 9 oder 10, wobei das Rohr achtundvierzig sich in Längsrichtung erstreckende Verstärkungsausbildungen (50) hat.
12. Kern nach einem der Ansprüche 9 - 11, wobei das erste und das zweite Endelement Fingerausbildungen haben, die in oder zwischen den sich in Längsrichtung erstreckenden Verstärkungsausbildungen (50) an den teilkreisförmigen Rohrab schnitten (44) angeordnet sind. 20
13. Kern nach einem der vorhergehenden Ansprüche, wobei das Rohr (60) aus Aluminium hergestellt ist. 25
14. Kern nach einem der vorhergehenden Ansprüche, wobei der Durchmesser des Kerns (58) größer als 200 mm ist.
15. Kern nach einem der vorhergehenden Ansprüche, wobei das erste und das zweite Endelement (62, 66) aus einem Kunststoffmaterial hergestellt sind. 30
16. Kern nach einem der vorhergehenden Ansprüche, einschließlich eines RFID-Tags (Radio Frequency Identification Tag). 35

Revendications

1. Moyeu (58) adapté pour recevoir un matériau en forme de feuilles, ledit moyeu (58) comprenant un tube (60), un premier élément d'extrémité (62) qui s'étend dans une première extrémité (64) du tube (60), et un deuxième élément d'extrémité (66) qui s'étend dans une deuxième extrémité (68) du tube (60), le moyeu (58) étant **caractérisé en ce que** le tube (60) est constitué d'une pluralité de parties de tube partiellement circulaires (6, 44) qui sont connectées les unes aux autres le long de bords s'étendant de façon longitudinale (8, 46), et les premier et deuxième éléments d'extrémité (62, 66) sont chacun constitués d'une pluralité de parties d'élément d'extrémité partiellement circulaires (4, 10, 42) qui sont connectées les unes aux autres le long de bords s'étendant de façon longitudinale (12). 40
2. Moyeu selon la revendication 1, dans lequel les 45

bords s'étendant de façon longitudinale (8) sur les parties de tube partiellement circulaires (6) comportent des formations d'engagement (18) pour engager des bords s'étendant de façon longitudinale adjacents (8), et dans lequel les formations d'engagement (18) sur les parties de tube partiellement circulaires (6) s'étendent vers l'intérieur du tube.

3. Moyeu selon la revendication 2, dans lequel les formations d'engagement sur les bords s'étendant de façon longitudinale (8) des parties de tube partiellement circulaires (6) sont connectés les unes aux autres par soudage, vis, rivets ou agrafes. 10
4. Moyeu selon la revendication 2 ou la revendication 3, dans lequel les formations d'engagement (18) sur les parties de tube partiellement circulaires (6) forment des cannelures de renforcement (20) qui s'étendent à partir d'une surface intérieure (22) du tube. 20
5. Moyeu selon l'une quelconque des revendications précédentes, dans lequel les parties de tube partiellement circulaires comportent chacune une rainure s'étendant de façon longitudinale (24) qui comprend une paroi de base (26), une paire de parois latérales (28) et une paroi supérieure (30), et dans lequel les rainures s'étendant de façon longitudinale (24) aux première et deuxième extrémités du tube servent à recevoir les premier et deuxième éléments d'extrémité, respectivement. 25
6. Moyeu selon la revendication 5, dans lequel les rainures s'étendant de façon longitudinale (24) ne s'étendent pas sur la totalité de la longueur du tube. 30
7. Moyeu selon la revendication 6, dans lequel les rainures s'étendant de façon longitudinale (24) s'étendent uniquement de façon longitudinale vers l'intérieur à partir des première et deuxième extrémités du tube sur une distance qui est légèrement plus longue que la longueur des premier et deuxième éléments d'extrémité qui se trouvent dans le tube. 35
8. Moyeu selon l'une quelconque des revendications 2 à 7, dans lequel les bords s'étendant de façon longitudinale (12) des parties d'élément d'extrémité partiellement circulaires (10) comportent des formations de joint à queue d'aronde (36, 38), dans lequel les parties d'élément d'extrémité partiellement circulaires (10) sont connectées les unes aux autres par des joints à queue d'aronde (34). 40
9. Moyeu selon la revendication 1, dans lequel les bords longitudinaux sur les parties de tube partiellement circulaires (44) sont soudés les uns aux autres, et dans lequel les parties de tube partiellement circulaires (44) comportent chacune sur leur surface 45

intérieure (48) une pluralité de formations de renforcement s'étendant de façon longitudinale (50).

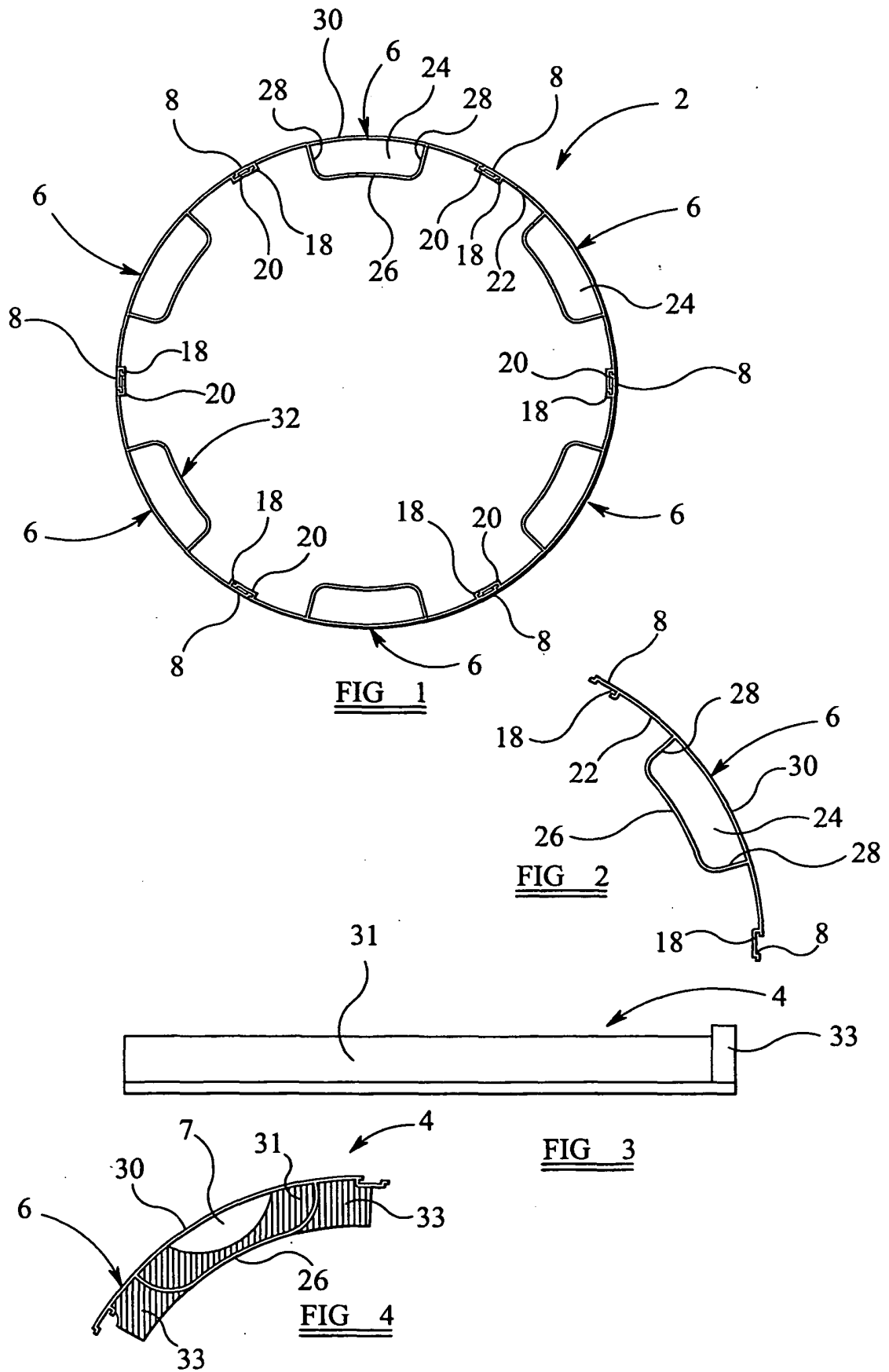
10. Moyeu selon la revendication 9, dans lequel les formations de renforcement s'étendant de façon longitudinale (50) présentent chacune une section transversale en forme de T. 5
11. Moyeu selon la revendication 9 ou la revendication 10, dans lequel le tube comprend quarante-huit formations de renforcement s'étendant de façon longitudinale (50). 10
12. Moyeu selon l'une quelconque des revendications 9 à 11, dans lequel les premier et deuxième éléments d'extrémité comportent des formations de doigt qui sont situées dans ou entre les formations de renforcement s'étendant de façon longitudinale (50) sur les parties de tube partiellement circulaires (44). 15
20
13. Moyeu selon l'une quelconque des revendications précédentes, dans lequel le tube (60) est constitué d'aluminium.
14. Moyeu selon l'une quelconque des revendications précédentes, dans lequel le moyeu (58) présente un diamètre supérieur à 200 mm. 25
15. Moyeu selon l'une quelconque des revendications précédentes, dans lequel les premier et deuxième éléments d'extrémité (62, 66) sont constitués d'une matière plastique. 30
16. Moyeu selon l'une quelconque des revendications précédentes et comprenant une étiquette d'identification par radiofréquences. 35

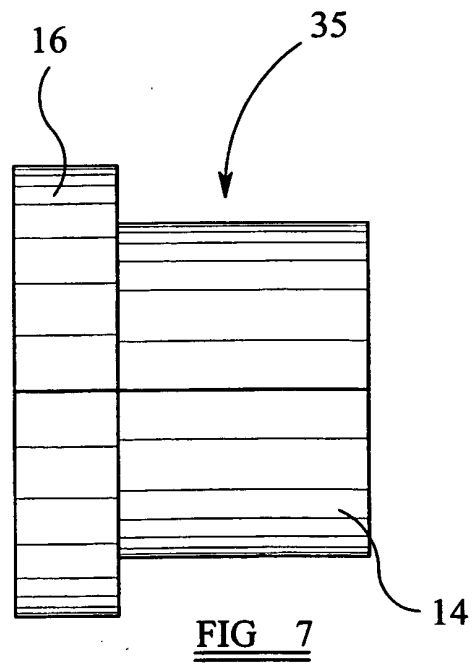
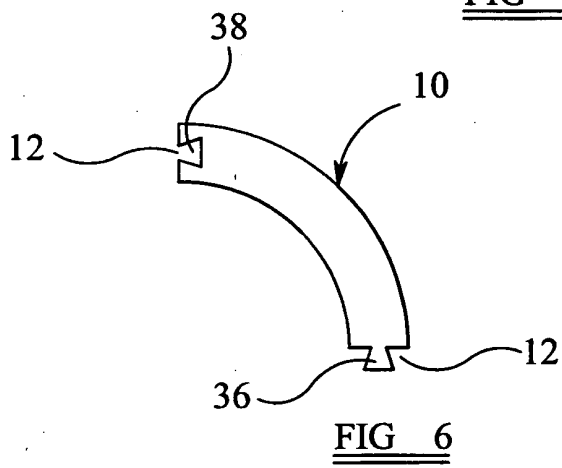
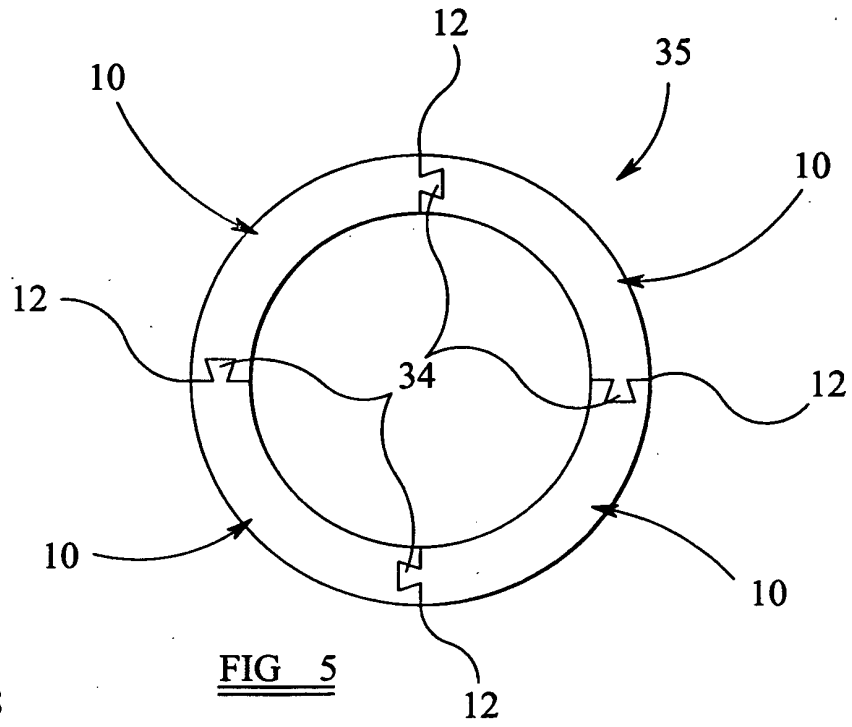
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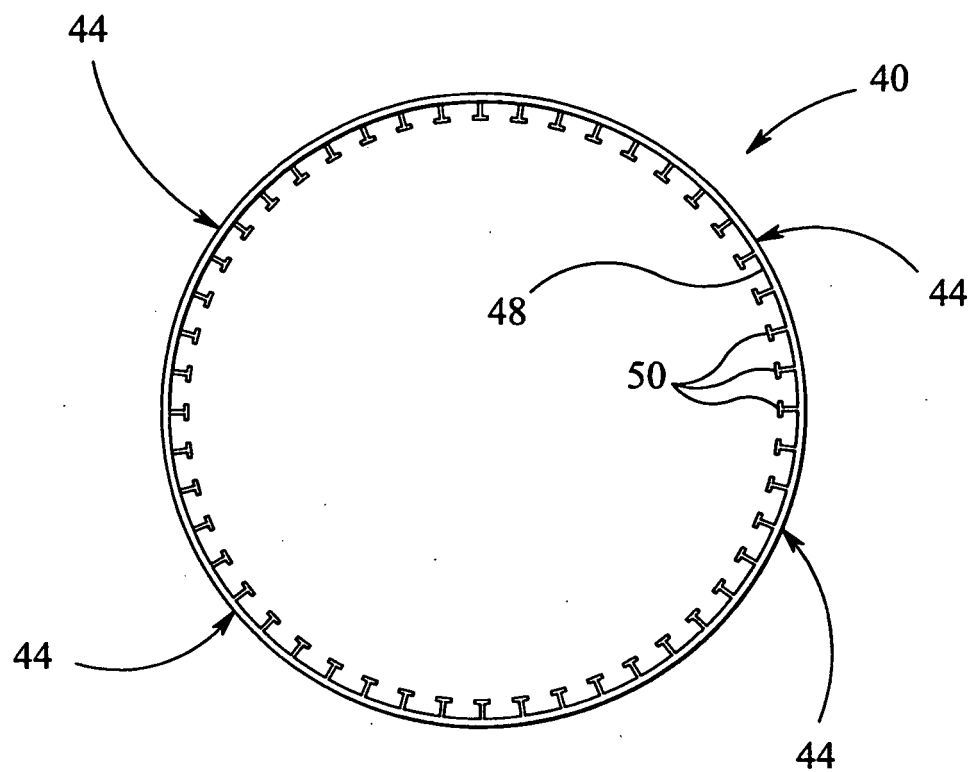


FIG 8

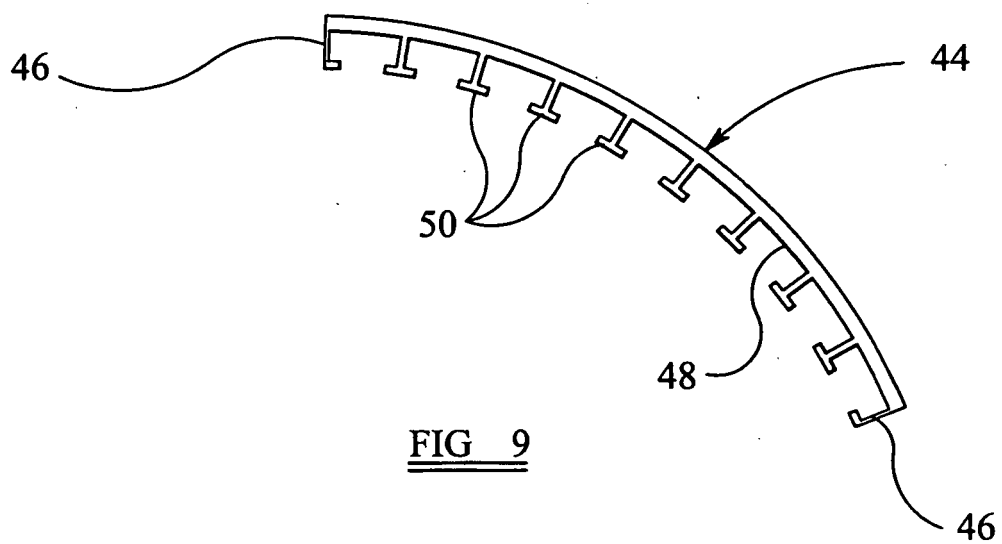


FIG 9

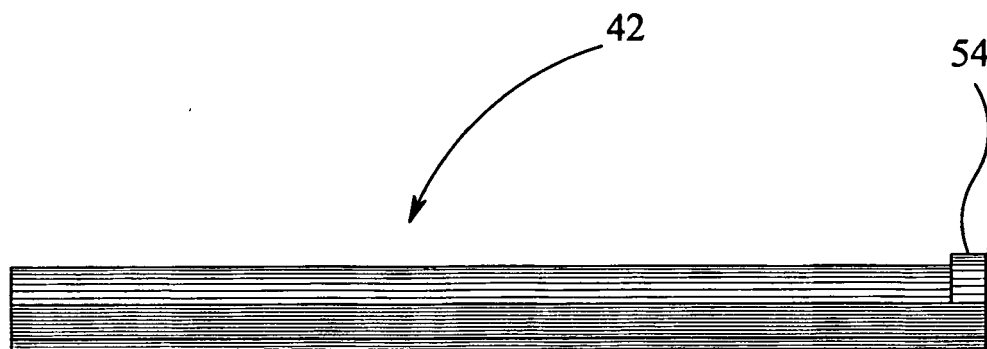


FIG 10

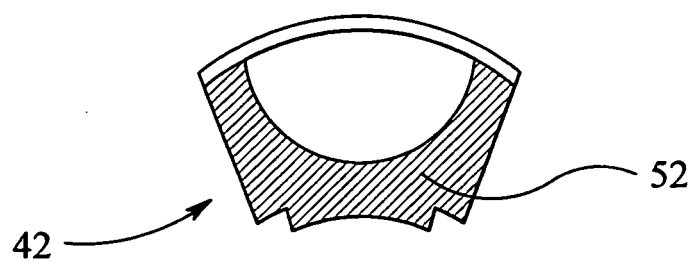


FIG 11

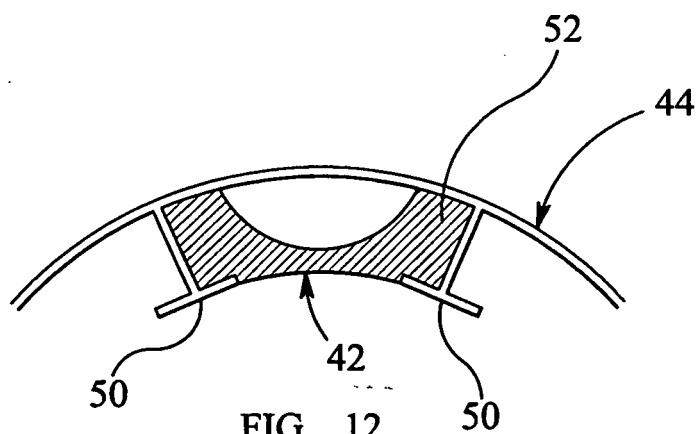
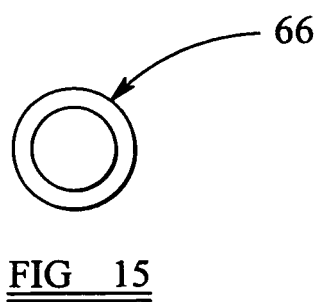
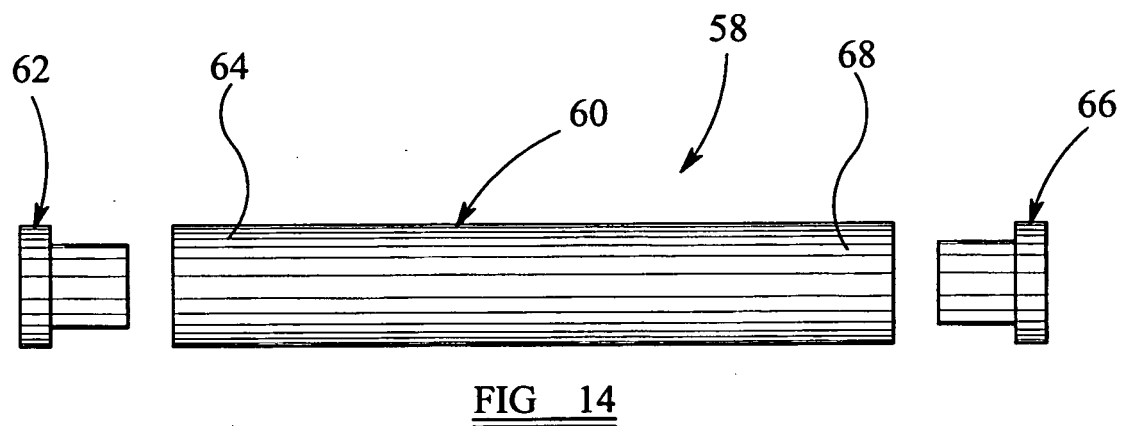
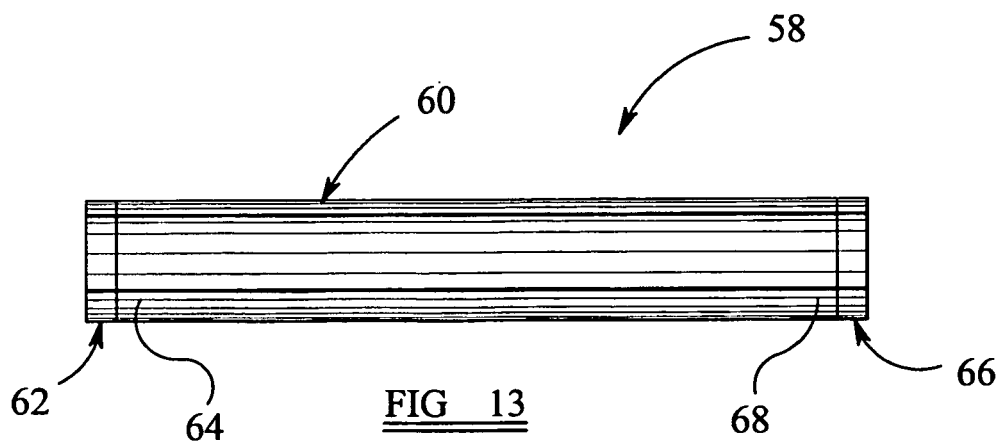


FIG 12



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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