

Elongated strip for the formation of tubular articles and a method of forming the strip into an article

Field of the Invention

The invention relates to the formation and strengthening of tubular objects such as pipes.

Description of the Prior Art

It is known to use plastic pipes for conveying water and other fluids which when buried, particularly in large diameters, have by necessity, because of earth loading or pressure test requirements, needed to have wall thicknesses of substantial dimensions thus making such pipes expensive.

Another problem with tubular objects is the bulk they present during transport and it has been proposed heretofore to form such tubular objects from strip and to wind the strip helically and to join the contiguous edges to form the tubular object, such a system being described in the specification of United States Patent No. 3 938 558 which deals with a longitudinally corrugated metal strip which has edges which can be contiguously joined.

It is also known to form a flexible hose from strip which has shaped longitudinal edges so arranged that when the strip is helically wound the one edge engages in the configuration of the other edge to seal the hose and form a flexible member which has an upstanding helical configuration on it but the strip is of relatively narrow width.

A further known method is to use a strip of somewhat wider form, formed of a synthetic material which again has the longitudinal edges shaped so that the one edge can engage into a socket in the other edge when the edges are contiguously positioned, this being disclosed in the specification of United States Patent No. 3 606 670. Such a method is also disclosed in German patent specification No 1778201 in which the strip is profiled additionally to form a bead extending longitudinally of the strip between the shaped edges and in German patent specification No 2613366 in which a plastic strip constructed to be wound into a tube has rib projections on one face.

The object of the present invention is to provide an improved form of strip and method of use which will have certain advantages over the known art and which avoids the need to have heavy sections and which can be used to form a tubular object such as a pipe or can be associated with a preformed pipe to stiffen and reinforce the pipe.

A further object is to provide a strip which can be wound into the form of a pipe and which has a configuration such that there will be adequate strength in such a pipe because of improved locking between adjacent turns of the strip.

Summary of the Invention

In accordance with the invention an elongated strip for forming articles by helically winding the said strip which has a series of upstanding ribs spaced apart across the width of the strip on at least one side thereof to form therebetween a series of open longitudinally extending side by side channels, and connecting means on the said strip formed by a joining rib and a complementary engaging rib spaced apart transversely of the said strip and adapted to interengage and be connected together when one edge portion is placed over at least the other edge portion of the strip when helically winding the strip whereby to hold the said strip in its helical configuration is characterised in that the strip has an extension laterally outwards from the engaging rib to engage the adjacent rib lying inwardly of the joining rib when the strip is helically wound and said adjacent rib is provided with means for interlocking with said extension.

Figure 1 is an end elevation of a strip formed according to this invention.

Brief Description of the Drawings

Figure 2 is a somewhat enlarged view showing how the two edges of contiguous parts of the strip interengage when wound together in a helical manner.

Figure 3 is a perspective view of a tubular article manufactured from such a strip, the end of the article being shown partly unformed to clearly show the strip.

Figure 4 is a view corresponding to Figure 1 but showing how the strip can be reversed to provide a smooth outer surface and if required to be wound around an inner tube whereby to have a series of longitudinal channels on the strip which may be sealed to form secondary conduits.

Figure 5 is a perspective view corresponding to Figure 3 showing a pipe with such a helically wound strip thereon.

Figure 6 shows how the form of the invention shown in Figures 1 to 3 can be filled in to further reinforce the strip.

Figure 7 shows a modified form of strip in which the ribs are relatively closely spaced and the strip itself is apertured between the ribs to provide a device which can for instance be used as a sand screen when such a strip is arranged in helical configuration.

Figure 8 shows a further embodiment of such a device, and

Figure 9 shows very schematically how a strip of the invention may be drawn off from a supporting reel and formed into a tubular article.

Figure 10 shows a further embodiment of such a device, and

Figure 11 shows very schematically how a strip of the invention may be drawn off from a supporting reel and formed into a tubular article.

Description of the Preferred Embodiments

Referring first to Figures 1, 2 and 3, it will be seen that the strip 1 has on it a series of upstanding ribs 2 which ribs are strengthened at their outer ends by small flanges 3, the rib 2a at

the one edge of the strip, referred to as a joining rib, having a series of barbs 4 on it, the rib 2b near the other edge of the strip, referred to as an engaging rib, being shaped to form a barbed socket 5 and arranged so that the rib 2a can engage the socket of the rib 2b, the strip having the rib 2b shaped so that it presses against an adjacent rib 2 when the two edges are joined as shown more particularly in Figure 2 where it will be noted that the edge of the rib 2c engages beneath the flange 3 on the rib 2. This forms a series of channels 6.

In Figure 3 is shown how a tubular object such as a pipe is formed when a strip is helically wound and the edges interengage by forcing the rib 2a into the socket 5 of the rib 2b.

In Figures 4 and 5 is again shown a strip similar to that shown in Figure 1 but in this case the strip 11 has the ribs 12 inwardly positioned when the tubular object is formed by helically winding such a strip, the strip again having a barbed joining rib 12a at one end and a socket 15 in the engaging rib 12b but in Figure 4 this strip is shown wound onto a liner 17 which may be a pipe which is required to be reinforced, and when such a strip is tightly wound onto the liner 17 with the barbed rib 12a engaged in the socket 15 of the rib 12b a series of channels 16 result which can be sealed if required by cementing or otherwise joining the flanges 13 to the liner 17. It will be obvious however that the strip of Figure 1 can similarly be used in this inverted manner without winding it onto a liner, and whether the configuration of Figure 3 or Figure 5 is used depends on whether a smooth outside surface is required or whether the ribs are merely for the purpose of stiffening and protecting and particularly whether the secondary channels are required.

In Figure 6 a similar configuration is again used in that the strip 41 has upstanding ribs 42 but in this case the longitudinal channels 46 between the ribs are filled by a material such as concrete to form a helical filler 49. The concrete can be poured into the channels 46 and that case the strip 41 forms a liner for the filler 49.

In Figure 7 the strip 51 again has ribs 52 but these are spaced closer together than in the previous embodiment and have shaped flanges 53 at the outer ends which form narrow openings between them, and the strip 51 itself is apertured at 58 between the ribs 51 and the device can then be used as a bore screen or the like where water is to permeate into the hollow of the screen but sand is prevented from entering the defined space.

Figure 8 shows a similar configuration to Figure 7 but in this case the strip 61 has larger ribs 62 at spaced intervals with smaller ribs 62d between the larger ribs 62 and here also the outside edges of the ribs 62 and 62a are provided with flanges 63 which can then form between them narrow slots so far as the smaller ribs 62a are concerned but the extending ribs

62 serve to prevent large materials from reaching and blocking the gaps between the ribs 62a, holes or slots 68 again being used through the strip to allow flow of liquid so that the device again acts as a bore screen or the like.

Figure 9 shows the strip 91 being fed from a reel 94, which contains a coil of strip 95, to between a pair of forming rollers 96 which force the joining rib into the socket of the engaging rib when the rollers 96 are driven to feed the strip 91 from the coil 95 onto itself at this point to form the tubular article 97, the article 97 resting on roller supports 98 which allow the article 97 to rotate as the further length of strip 91 from the coil 95 is joined onto it.

An elongated strip for forming articles by helically winding the strip which has a series of upstanding ribs spaced apart across the width of the strip and connecting means on the strip formed by a joining rib and a complementary engaging rib spaced apart transversely of the strip and adapted to interengage and be connected together when the strip is helically wound and in which at least some of said ribs each have a flange adjacent its free-end portion to strengthen such ribs, each of said flanges being separated from the flange of any adjacent rib forms the subject of Applicants copending application No. 80101722.9.

Claims

1. An elongated strip for forming articles by helically winding the said strip which has a series of upstanding ribs (2) spaced apart across the width of the strip on at least one side thereof to form therebetween a series of open longitudinally extending side by side channels (6), and connecting means (2a, 2b) on the said strip formed by a joining rib (2a) and a complementary engaging rib (2b) spaced apart transversely of the said strip and adapted to interengage and be connected together when one edge portion is placed over at least the other edge portion of the strip when helically winding the strip whereby to hold the said strip in its helical configuration, characterised in that the strip has an extension (2c) laterally outwards from the engaging rib (2b) to engage the adjacent rib lying inwardly of the joining rib (2a) when the strip is helically wound and said adjacent rib (2) is provided with means (3) for interlocking with said extension (2c).

2. An elongated strip according to claim 1, wherein the said joining rib is a barbed rib (4) on one side of the strip and the said engaging rib is on the same side of the strip and has a barbed socket (5) formed therein from the opposite side of the said strip.

3. An elongated strip according to claim 1 or 2, wherein said adjacent rib (2) is provided with a flange (3).

4. An elongated strip according to claim 3, wherein said adjacent rib (2) is "T" shaped.

5. An elongated strip according to any one of

the one edge of the strip, referred to as a joining rib, having a series of barbs 4 on it, the rib 2b near the other edge of the strip, referred to as an engaging rib, being shaped to form a barbed socket 5 and arranged so that the rib 2a can engage the socket of the rib 2b, the strip having the rib 2b shaped so that it presses against an adjacent rib 2 when the two edges are joined as shown more particularly in Figure 2 where it will be noted that the edge of the rib 2c engages beneath the flange 3 on the rib 2. This forms a series of channels 6.

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An elongated strip for forming articles by helically winding the strip which has a series of upstanding ribs spaced apart across the width of the strip and connecting means on the strip formed by a joining rib and a complementary engaging rib spaced apart transversely of the strip and adapted to interengage and be connected together when the strip is helically wound and in which at least some of said ribs each have a flange adjacent its free-end portion to strengthen such ribs, each of said flanges being separated from the flange of any adjacent rib forms the subject of Applicants copending application No. 80101722.9.

Claims

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2. An elongated strip according to claim 1, wherein the said joining rib is a barbed rib (4) on one side of the strip and the said engaging rib is on the same side of the strip and has a barbed socket (5) formed therein from the opposite side of the said strip.

3. An elongated strip according to claim 1 or 2, wherein said adjacent rib (2) is provided with a flange (3).

4. An elongated strip according to claim 3, wherein said adjacent rib (2) is "T" shaped.

5. An elongated strip according to any one of



claims 1—4, wherein the said upstanding ribs (52) are relatively closely spaced and the flanges (53) form slits opening from the said channels formed between the ribs and apertures (58) extend through the said strip opening to the said channels (53).

6. An elongated strip according to any one of claims 1—4, characterised by spaced ribs (62) upstanding further than the remaining ribs (62a).

7. A method of forming an article by winding an elongated strip as claimed in any one of claims 1—4 into a helical form and joining said connecting means by interengaging or cementing said means to hold the strip in a helical configuration, wherein the channels between the said ribs are filled with a solid material during or after helically winding the said strip.

8. A method of forming an article by winding an elongated strip as claimed in any one of claims 1—4 into a helical form and joining said connecting means by interengaging or cementing said means to hold the strip in a helical configuration, wherein the said strip is wound onto a tubular article to reinforce said article.

9. A method of forming an article by winding an elongated strip as claimed in any one of claims 1—4 into a helical form and joining said connecting means by interengaging or cementing said means to hold the strip in a helical configuration, wherein a further strip is wound over the said strip with the helix being formed in the opposite direction whereby to reinforce the said strip.

Revendications

1. Longue bande pour former des articles en enroulant hélicoïdalement ladite bande qui comporte sur une de ses faces une série de nervures verticales (2) espacées les unes des autres sur la largeur de la bande de manière à former entre elles une série de rainures ouvertes (6) s'étendant côte à côte longitudinalement, et des moyens de raccordement (2a, 2b) formés sur ladite bande par une nervure d'assemblage (2a) et une nervure d'emboîtement complémentaire (2b) espacées l'une de l'autre transversalement à ladite bande et adaptées pour emboîter l'une dans l'autre et être assemblées l'une à l'autre lorsqu'une des parties marginales est placée sur au moins l'autre partie marginale de la bande pendant l'enroulement hélicoïdal de la bande de manière à maintenir ainsi ladite bande dans sa configuration hélicoïdale, caractérisée par le fait que la bande comporte un prolongement (2c) s'étendant latéralement vers l'extérieur de toutes les nervures d'emboîtement (2b) de manière à porter contre la nervure adjacente se trouvant intérieurement par rapport à la nervure d'assemblage (2a) quand la bande est enroulée hélicoïdalement, et ladite nervure adjacente (2) est munie d'un moyen (3) destiné à s'enclencher avec ledit prolongement (2c).

2. Longue bande suivant la revendication 1, dans laquelle ladite nervure d'assemblage est une nervure crantée (4) présente sur une des faces de la bande et ladite nervure d'emboîtement se trouve sur la même face de la bande et comporte une cavité crantée (5) qui est formée à partir de la face opposée de ladite bande.

3. Longue bande suivant les revendications 1 ou 2, dans laquelle ladite nervure adjacente (2) est pourvue d'un rebord (3).

4. Longue bande suivant la revendication 3, dans laquelle ladite nervure adjacente (2) est profilée en "T".

5. Longue bande suivant l'une quelconque des revendications 1 à 4, dans laquelle lesdites nervures verticales (52) sont relativement proches les unes des autres et les rebords (53) forment des fentes s'ouvrant à partir desdites rainures formées entre les nervures, et des ouvertures (58) s'étendent à travers ladite bande en débouchant dans lesdites rainures (53).

6. Longue bande suivant l'une quelconque des revendications 1 à 4, caractérisée par des nervures espacées (62) plus hautes que les nervures restantes (62a).

7. Procédé pour former un article en enroulant sous une forme hélicoïdale une longue bande suivant l'une quelconque des revendications 1 à 4, et en assemblant lesdits moyens de raccordement par emboîtement ou collage desdits moyens de manière à maintenir la bande dans une configuration hélicoïdale, procédé dans lequel on remplit les rainures entre lesdites nervures avec une matière solide pendant ou après l'enroulement hélicoïdal de ladite bande.

8. Procédé pour former un article en enroulant sous une forme hélicoïdale une longue bande suivant l'une quelconque des revendications 1 à 4, et en assemblant lesdits moyens de raccordement par emboîtement ou collage desdits moyens de manière à maintenir la bande dans une configuration hélicoïdale, procédé dans lequel on enroule ladite bande sur un article tubulaire pour renforcer ledit article.

9. Procédé pour former un article en enroulant sous une forme hélicoïdale une longue bande suivant l'une quelconque des revendications 1 à 4, et en assemblant lesdits moyens de raccordement par emboîtement ou collage desdits moyens de manière à maintenir la bande dans une configuration hélicoïdale, procédé dans lequel on enroule une autre bande sur ladite bande en formant une hélice dans le sens opposé de manière à renforcer ainsi ladite bande.

Patentansprüche

1. Länglicher Streifen zur Formung von Gegenständen durch wendelförmiges Wickeln des Streifens, welcher eine Reihe hochstehender Rippen aufweist, die im Abstand voneinander wenigstens auf einer Seite des Streifens angeordnet sind, um zwischen ihnen eine Reihe



offener nebeneinander verlaufender Kanäle zu bilden, und welcher ferner Verbindungsmittel aufweist, die durch eine Verbindungsrippe und eine komplementäre Eingriffsrippe gebildet wird, die quer zum Streifen voneinander beabstandet sind und darauf eingerichtet sind, ineinander einzugreifen und miteinander verbunden zu werden, wenn ein Kantenabschnitt beim wendelförmigen Wickeln des Streifens wenigstens über den anderen Kantenabschnitt aufgelegt wird, um dadurch den Streifen in seiner wendelförmigen Gestalt zu halten, dadurch gekennzeichnet, daß der Streifen eine Erweiterung (2c) von der Eingriffsrippe (2b) zur Seite nach außen aufweist, um die benachbarte Rippe zu kontaktieren, die von der Verbindungsrippe einwärts liegt, wenn der Streifen wendelförmig gewickelt ist und die benachbarte Rippe (2) mit einer Einrichtung (3) zur Verriegelung mit der Erweiterung (2c) versehen ist.

2. Streifen nach Anspruch 1, dadurch gekennzeichnet, daß die Verbindungsrippe eine Rippe (4) mit Widerhaken auf einer Seite des Streifens ist und die Eingriffsrippe sich auf derselben Seite des Streifens befindet und eine Aufnahme (5) mit Widerhaken aufweist, die darin von der entgegengesetzten Seite des Streifens geformt ist.

3. Streifen nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die benachbarte Rippe (2) mit einem Flansch (3) versehen ist.

4. Streifen nach Anspruch 3, dadurch gekennzeichnet, daß die benachbarte Rippe (2) T-förmig ist.

5. Streifen nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß die hochstehenden Rippen (52) relativ nahe beieinander angeordnet sind und die Flansche (53) Schlitz bilden, die von den zwischen den Rippen gebildeten Kanälen her offen sind, und daß Öff-

nungen (58) durch den Streifen hindurch verlaufen, die zu den Kanälen (53) hin offen sind.

6. Streifen nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß der beabstandete Rippen (62) weiter hochstehen als die übrigen Rippen (62a).

7. Verfahren zur Formung von Gegenständen durch Wickeln eines länglichen Streifens nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß der Streifen zu einer wendelförmigen Gestalt geformt wird und die Verbindungsmittel durch Ineinandergreifen oder Zementieren verbunden werden, um den Streifen in der wendelförmigen Gestalt zu halten, wobei die Kanäle zwischen den Rippen während oder nach dem wendelförmigen Wickeln des Streifens mit einem festen Material gefüllt werden.

8. Verfahren zur Formung von Gegenständen durch Wickeln eines länglichen Streifens nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß der Streifen zu einer wendelförmigen Gestalt geformt wird und die Verbindungsmittel durch Ineinandergreifen oder Zementieren verbunden werden, um den Streifen in der wendelförmigen Gestalt zu halten, wobei der Streifen auf einen rohrförmigen Gegenstand gewickelt wird, um ihn zu verstärken.

9. Verfahren zur Formung von Gegenständen durch Wickeln eines länglichen Streifens nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß der Streifen zu einer wendelförmigen Gestalt geformt wird und die Verbindungsmittel durch Ineinandergreifen oder Zementieren verbunden werden, um den Streifen in der wendelförmigen Gestalt zu halten, wobei über den Streifen ein weiterer Streifen gewickelt wird und dabei die Wendel in der entgegengesetzten Richtung geformt wird, um den Streifen zu verstärken.

