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(54) **WALL LEAD-IN FOR FEEDER LINER**

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ABSTRACT

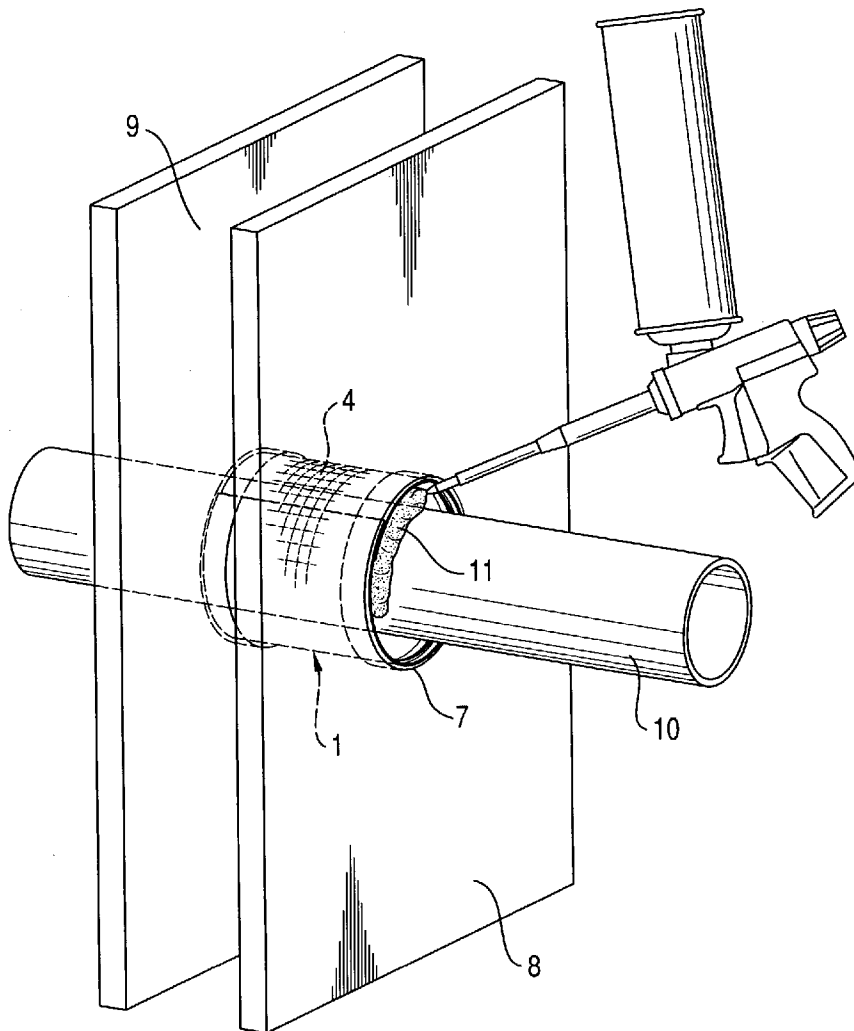
A wall lead-in for at least one feeder line (10) and including an element formed of an expandable material (11) and provided in an intermediate annular space between a through-opening (7) formed in a wall (8) and the at least one feeder line (10), and a sleeve-shaped form member having an outer diameter corresponding to a diameter of the through-opening (7), designed for surrounding the feeder line (10) and arrangeable coaxially therewith, and formed of a form element (1) made of a perforated strip material and having a predetermined length.

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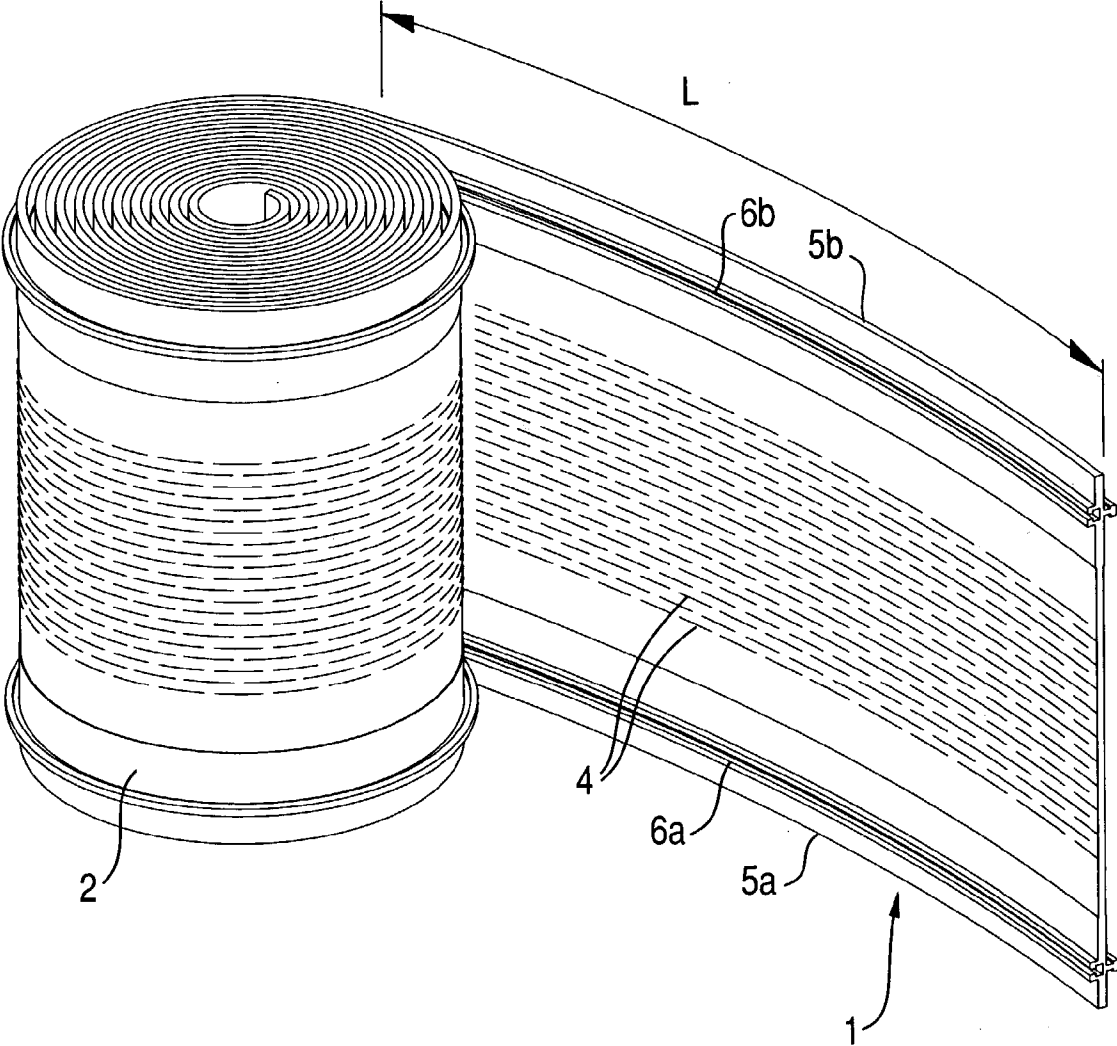
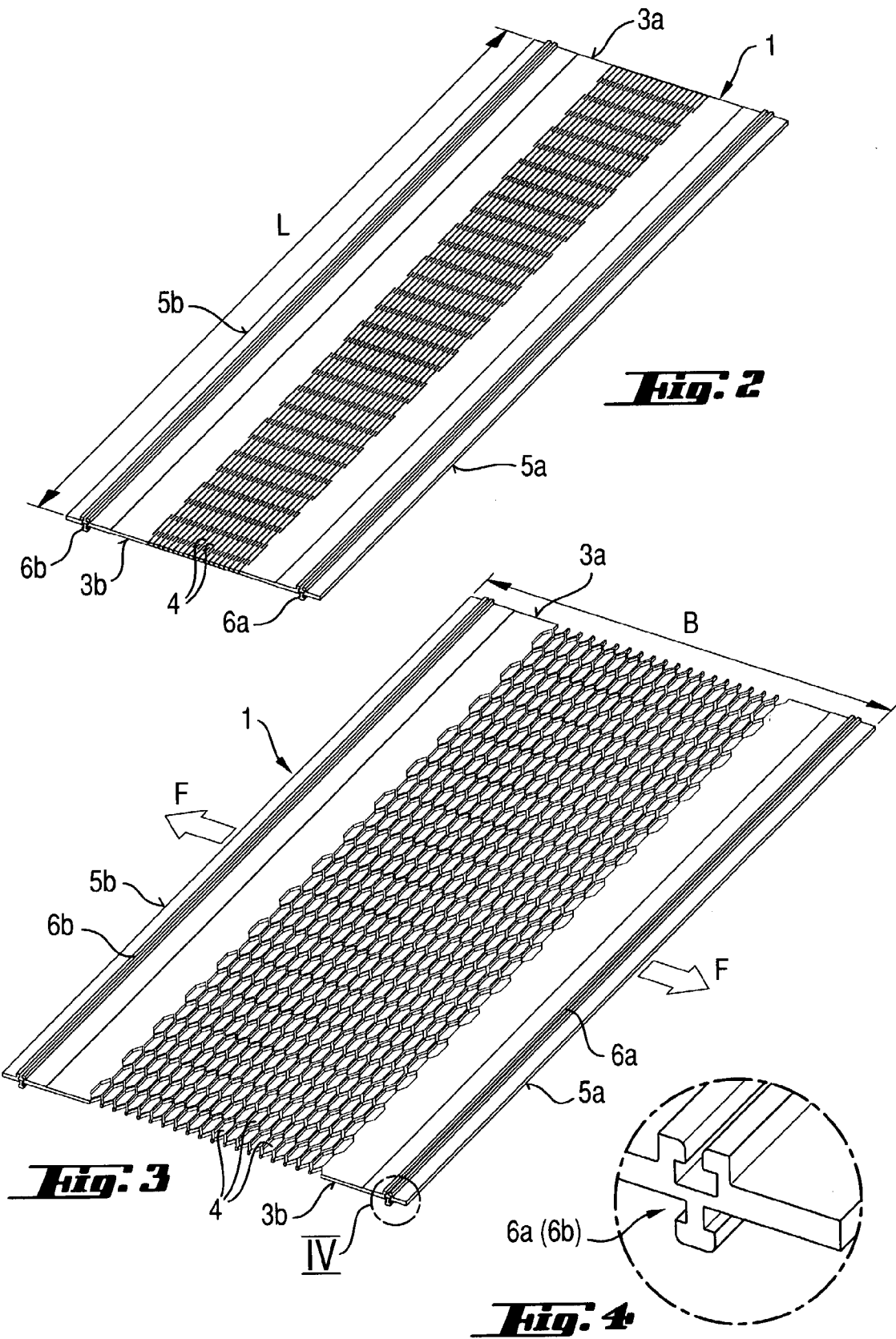


Fig. 1



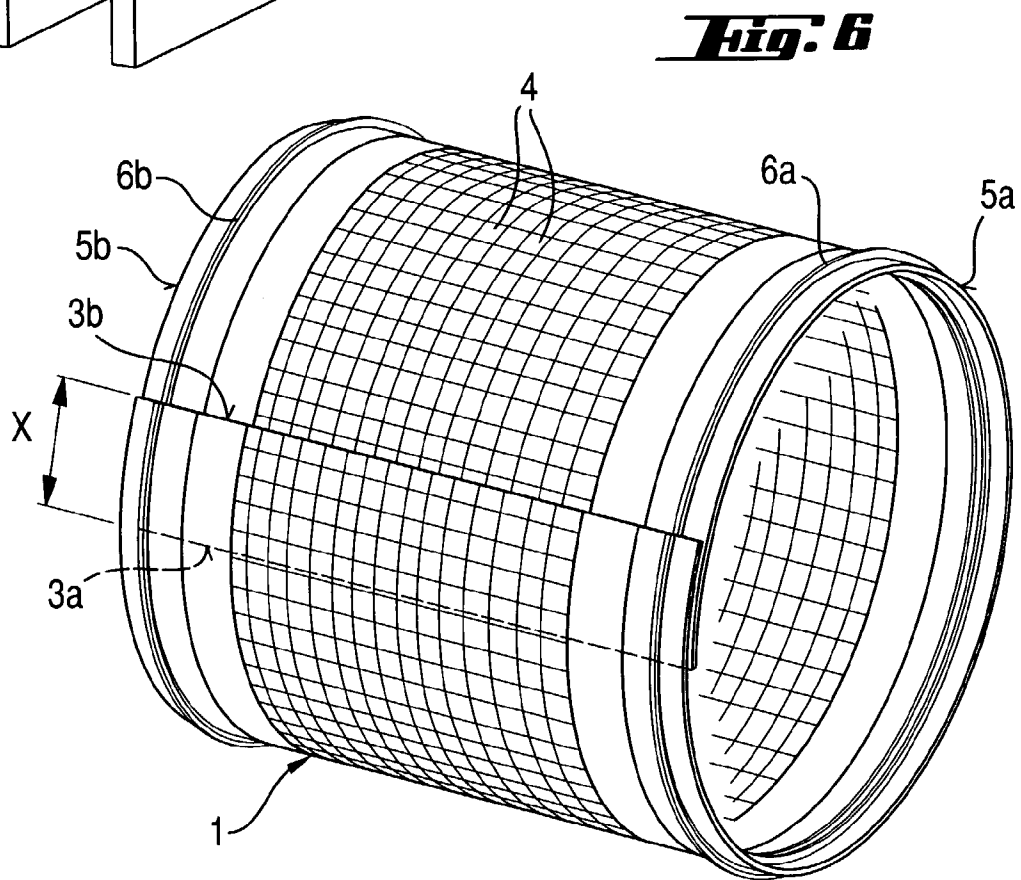
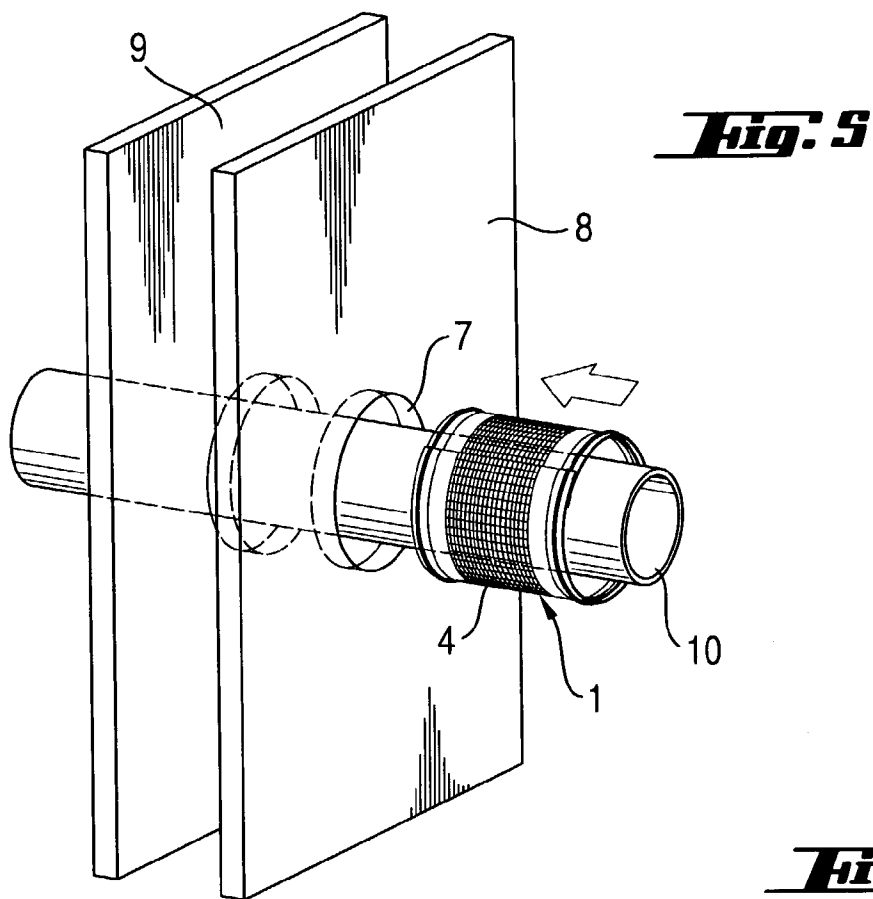
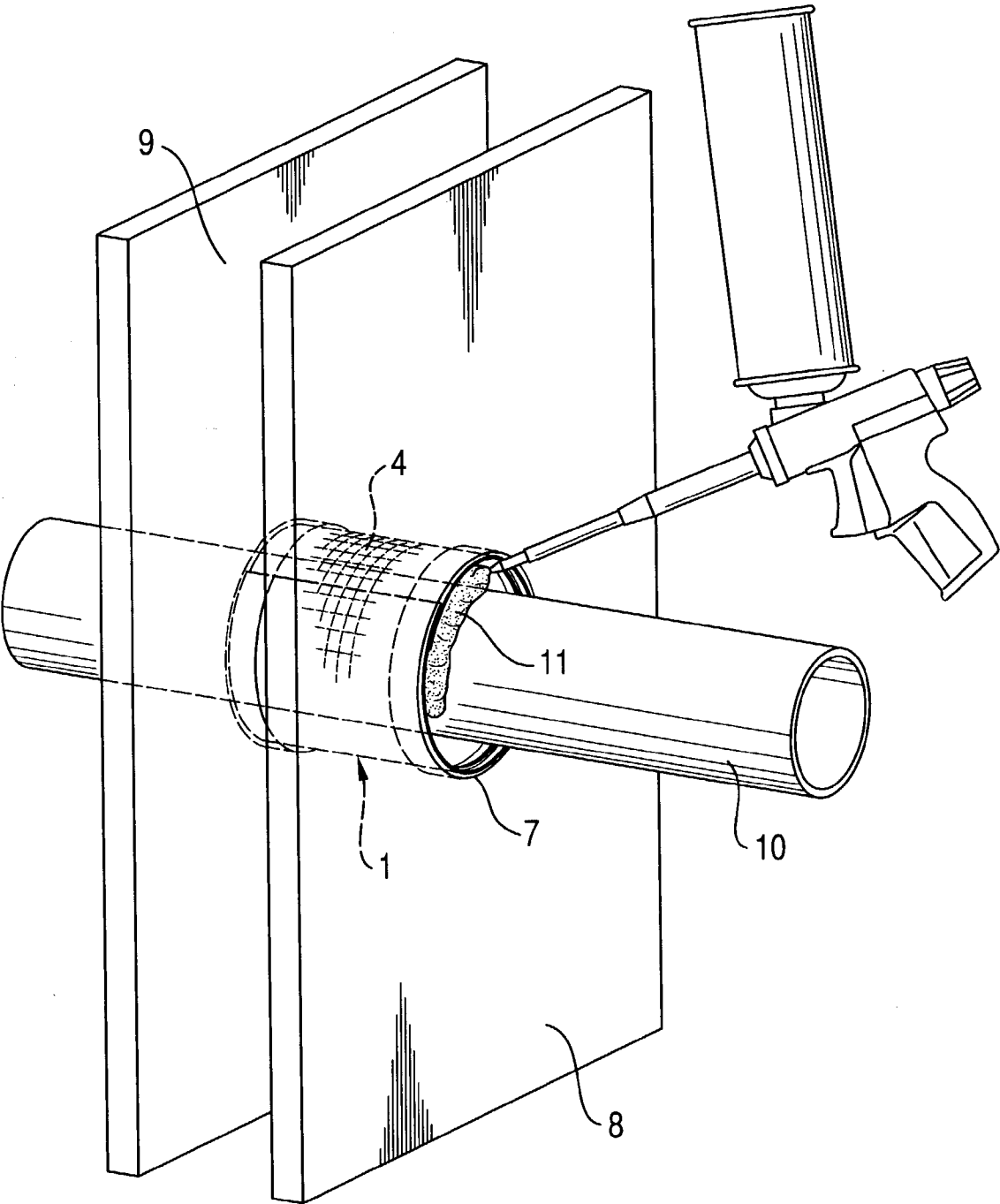
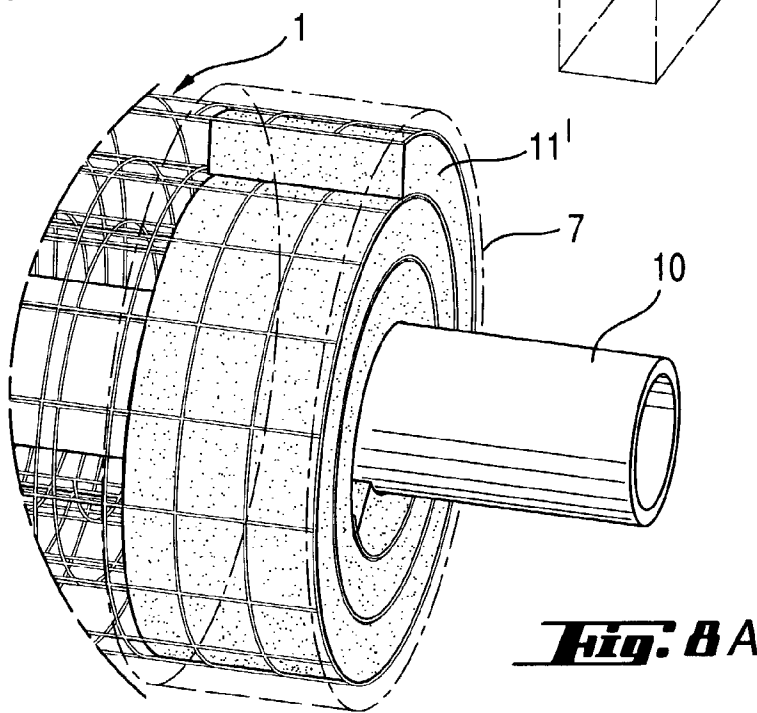
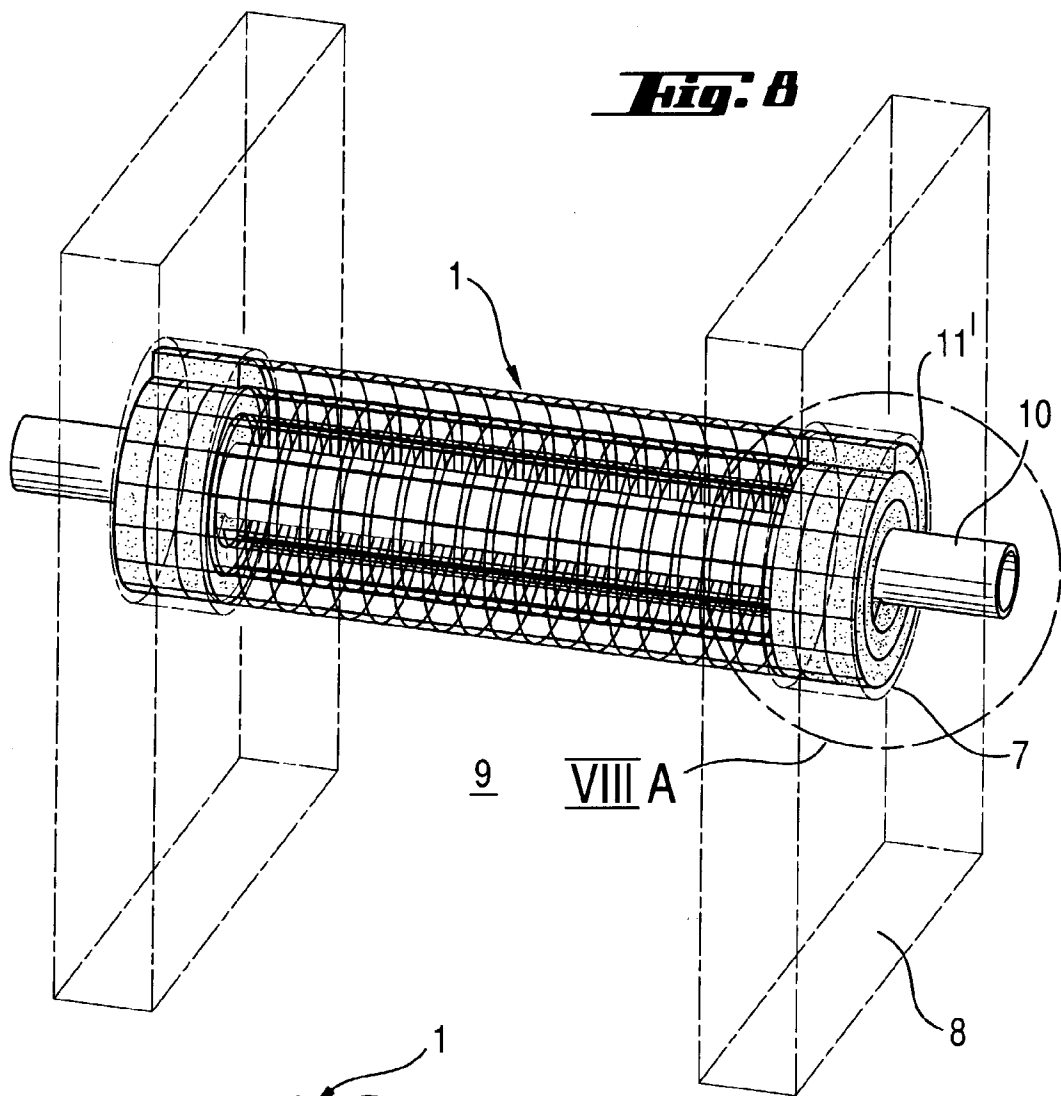


Fig. 1





WALL LEAD-IN FOR FEEDER LINER

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a lead-in for feeder lines such as current conductors and water conduits which extend through through-openings formed, in particular, in hollow walls, such as side walls, partitions and ceilings, and in particular to a lead-in designed for bridging the hollow space of a hollow wall. The present invention also relates to a method of forming such a lead-in.

[0003] 2. Description of the Prior Art

[0004] German Publication DE-19915667 discloses filling an intermediate annular space between a feeder line and the through-opening with an expandable material such as a polymer foam. The expandable material penetrates not unsubstancially into the hollow space when a pressure, which is required for a complete filling of the intermediate space, is applied.

[0005] German Publication DE-19955765 discloses closing an intermediate space between the through-opening and a feeder line with self-expandable band which is wound about the feeder line. The band is capable to close a narrow hollow space in a wall. However, a wide space such as exists, e.g., between walls of a formwork, the band cannot bridge.

[0006] U.S. Pat. No. 5,040,351 discloses the use of a rigid sleeve which is inserted into the intermediate space and which forms part of the lead-in. Such sleeves are only suitable for walls in which the opposite through-opening have the same diameter, and they should be mounted before the feeder line itself is inserted.

[0007] German Publication DE-25 51 693 discloses filling of the intermediate space with mineral wool, with sealing of the hollow space with expanded sheet metal.

[0008] U.S. Pat. No. 5,058,346 discloses filling the volume of the intermediate space with spherical expanded sheet metal insertable into each other, which provides for heat conductance between the wall and the feeder line.

[0009] German Publication DE-35 35 251 discloses a dowel for securing a lead-in to walls with a hollow space therebetween. The dowel is cemented in a blind bore and has a radially outer, surrounding dowel sleeve that is formed of a metal grid or a perforated sheet metal and is inserted into the bore beforehand.

[0010] German Publication DE-36 43 708 discloses using a sheet metal or metal cloth covered with intumescent material.

[0011] German Publication DE-196 20 898 discloses use of an intumescent scotch tape.

[0012] An object of the present invention is to provide a wall lead-in for feeder lines and suitable for bridging the hollow space of a hollow wall.

SUMMARY OF THE INVENTION

[0013] These and other objects of the present invention, which will become apparent hereinafter, are achieved by a lead-in having intermediate spacer means formed of an

expandable material and provided between a through-opening formed in a wall and the at least one feeder line, and a sleeve-shaped form member, having an outer diameter corresponding to a diameter of the through-opening, designed for surrounding the feeder line and arrangeable coaxially therewith, and formed of a form element made of a perforated strip material having a predetermined length.

[0014] By using a sleeve-shaped, rigid form member, which at least partially bridges the wall hollow space, a necessary pressure can be used for filling the intermediate space between the through-opening and the feeder line with expandable and hardenable material. The expandable and hardenable material which pours at least partially out through the openings of the perforated form member, after hardening, reliably secures the form member and the feeder line with the wall.

[0015] Advantageously, the perforated form element, of which the form member is formed, is formed of a manually plastically stretchable material, advantageously, of expandable metal sheet, metal cloth, perforated sheet metal, at least 50% of which is occupied by openings, or of a plastic grid 50% of the surface of which is occupied by openings. The form elements can be manually formed with different thicknesses.

[0016] Advantageously, the perforated form element, upon being formed into a sleeve-shaped, form member, has a region formed by overlapping side edges having substantially the same width. The form element is usually cut off from a yardware band and with a length corresponding to the circumference of a wall through-opening into which the to-be formed form member is to be inserted.

[0017] Advantageously, the sleeve-shaped form member has axial end edges which are formed by side edges of the form element which, optionally, can be free of perforation. This prevents any possibility of damage of regions projecting beyond the wall surface.

[0018] Advantageously, the side edges are provided with a continuous self-locking element or with spaced from each other, self-locking sections, which insure, upon forming the sleeve-shaped form member, fixed connection of the end edges with each other.

[0019] For sealing the intermediate space between the through-opening and feeder line, first a form element is cut off of a perforated strip material available in form of yardware, taking into consideration the circumference of the wall through-opening, the width of the overlapping region of the to-be-formed sleeve-shaped form member, and loss of length upon cutting. Then, the form element is plastically stretched on the wall and is bent around the feeder line, whereby the sleeve-shaped form member is formed. Finally, the overlapping region is closed by using the self-locking elements provided on the side edges of the form element. Thereafter, the sleeve-shaped form member is inserted through the intermediate space between the through-opening and the feeder line, and the annular space between the form member and the feeder line is filled with an expandable and hardenable, foamed material which pours out through the perforated form member, securing the form member and the feeder line to the wall.

[0020] According to the present invention, a fire-resistant lead-in element can be formed by using a perforated form

element e.g. expanded metal in combination with intumescent material which expands and fills the intermediate space upon occurrence of fire.

[0021] A fire-resistant lead-in element includes a relatively stiff perforated form element having an inherent stiffness and a plurality of openings at its surface and is designed for being bent around a feeder line coaxially therewith and insertable into an intermediate space between a wall through-opening and the feeder line, and a layer of an intumescent material provided on the form element at least in a region of the form element to be located in the intermediate space.

[0022] Advantageously, the size of the openings of the perforated form element does not exceed 50 mm. As a result, the expandable intumescent material only unsubstantially penetrates through the form element. However, the form element remains plastically deformable.

[0023] Advantageously, the entire perforated form element is covered with the layer of the intumescent material, so that the intumescent material is uniformly distributed over the form element, and the form element remains mechanically stable.

[0024] Advantageously, the perforated form element with a layer of an intumescent material is bent about the feeder line helicoidally several times over itself, with the radial dimension of the laps being adapted to the intermediate annular space.

[0025] The fire-resistant lead-in form element has both its end edges covered with a strip-shaped layer of an intumescent material, which insures a reliable sealing the intermediate annular space on opposite sides of the hollow space, without penetration of the intumescent material in the hollow space, which is ineffective in the hollow space.

[0026] The novel features of the present invention, which are considered as characteristic for the invention, are set forth in the appended claims. The invention itself, however, both as to its construction and its mode of operation, together with additional advantages and objects thereof, will be best understood from the following detailed description of preferred embodiments, when read with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] The drawings show:

[0028] FIG. 1 shows a reel of a perforated yardware material used in forming a lead-in according to the present invention;

[0029] FIG. 2 shows a section of the yardware material shown in FIG. 1 of which a lead-in form element is formed;

[0030] FIG. 3 shows the section of the yardware material shown in FIG. 2 in a stretched condition;

[0031] FIG. 4 shows a detail IV in FIG. 3 at an increased scale;

[0032] FIG. 5 shows a section of a hollow wall through which a feeder line extends;

[0033] FIG. 6 shows a lead-in form element;

[0034] FIG. 7 shows formation of an intermediate annular spacer between the form element and the feeder line;

[0035] FIG. 8 shows the lead-in formed as fire-resistant element; and

[0036] FIG. 8A shows a detail VIII A in FIG. 8.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0037] FIG. 1 shows a reel 2 of a perforated yardware material of which a section having a length L is cut for forming a lead-in form element 1 according to the present invention.

[0038] FIG. 2 shows a cut-off section of the perforated material having similarly formed side edges 3a, 3b.

[0039] FIG. 3 shows the same section as FIG. 2 cut in a stretched condition, with the perforation openings 4 occupying 50% of the surface of the form element 1. The section is stretched manually upon application of a force F to width B. This section has non-perforated, smooth side edges 5a, 5b provided each with a continuous self-locking mechanism 6a, 6b, which extends along the entire length of the form element section and which is shown in detail in FIG. 4.

[0040] FIG. 5 shows the formation of the lead-in form member. The stretched perforated form element, which is shown in FIG. 3, is bent about a feeder line 10 that extends through a hollow wall 8 having a hollow space 9. Upon bending the stretched form element 1 about the feeder line 10, the sleeve-shaped form member is formed. As shown in FIG. 6, the sleeve-shaped form member has an overlapping region X. The overlapping region X is closed with self-locking mechanisms 6a, 6b which are provided, respectively, on side edges 5a, 5b that form end edges of the sleeve-shaped form member. After the sleeve-shaped form member is formed, it is inserted through the through-opening 7 in the wall 8, as shown in FIG. 5.

[0041] As shown in FIG. 7, in the ring space between the form member and the feeder line 10, an expandable and hardenable, formed material 11 is injected.

[0042] Generally, FIGS. 1, 2, 3, 5, and 7 illustrate the method of forming a wall lead-in according to the present invention.

[0043] FIG. 8 shows formation of the lead-in as a fire-resistant element. A stretched, perforated form element 1, which is formed as an intralaminar prefolded metal grid with mesh size 5 mm×5 mm is bent helicoidally several times about the feeder line 10, which extends through the through-opening 7 formed in a hollow wall 8 with a hollow space 9. The opposite, spaced ends of the sleeve-shaped member are provided each with a strip-shaped layer formed of an intumescent material 11. The strip-shaped layer has a width of about 20 mm and a thickness of about 5 mm. The strips of the intumescent material are provided axially outside of the hollow space 9 adjacent thereto.

[0044] Though the present invention was shown and described with references to the preferred embodiments such are merely illustrative of the present invention and are not to be construed as a limitation thereof, and various modifications to the present invention will be apparent to those skilled in the art. It is, therefore, not intended that the present

invention be limited to the disclosed embodiments or details thereof, and the present invention includes all of variations and/or alternative embodiments within the spirit and scope of the present invention as defined by the appended claims.

What is claimed is:

1. A wall lead-in for at least one feeder line (10), comprising means formed of an expandable material (11) and provided in an intermediate annular space between a through-opening (7) formed in a wall (8) and the at least one feeder line (10); and a sleeve-shaped form member having an outer diameter corresponding to a diameter of the through-opening (7), designed for surrounding the feeder line (10) and arrangeable coaxially therewith, and formed of a form element (1) made of a perforated strip material and having a predetermined length.

2. A wall lead-in according to claim 1, wherein the perforated strip material is a manually stretchable material.

3. A wall lead-in according to claim 1, wherein the form element (1) has similarly formed side edges (3a, 3b) which overlap each other in the sleeve-shaped form member.

4. A wall lead-in according to claim 1, wherein the form element (1) is cut off of yardware reel (2).

5. A wall lead-in according to claim 1, wherein the form element (1) has smooth side edges (5a, 5b) forming end edges of the form member (1).

6. A wall lead-in according to claim 5, wherein at least one side edge is non-perforated.

7. A wall lead-in according to claim 5, wherein at least one of the side edges (5a, 5b) has self-locking means (6a, 6b).

8. A wall lead-in according to claim 7, wherein the self-locking means (6a, 6b) is one of continuous self-locking means and formed of separate elements distributed over a circumference of the at least one of side edges.

9. A method of sealing an intermediate annular space between a through-opening (7) formed in a wall (8) and a feeder line (10), the method comprising the steps of providing a form element (1) formed of a section of a perforated strip material having a predetermined length; manually plastically binding the form element (1) about the feeder line (10) forming a sleeve-shaped form member; inserting the sleeve-shaped form member axially in the through-opening (7); and injecting, in an intermediate space between the feeder line (10) and the form member, an expandable and

hardenable, formed material (11), the form member being secured to the wall (7) by the formed material poured through perforation of the form member.

10. A method according to claim 9, wherein the bending strip includes closing the sleeve-shaped form member in a region (X) of overlapping side edges thereof with locking means (6a, 6b) provided over a circumference of the form member.

11. A method according to claim 9, wherein the providing step includes cutting the form element (1) off a reel of a yardware perforated material.

12. A method according to claim 9, wherein the expandable, hardenable, foamed material comprises an intumescent material.

13. A method according to claim 12, wherein openings (4) of the perforated form element have a size smaller than 50 mm².

14. A fire-resistant led-in form element comprising an inherently stiff perforated form element for being bent around a feeder line (10) coaxially therewith and insertable into an intermediate annular space between a wall through-opening (7) through which the feeder line extends, and the feeder line (10); and intumescent material means (11') provided on the form element (1) at least in a region of the form element (1) to be located in the intermediate annular space.

15. A fire-resistant lead-in form element according to claim 14, wherein the intumescent material means (11') is provided on the form element at least partially in form of a layer.

16. A fire-resistant lead-in form element according to claim 14, wherein the form element (1) with the intumescent layer is bendable about a feeder line (10) helicoidally several times over itself.

17. A fire-resistant lead-in form element according to claim 14, wherein the intumescent material means (11') is provided in form of a layer covering opposite side edges of the perforated form element (1).

18. A fire-resistant lead-in form element according to claim 14, wherein openings (4) of the perforated form element (1) are of a size smaller than 50 mm².

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