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Connector for a corrugated pipe with locking portion

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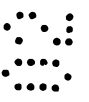
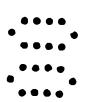
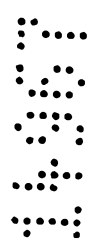
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Connector for a Corrugated Pipe with Locking Portion

Abstract

The invention relates to a connector for a corrugated pipe for fastening a corrugated pipe, wherein a locking portion (10) with a lip (30, 32, 34, 35, 36) on a side of the locking portion facing the corrugated pipe is provided and the locking portion in the closed condition of the connector for a corrugated pipe is opposite the interlocking portion, whereby in accordance with the invention the lip extends along the locking portion so that it extends for more than 180° of the corrugated pipe circumference between two adjacent corrugated pipe corrugations, whereby the lip portions are closer to one another relative to the plane of symmetry (54) than the furthest spaced apart inner contours of the lip which are opposite one another.



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Connector for a Corrugated Pipe with Locking Portion

The following statement is a full description of this invention, including the best method of performing it known to me/us:-

CONNECTOR FOR A CORRUGATED PIPE WITH LOCKING PORTION

Field of the Invention

The present invention relates to a connector for a corrugated pipe for the fastening of a
5 corrugated pipe and having a locking portion which includes at least one lip on a side of
the locking portion directed towards the corrugated pipe, whereby in the locked condition
of the connector for a corrugated pipe an interlocking portion lies opposite the locking
portion.

Background Art

Such connector for a corrugated pipes are sufficiently known in the art and are
manufactured and distributed by the applicant itself. Such connectors for corrugated
pipes are often constructed as click together ties, whereby the locking portion is most of
the time C-shaped. The legs of the C-shaped locking portion are inserted into an
15 interlocking portion and interlock with the latter, whereby the lip extends between the
corrugation peaks of a corrugated pipe and thereby fastens the corrugated pipe within
such a connector for a corrugated pipe.

Further known connector for a corrugated pipes include a locking portion which is
20 connected with the interlocking portion by way of a hinge or a connecting web. Also, in
those connectors for corrugated pipes several lips engage the corrugations of a corrugated
pipe.

As already mentioned, several, which means at least two or three lips, are required in the
25 known connectors for corrugated pipes, which must engage the corrugation valleys of a
corrugated pipe to be fastened. For example, when the pipe in the region of the connector
for a corrugated pipe is bent or when a pulling force is exerted on the pipe, at least two or
three lips are required in the prior art connector for a corrugated pipe in order for the
connector to sufficiently robustly connect with a corrugated pipe at very exact
30 specifications, permanently, and as far as possible tear-off proof. As a result, corrugated
pipes of only one single corrugated pipe profile can be sufficiently strongly fastened with
a specific connector for a corrugated pipe.

Object of the Invention

35 It is an object of the present invention to substantially overcome or at least ameliorate one
or more of the disadvantages of the prior art, or at least to provide a useful alternative.

Summary of the Invention

The invention provides a connector for fastening to a corrugated pipe including;

a locking portion having at least one lip on a side that faces the corrugated pipe in use, said lip extending continuously over more than 180° around the circumference of said corrugated pipe and between two adjacent corrugations of said corrugated pipe in use, said locking portion having an plane of symmetry in which a longitudinally extending axis of said pipe lies in use; and

an interlocking portion adapted to engage with said locking portion and located opposite to said locking portion when said connector is in use,

wherein the end portions of said lip are closer to each other in relation to said axis of symmetry of said locking portion than the mutually opposite inner regions of the lip which are furthest apart.

The preferred embodiment provides on one hand a connector for a corrugated pipe of versatile use, which on the other hand is especially equipped with a further improved holding force for the corrugated pipe.

5

The advantages to be achieved in accordance with the preferred embodiment are based on the lip on the locking portion extending so far that it extends over more than 180° of the corrugated pipe circumference between two adjacent corrugated pipe corrugations, whereby the lip portions are closer to one another relative to a plane of symmetry than the furthest spaced apart inner contours of the lip which are opposite to one another.

10

This means, especially in the lower end region of legs of the locking portion, the lip portions which are opposite to one another relative to the plane of symmetry are closer to one another than the regions of the lip which are opposite to the longitudinal axis of a fastened corrugated pipe.

15

The inner diameter of the lip can thereby be shaped evenly rounded or also linearly protrude or the like.

20

This enables an optimized force distribution onto the lip profile, especially at the end regions of the lips. An increased engagement pressure especially in the region in which such a connector for a corrugated pipe is normally pushed together can also be guaranteed.

25

Surprisingly, even when using a single lip, an increase in the rip out force of more than 30% can be achieved with this construction in accordance with the invention.

These surprising results are furthermore coupled with the circumstance that different profiles, especially fine or coarse profiles, of a corrugated pipe can be fastened in a connector for a corrugated pipe in accordance with the invention.

30

Of course, when giving up this last advantage, multiple lips can also be used in the connector for a corrugated pipe, for example, in order to provide an even higher holding force.

35

Advantageously, the lip extends symmetrically to a plane of symmetry or to a cylinder axis which extends in longitudinal direction of a fastened corrugated pipe. The lip thereby extends on one side at least by more than 90° in circumferential direction of the corrugated pipe. It is thereby essential

that the lip in the lower region, which means in that region where the locking portion ends, does not extend linear, which means tangential to the pipe diameter, but follows the pipe diameter at least for a short region, which means in that region in which the lip extends by more than 90° in circumferential direction of the corrugated pipe, or at least partially approaches the pipe.

5

It is advantageous when the lip extends in circumferential direction of the pipe for more than 190°, especially more than 200°, for example, for 210°, 220° or more.

10 In an additional region which lies beyond the 180° circumferential extent, the lip should radially inwardly extend further than in that region which is part of the 180° circumferential extent. The lip should thereby, as mentioned above, at least substantially approach or follow the outer circumference of the corrugated pipe in a corrugation valley in the additional region. The lip can thereby also be provided with a smaller diameter or circular section diameter than the associated corrugated pipe or the associated corrugated pipe within a corrugation valley, to be able to provide
15 a compression between the outer circumference of the corrugated pipe and the lip of the locking portion.

Of course, radially inwardly the lip can be of different heights, which means, the lip itself can radially inwardly have a wavy profile, a toothed profile, or can be constructed otherwise. However,
20 a continuous, linear lip profile is advantageous which at least substantially fits the outer diameter of a corrugated pipe in a corrugation valley.

Preferably, the inner partial radius of the lip is at least essentially even throughout, whereby the contour of the locking portion at the inner circumference of the locking portion to which the lip is connected can be at least substantially about oval. This has the effect that the required clearance
25 can be created for providing the lip with different dimensions.

Although it is also possible to construct the locking portion and the lip asymmetrically, it is very sensible for an easier handling to construct the locking portion symmetrical to a plane and to vary
30 the progressively higher lip in its radial height symmetrically to both sides of the plane.

It is thereby especially essential that the height increases from the intersection of the plane of symmetry of the locking portion with the lip, which is also constructed symmetrically thereto.

Advantageously, the locking element has two legs with a connecting portion, whereby the legs together with the connecting portion serve as an elastic element, whereby the locking element can be interlocked with an interlocking portion by way of at least one detent portion.

5 The interlocking portion itself can also be provided with at least one lip, which corresponds to the lip on the locking element or is constructed as a continuation of that lip. It is also possible to provide one or more lips in the interlocking portion, whereby that lip or lips are staggered to the lip in the locking portion by the axial extent of at least one corrugated pipe corrugation.

The locking portion can be connected with the interlocking portion by way of a connecting

10 portion. This connecting portion can be realized, for example, in the form of a web or a film hinge or the like. In this manner, a connector for a corrugated pipe in accordance with the invention can possibly also be constructed as a connector for a corrugated pipe to be assembled by a swivel movement, whereby, however, according to the invention especially attention is given to a two-part connector for a corrugated pipe with separate locking portion and separate interlocking
15 portion, since the advantages to be achieved according to the invention especially come into play here. It must particularly be noticed, that connector for a corrugated pipes with components connected through a film hinge have a point of weakness especially in region of the film hinge which is not present in a two-part connector for a corrugated pipe in accordance with the invention. Thus, when especially tear-out resistant connector for a corrugated pipes are required,
20 one will always have to turn to a two-part connector for a corrugated pipe.

In the case of a two-part connector for a corrugated pipe, it is practical when the detent portions are provided on each of the legs which belong to the locking portion. The interlocking portion then has complementary recesses which correspond to the detent portions on the locking portion.

25 When a connector for a corrugated pipe is used in which the locking portion and interlocking portion are connected, the detent portion can be left out, since the opposite side is held by way of the film hinge, the connecting lip or the like. Otherwise is also possible, to provide a principally two-part realization of a connector for a corrugated pipe with the features according to the
30 invention, with a connecting portion, which means, for example, a longer connecting web, for example, in order to permanently hold together the two components.

As already mentioned, it is especially advantageous to let the locking portion by way of its lip lie against the corrugated pipe, possibly under tension, and in the transition or overlap region between
35 the locking portion and the interlocking portion, which means where the detent portions engage the

interlocking portion. The corrugated pipe thereby has a somewhat smaller outer diameter than or the same outer diameter as the inner diameter of the lip in this region.

A spring portion is provided at the end region of the lip, so that the lip during pushing of the locking portion onto a corrugated pipe end can elastically give. To this end, a recess can be respectively provided at the end portions of the lip, so that in connection with the elastic properties of the material of which the connector for a corrugated pipe is normally manufactured, namely plastic, the lip can give way to the pipe, whereby at the same time also the elastic properties of the corrugated pipe can be used. However, since not only plastic corrugated pipes but also metal corrugated pipes can be fastened in the connector for a corrugated pipe in accordance with the invention, it can be efficient to arrange the elastic properties of the end portions of the lip in such a way that an elastic property of the corrugated pipe is not required.

It is well understood that the connector for a corrugated pipe in accordance with the present invention can be used as a connecting portion, for example onto a machine housing, which means a threaded connection or a bajonet connection extends from the interlocking portion. The connector for a corrugated pipe in accordance with the invention can also be used as a corner connection, a connector between two corrugated pipe ends, as a branch portion, or the like.

Brief Description of the Drawings

The present invention will now be described in more detail by way of the attached figures with reference to a specific embodiment with features according to the invention. Further features, advantages and goals of the invention are thereby disclosed. It show in the drawings:

Figure 1 a side view of the locking portion with features according to the invention;

Figure 2 a top view of a locking portion according to Figure 1; and

Figure 3 an outer view of the locking portion according to Figure 1 and 2.

Detailed Description of the Preferred Embodiment

Equal parts or parts at least of equal function are referred to in the Figures with the same reference number.

A locking portion 10 according to Figure 1 includes two legs 12a, 12b, which are connected with one another by way of a connecting portion 14. A round or oval contour advantageously results at the inner circumference of the body composed of the legs 12a, 12b and the connecting portion 14 from which the legs 12a, 12b tangentially extend. This contour can then be best pushed onto a

corrugated pipe (not illustrated) radially to its cylindrical axis. This applies for round corrugated pipes. Correspondingly, the shape must be adapted to the shape of corrugated pipes of other types, for example, oval corrugated pipes, cornered corrugated pipes or other types of corrugated pipes.

- 5 Detent portions 18a, 18b are respectively provided on the legs 12a, 12b by way of which the locking portion 10 can be fastened to an interlocking portion (not illustrated). The interlocking portions 18a, 18b include control guides 19a, 19b which lead to the legs 12a, 12b moving inwardly during insertion of the locking portion into the interlocking portion, so that then the detent portions 18a, 18b can engage in active connection with a cooperating shape or the detent shoulders on the
- 10 interlocking portion. The end portions 22a, 22b of the legs 12a, 12b can be shaped and constructed so that they elastically engage a corresponding recess on the interlocking portion in order to transmit an additional holding force in this way.

- 15 A lip 30, 32, 34, 35, 36 extends along the inner region of the locking portion 10. The locking portion overall is symmetrical to a plane of symmetry 54, which means the point of intersection between the plane of symmetry 54 and the region 30 of the lip is the "zero point" of the lip from which the dimensions of the lip change symmetrically and evenly or from which their height increases evenly towards the end regions 34 of the lip.

- 20 The main axis of a corrugated pipe extends through a virtual center point 52, the center of the circle defined by the inner circumference 36 of the lip. The circle 36, which means the inner circumference of the lip, corresponds to a pipe diameter in a corrugation valley.

- 25 Starting from the zero point 30 of the lip, the height of the lip increases throughout the regions 32, 34 and 35, starting from the body of the locking portion 10, which means the connecting portion 14 and the legs 12a, 12b.

- 30 The lip can thereby be constructed in such a way that it evenly engages corrugation valleys of a corrugated pipe, but this can also take place under tension, which means the height of the lip in the region 30 of the lip is less than the depth of the corrugation of a corrugated pipe, while in the region 35 the height of the lip is higher than the depth of the corrugation of the corrugated pipe. In this manner, the corrugated pipe can be braced relative to the lip or relative to the locking portion 10. However, this can lead to friction and to wear.

As is apparent, the lip is constructed in such a way that it engages the wall of a corrugated pipe in a corrugation valley over more than 180°, which means beyond the virtual center point 52. For example, if the pipe is bent, increased contact pressure in the interlocking region of the locking portion automatically results so that a higher rip out force would be necessary for removal of the corrugated pipe. Further, this is combined with an additional leverage of the anchorage of the legs of the locking portion 10 within the interlocking portion (not illustrated). The rip out force can be increased by 30% and more by way of the illustrated oval shape of the lip or the oval height change of the lip. This very advantageous and surprising result can be achieved although instead of the normally two to three lips only a single lip is used. The use of only a single lip however guarantees that different pipe profiles, which means fine and course pipe profiles, can be fastened with the connector for a corrugated pipe in accordance with the invention.

The lip profile which is constructed according to the present invention guarantees an optimal force distribution even in extreme situations, which means when the pipe in the region of the connector for a corrugated pipe in accordance with the invention is highly bent, and thereby provides for an even more secure fastening of the pipe.

Recesses are provided at the end portions 35 of the lip which leads to the end portions of the lip having elastic properties. The recesses 20a, 20b can thereby be dimensioned in such a way that the end regions of the lip can radially outwardly give for an appropriate distance when a corrugated pipe is to be fastened, which means when the locking portion is pushed onto a corrugated pipe end.

Figure 2 shows the locking portion 10 according to Figure 1 from above. The rounded connecting portion 14 merges into the large straight-shaped legs 12a, 12b. The detent portions 18a, 18b extend from the legs 12a, 12b, below which the elastic regions 22a, 22b are visible.

Figure 3 shows the locking portion constructed in accordance with the invention from the outside, whereby only the already described components are visible. In addition to the portions according to Figure 2, the guide region 19a is visible through which the legs 12a, 12b are forced to avoid a corresponding complementary profile of the locking portion so that the legs 12a, 12b can engage a latch connection through the detent arrangements 18a, 18b.

The claims defining the invention are as follows:

1. A connector for fastening to a corrugated pipe including;

a locking portion having at least one lip on a side that faces the corrugated pipe in use, said lip extending continuously over more than 180° around the circumference of said corrugated pipe and between two adjacent corrugations of said corrugated pipe in use, said locking portion having a plane of symmetry in which a longitudinally extending axis of said pipe lies in use; and

an interlocking portion adapted to engage with said locking portion and located opposite to said locking portion when said connector is in use,

wherein the end portions of said lip are closer to each other in relation to said axis of symmetry of said locking portion than the mutually opposite inner regions of the lip which are furthest apart.
2. A connector according to claim 1, wherein said lip extends in a circumferential direction of the corrugated pipe over more than 190°.
3. A connector according to claim 1, wherein a plane perpendicular to said plane of symmetry and passing through said axis of said pipe in use, divides said lip into a first region containing said lip end portions and a second region containing the remainder of said lip, wherein the portions of the lip in said first region extend radially further inwardly than said lip at the intersection of said first and second regions.
4. A connector according to claim 3, wherein said lip in at least said first region follows the outer circumference of said corrugated pipe in a corrugation valley.
5. A connector according to claim 3, wherein a radially inner surface of said lip in said first region matches the outer circumference of said corrugated pipe in a corrugation valley.
6. A connector according to claim 3, wherein a radially inner surface of said lip in said first region is smaller than said outer circumference of said corrugated pipe in a corrugation valley.
7. A connector according to claim 1, wherein said lip has a radial thickness that varies around the circumference of said corrugated pipe.

8. A connector according to claim 1, wherein a radially inner surface of said lip forms an arc of substantially constant radius.

5 9. A connector according to claim 1, wherein a radially inner surface of said lip forms an arc of substantially oval profile.

10 10. A connector according to claim 1, wherein said lip has a radial thickness that increases from the point of intersection of said lip with said plane of symmetry to said end portions.

11. A connector according to claim 1, wherein a body of said locking portion includes two legs with an intermediate connecting portion which together form said locking portion.

15 12. A connector according to claim 1, wherein said interlocking portion has at least one lip which corresponds to said lip on said locking portion or is staggered axially in use thereto by at least one corrugated pipe corrugation.

20 13. A connector according to claim 11, wherein said locking portion is latchable to said interlocking portion by at least one detent portion provided on at least one of said two legs.

25 14. A connector according to claim 1, wherein said locking portion is held on said interlocking portion by way of a structure selected from a group consisting of a connecting portion, a film hinge, a connecting web and the like.

30 15. A connector according to claim 1, wherein said locking portion rests on or against said corrugated pipe in use, by way of its lip in a transition or overlapping region between said locking portion and said interlocking portion.

16. A connector according to claim 1, wherein an elastic portion is provided on at least one of said end regions of said lip.

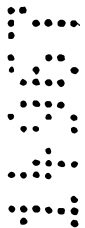
17. A connector substantially as hereinbefore described with reference to the accompanying drawings.

Dated 15 April, 2003

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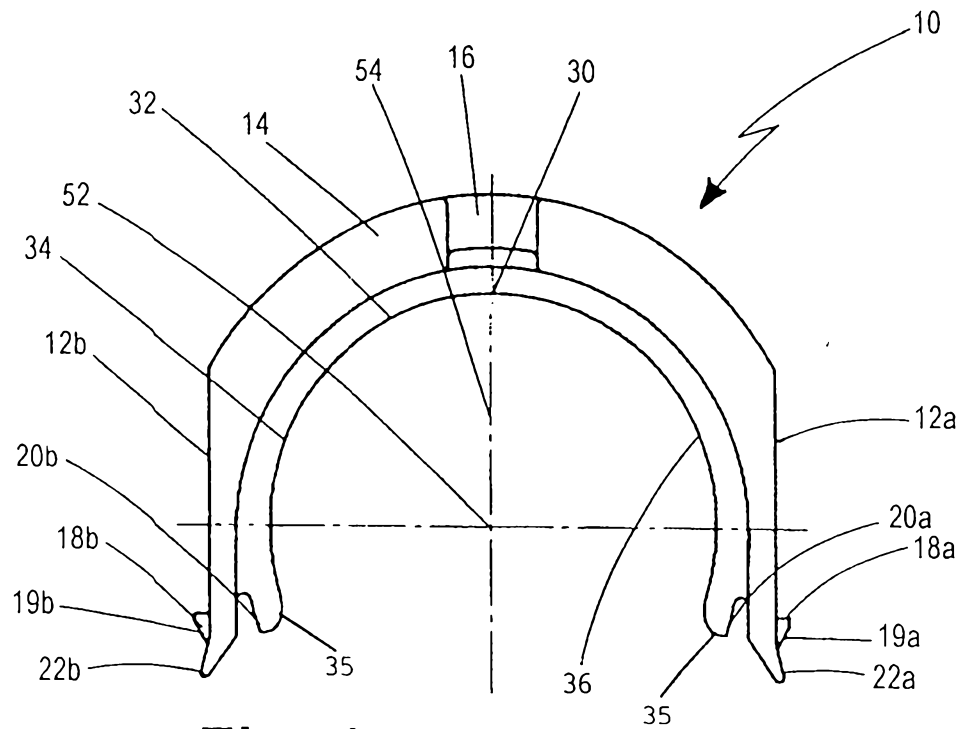


Fig. 1

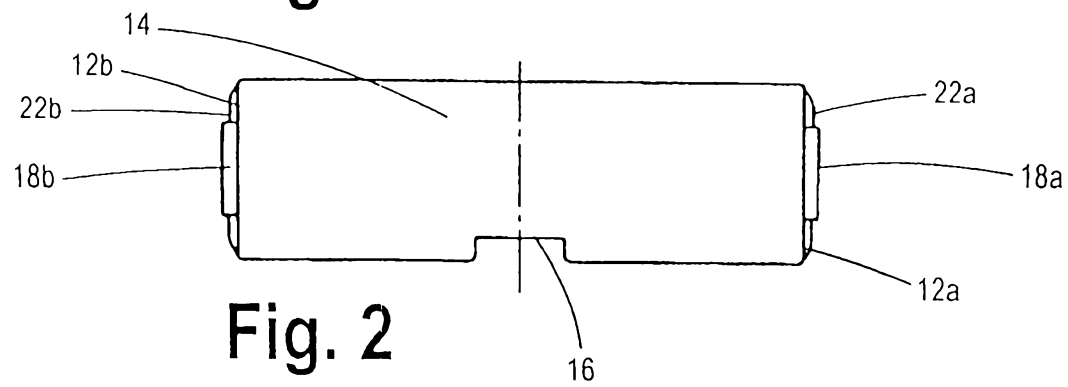


Fig. 2

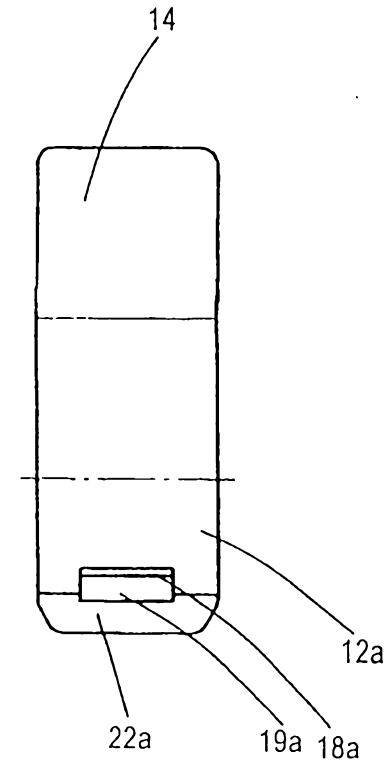


Fig. 3