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## (54) Fire or smoke barrier

(57) A side guide comprising a C-channel having inturned lips, which prevents the removal of a curtain from the guide, the curtain having projections provided along its edge, the space between the lips being smaller that the projections. The side guide also includes at least one extendable clamping member positioned within or in front of the C-channel, the clamping member extending towards the curtain once it has been deployed, and a second clamping member, opposite or slightly off-set from the first member. On deployment of the curtain the clamping member(s) is activated to extend, clamping the curtain and preventing the passage of smoke through the side guide. The second clamping member may be a flat plate against which the first clamping member can clamp the curtain, or may be a second extendable clamping member, clamping the curtain therebetween.

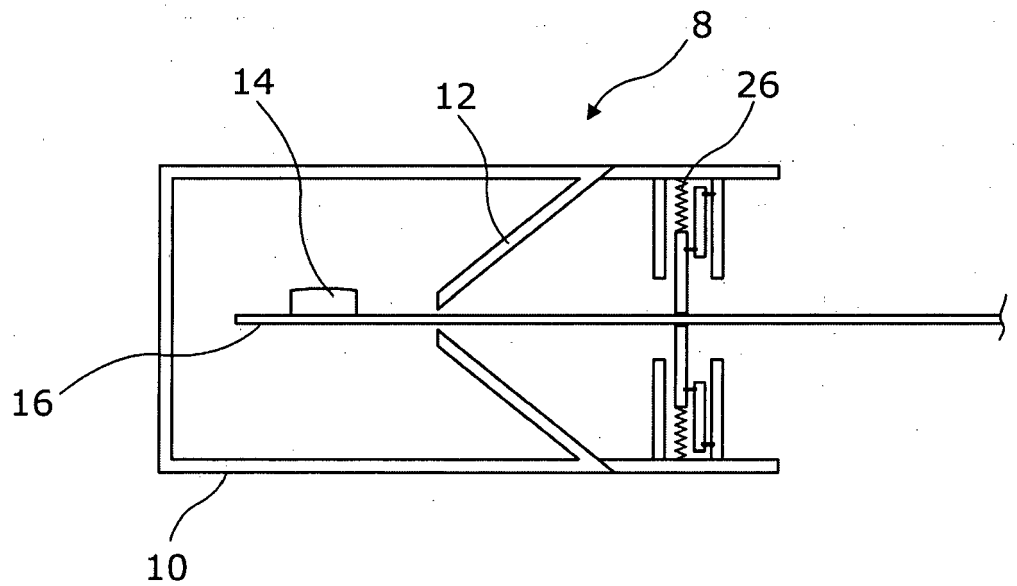


Figure 3

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## Description

**[0001]** The present invention relates to a smoke and fire barrier, for inhibiting the travel of smoke and fire around a building.

**[0002]** To reduce and delay the spread of fire within a building, according to building regulations, the building must be provided with a series of fire doors, to prevent fire and smoke from spreading between different areas of a building. In some buildings it is inconvenient to have fire doors, which according to the regulations must always be kept shut except to allow the movement of people around the building. Automatically deploying fire curtains can be used as an alternative, and these can include mechanisms to allow the passage of people through the deployed curtain if trapped on the fire side thereof. Fire curtains can also be used to divide up large spaces into much smaller areas to contain a fire and assist in the fire fighting strategy.

**[0003]** It can be advantageous to provide smoke seals on such curtains, to reduce the passage of smoke around the building. Fire and smoke curtains usually incorporate side guides holding the side of the curtain in its position against a fire rated structure. These also reduce the flow of smoke, but it is still possible for some smoke to pass though the side guides.

**[0004]** The object of the present invention is to provide an improved smoke leakage performance for a fire or smoke barrier.

**[0005]** According to the invention there is provided a side guide for a fire or smoke barrier, the barrier including a curtain having formations provided along side edges, the side guide comprising:-

- a channel having a pair of inward projections on either side of the channel to prevent the removal of the curtain from the side guide, the space between the projections being smaller than the formations provided on the curtain;
- at least one extendable clamping member positioned within or in front of the channel, the clamping member extending towards the curtain once it has been deployed
- a further clamping member opposite to or slightly offset from the first extendable clamping member; and
- activation means for extending at least the first extendable clamping member on full deployment of the curtain to clamp the curtain against the further clamping member, reducing smoke flow through the side guide.

**[0006]** In some embodiments the further clamping member will be a flat plate against which the extendable clamping member can clamp the curtain.

**[0007]** In other embodiments, the further clamping member may be a second extendable clamping member. The two extendable clamping members may be positioned directly opposite to each other, clamping the curtain between their ends. Alternatively the extendable clamping members may be slightly off-set with respect to each other, urging the curtain into a tight S-shape on deployment.

**[0008]** Typically the clamping members will be provided on the front of the side guide channel, with the curtain being clamped in front of the side guide projections. However, the clamping members may be provided within the side guide channel, typically between the end of the projections and the formations on the curtain.

**[0009]** Where one extendable clamping member is provided, for clamping onto a flat plate, the plate may be an extension of the projection on that side of the guide.

**[0010]** Preferably the extendable clamping member will extend from a channel in which it is housed. The clamping member may be connected to a series of pivot members along its length, which are in turn connected to one side of the channel. Usually means will be provided to urge the clamping member into the housing when not deployed. This may be in the form of a spring connected between the channel and the clamping member holding the clamping member within the channel and the pivot members vertically under non-deployment conditions. On deployment, the clamping member is urged out of the channel, downwards, with the pivot member pivoting downwards against spring action, determining the extent of the extension of the clamping member.

**[0011]** Typically the side guide will be made of metal. The clamping members may also be made of metal, but will typically include a rubber or soft plastics material tip. They may also be made of a high melting point plastics material, preferably having a soft edge for enhanced sealing.

**[0012]** To help understanding of the invention, a specific embodiment thereof will now be described by way of example and with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a fire and smoke curtain;

Figure 2 is a sectional view of a side guide including smoke sealing apparatus according to the present invention, open;

Figure 3 is sectional view of the side guide of Figure 2 with the smoke sealing apparatus closed;

Figure 4 is a front view of the smoke sealing apparatus of the invention;

Figure 5 a side view of the smoke sealing apparatus of the invention, closed;

Figure 6 is a side view of the smoke sealing apparatus, open;

Figure 7 a sectional view of another side guide according to the invention, with the smoke sealing apparatus open;

Figure 8 is a sectional view of the side guide of Figure 7 with the smoke sealing apparatus closed;

Figure 9 is a sectional view of a further side guide according to the invention, with the smoke sealing

apparatus open;

Figure 10 is a sectional view of the side guide of Figure 9, closed;

Figure 11 is a sectional view of a fourth side guide according to the invention, with the smoke sealing apparatus open;

Figure 12 is a sectional view of the side guide of Figure 11, with the smoke sealing apparatus closed;

Figure 13 is a sectional view of an activation mechanism according to the invention before activation; and

Figure 14 is a sectional view of the activation mechanism of Figure 13, after activation.

**[0013]** Referring to Figure 1, the fire and smoke barrier 1 thereshown comprises a head box 2 positioned over a doorframe, holding a curtain 4 wound on a roller (not shown). The roller is of a known type, having a combined internal motor, gearbox and brake (also not shown) arranged for gravity failsafe deployment of the curtain in the event of fire under the weight of a bottom bar 6. However, other forms of curtain deployment systems could be used. The barrier also includes a pair of side guides 8, extending from either side of the headbox to ground level. The side guides hold edges of the curtain, preventing removal of the curtain from the guides, which could allow passage of smoke and fire. In other embodiments the headbox can be positioned above a doorframe, with the side guides forming and being within the jams on either side of the door opening.

**[0014]** Referring now to Figures 2 and 3, the side guides are C-shaped in cross-section 10, having inturned lips 12. These lips 12 prevent the removal of spaced projections 14 near the side edges 16 of the curtain 4 from being removed from the guides. This is all conventional.

**[0015]** According to the invention, the guides are also provided with means for clamping the curtain once it is fully deployed, to prevent, or at least significantly reduce, the flow of smoke across the barrier via the side guides.

**[0016]** Referring specifically to Figure 2, the guides 8 are provided with a pair of clamping members 20 on either side of the front opening 18. These members 20 are housed in U-shaped channels 22, and pivotally attached thereto by extending pivot members 24. A spring 26 holds the clamping member 20 within the channel when the curtain is not deployed, with the extending pivot members 24 laying substantially vertically within the channel. An activation bar 28, as shown in Figure 5, extends horizontally from the lower end of the clamping member 20.

**[0017]** Turning now to Figure 3, once the bottom bar has extended almost to ground level, it meets the activation bar 28, and urges it downwards, against the action of the spring 26. This causes pivoting of the pivot members 24, which pivot to a horizontal or near horizontal position, allowing the clamping member to emerge from the channel 22. A pair of these clamping members positioned on either side of the side guide will clamp the edges of the curtain therebetween, providing a smoke seal, which prevents or at least significantly reduces the amount of smoke passing through the barrier.

**[0018]** Referring to Figures 4, 5 & 6, which show the clamping mechanism as such. Within the channel 22 is provided the clamping member 20. This will typically be made of metal, however, it may be made of or at least covered on its outer edge with a slightly pliable material, such as a silicone extrusion or other relatively soft plastics material, as this will create a better seal against the fabric of the curtain. The clamping member 20 is pivotally connected to a series of pivot members 24, which are in turn pivotally connected to the channel. The pivot members being pivotally connected to the clamping member 20 at their upper ends, and pivotally connected to the channel 22 at their lower ends. A spring 26 connects the clamping member 20 to the channel, such that the pivot members are held essentially vertically within their attachment to the clamping member 20 above their attachment to the channel. The activation bar 28 extends out of the clamping member 20 and when the bottom bar reaches this level it rests on the activation bar, acting against spring action to pivot the clamping member 20 out of the channel, with the pivot members 20 pivoting to an essentially horizontal position. This results in abutment of the curtain by the clamping member 20 once the curtain is fully deployed. On retraction of the curtain, the bottom bar will immediately move off the activation bar 28, which will allow the spring to urge the clamping member 20 back into the channel, releasing the curtain.

**[0019]** Now turning to Figures 7 and 8, the side guide 108 thereshown is a C-channel section 110 having inturned lips 112. In this embodiment the side guide is provided with a single clamping member 120, which operates in the same manner as those described with reference to Figures 2 and 3. Opposite to the clamping member 120 on the front 118 of the guide is a plate 130. Thus once the clamping member 120 is extended, it clamps the curtain 104 against the plate 130.

**[0020]** Figures 9 and 10 show a further side guide 208 according to the invention, again comprising a C-channel section 210 having in-turned lips 212. The guide 208 is provided with a pair of off-set extendable clamping members, which again operate as described with reference to the previous embodiments. On deployment, clamping members 220 extend out of their channels, urging the curtain into a tight S-shape around them. This also creates a seal significantly reducing the passage of smoke through the side guide.

**[0021]** Figures 11 and 12 show a further embodiment of the invention, including a side guide 310 having inturned lips 312. One of the pair of lips 314 is provided with an extension 316 into the interior of the C-channel section 310, parallel to the side 318 of the guide 310. Opposite to the extension 316, within the guide 310 is provided a clamping member 320 of similar construction to those described with reference to the previous embodiments. On full deployment of the curtain, the clamping

member 322 extends out of its channel, clamping the curtain against the extension 316 within the side guide. Thus creating a seal within the side guide and hence significantly reducing the passage of smoke through the guide.

**[0022]** In further embodiments, the mechanism for activation of the extension may be activation by a pawl, which drops from the centre of the roller once the final roll of fabric has been deployed. The concept of a pawl, or drop down latch, is taught in our earlier patent application, published under No. WO 2010/142944. Referring to Figures 13 & 14, the curtain 400 is provided on a roller 402 and after the final roll of curtain has been unwound from the roller, a pawl 404 drops down. A clamping member 420 is provided within a U-shaped channel 422 as described previously, connected to pivot members. However in this embodiment, the member 420 is held within the channel by a wire 426. The wire passes over pulleys 428 and is connected to a stop 430 including a spring 432 resisting extension of the clamping member 420 out of the channel 422. As the pawl 404 is released from the roller, it presses against the stop 430, acting against the spring to release the wire 426 allowing the clamping member to move out of its channel and clamp against the curtain.

**[0023]** The invention is not intended to be restricted to the details of the above-described embodiment. For instance, a pair of clamping member may be provided within the side guide channel, either directly opposite to each other as in Figures 2 and 3 or off-set as in Figures 9 and 10.

**[0024]** Other methods of activating the clamping member using the pawl can be envisaged. For example the pawl can drop down against a series of spring loaded cams, which then acts against a lever arm urging the clamping member out of its channel and into a clamping position. In a further alternative the pawl falls against a carriage on a free moving track. The carriage is attached to a head box of the barrier via a spring. A wire is attached to the carriage that is then attached to the clamping member. As the pawl falls against the carriage this causes it to move along the track, relieving the tension on the wire, allowing deployment of the clamping member.

## Claims

1. A side guide for a fire or smoke barrier, the barrier including a curtain having formations provided along each side edge, the side guide comprising:-

   • a channel having a pair of inward projections on either side of the channel to prevent the removal of the curtain from the side guide, the space between the projections being smaller than the formations provided on the curtain;
   • at least one extendable clamping member positioned within or in front of the channel, the clamping member extending towards the curtain once it has been deployed within the channel
   • a further clamping member opposite to or off-set from the first extendable clamping member; and
   • activation means for extending at least the first extendable clamping member on full deployment of the curtain to clamp the curtain against the further clamping member, reducing smoke flow through the side guide.

2. A side guide as claimed in claim 1, wherein the further clamping member is a flat plate against which the extendable clamping member can clamp the curtain.

3. A side guide as claimed in claim 1, wherein the further clamping member is a second extendable clamping member.

4. A side guide as claimed in claim 3, wherein the two extendable clamping members are positioned directly opposite to each other, clamping the curtain between their ends.

5. A side guide as claimed in claim 3, wherein the extendable clamping members are slightly off-set with respect to each other, urging the curtain into a tight S-shape on deployment.

6. A side guide as claimed in any preceding claim, wherein the clamping members are provided on the front of the side guide channel, with the curtain being clamped in front of the side guides.

7. A side guide as claimed in any one of claims 1 to 5, wherein the clamping members may be provided within the side guide channel.

8. A side guide as claimed in any preceding claim, wherein the extendable clamping member is housed in a channel from which it extends on deployment.

9. A side guide as claimed in claim 8, wherein the clamping member is connected to a series of pivot members along its length, which are in turn connected to one side of the channel.

10. A side guide as claimed in claim 9, wherein a spring is connected between the channel and the clamping member holding the clamping member within the channel and the pivot members vertically under non-deployment conditions.

11. A side guide as claimed in any preceding claim, wherein the clamping members are made of metal.

12. A side guide as claimed in claim 11, wherein the

clamping members have a tip of rubber or soft plastics material.

**13.** A side guide as claimed in any preceding claim, wherein the activation means includes a pawl which extends on full deployment of the curtain.

**14.** A side guide as claimed in any one of claims 1 to 13, wherein the activation means includes a spigot at the bottom of the clamping member, acted on by a bottom bar on the curtain.

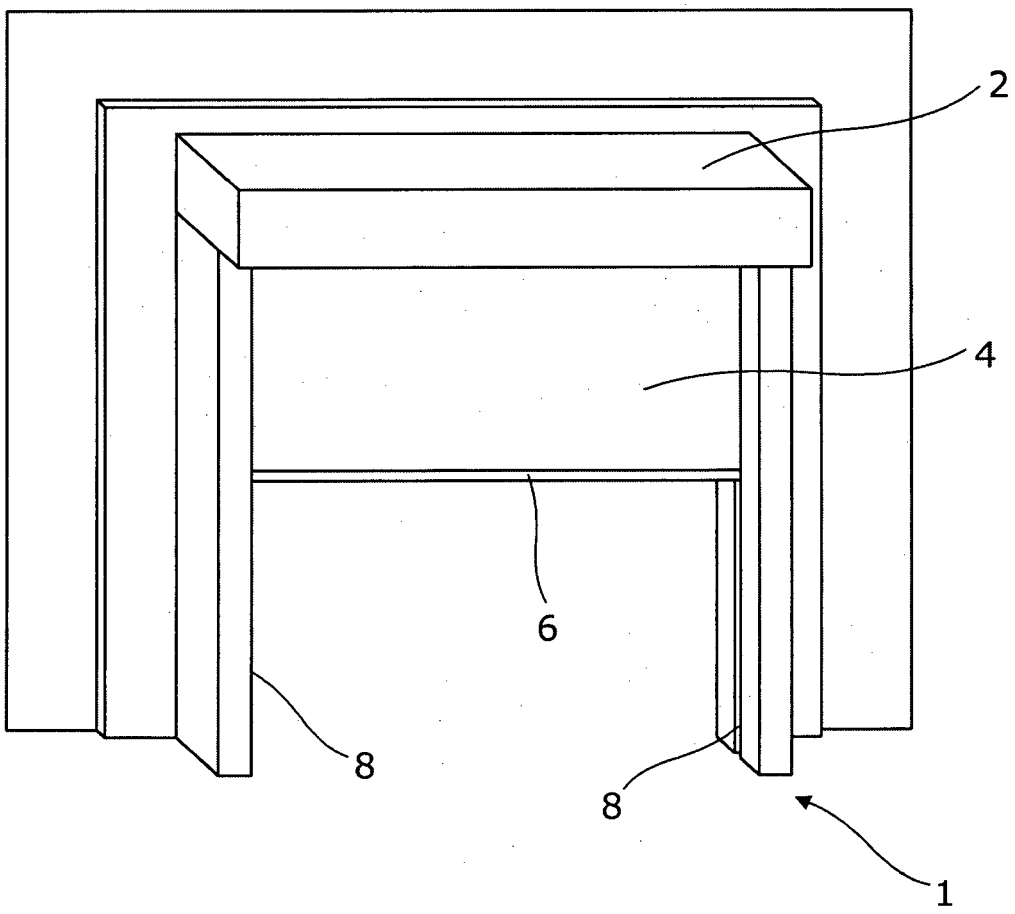


Figure 1

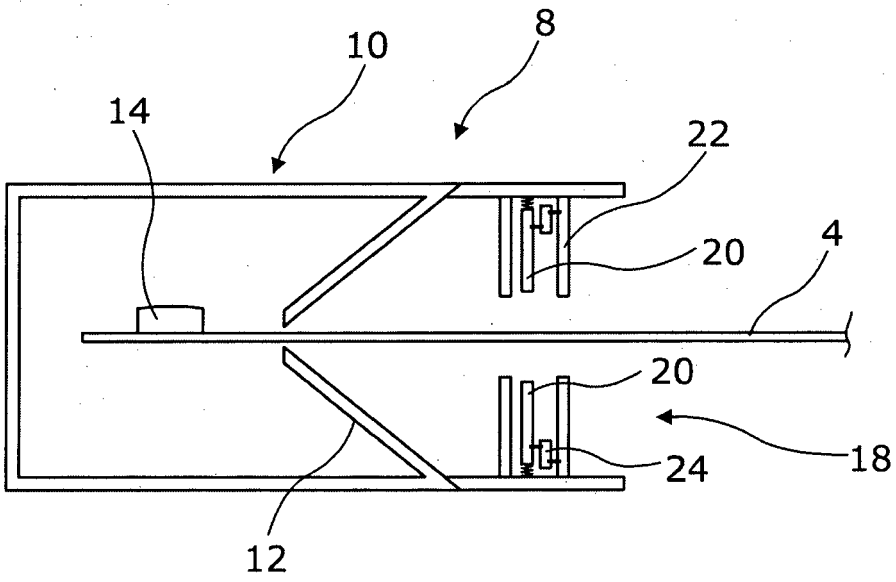


Figure 2

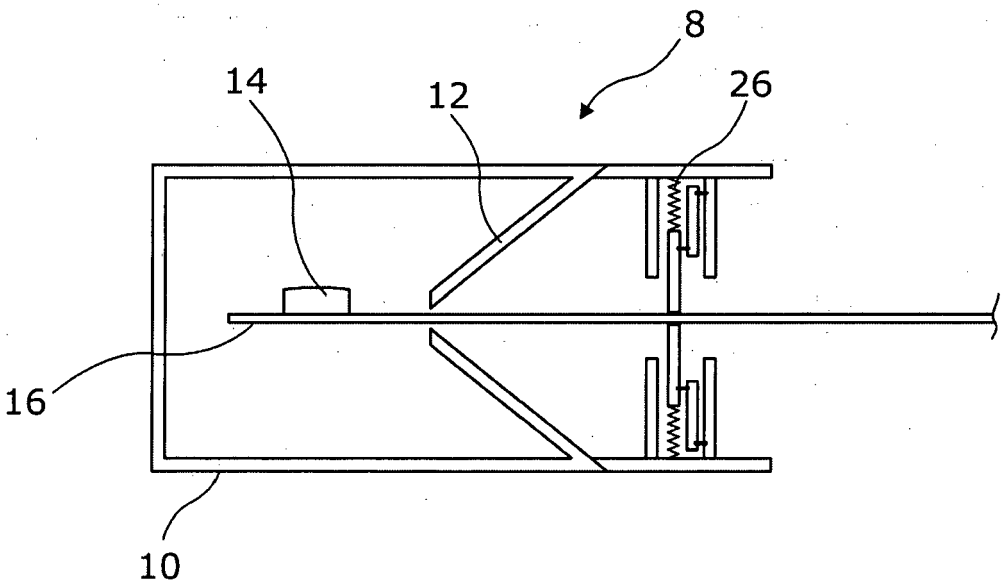


Figure 3

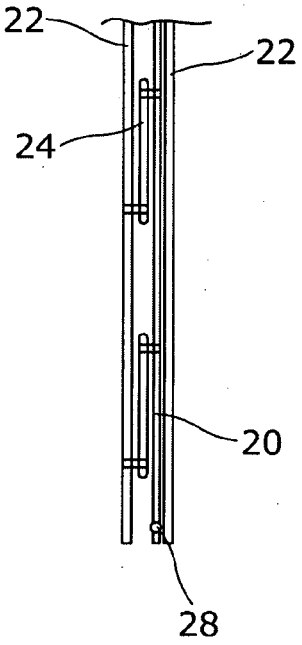


Figure 4

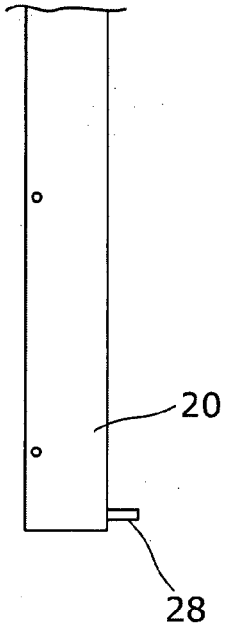


Figure 5

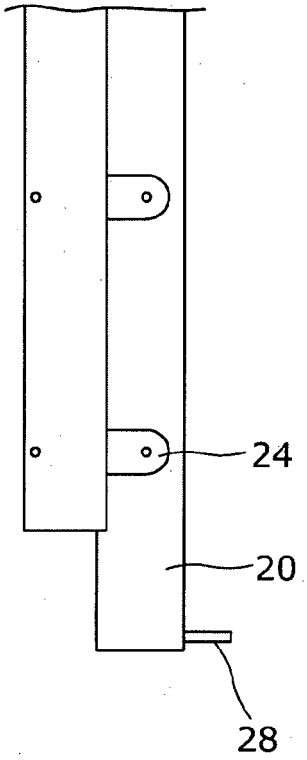


Figure 6

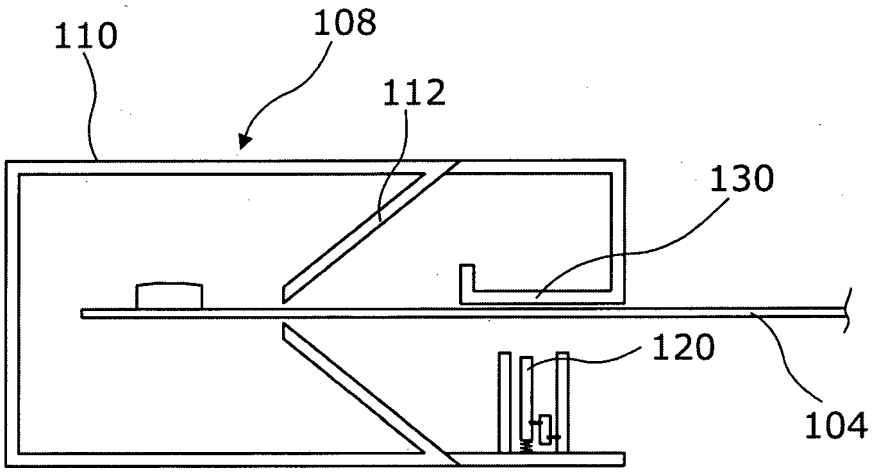


Figure 7

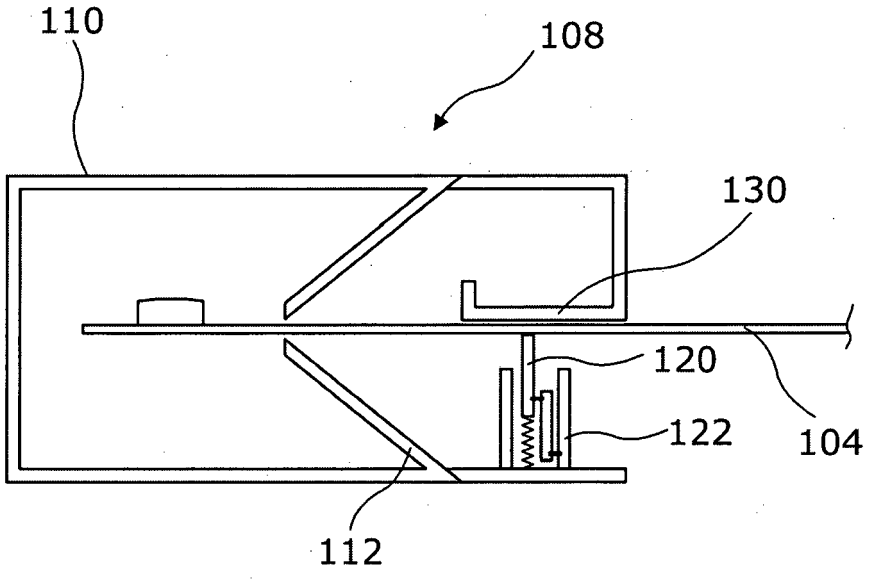


Figure 8

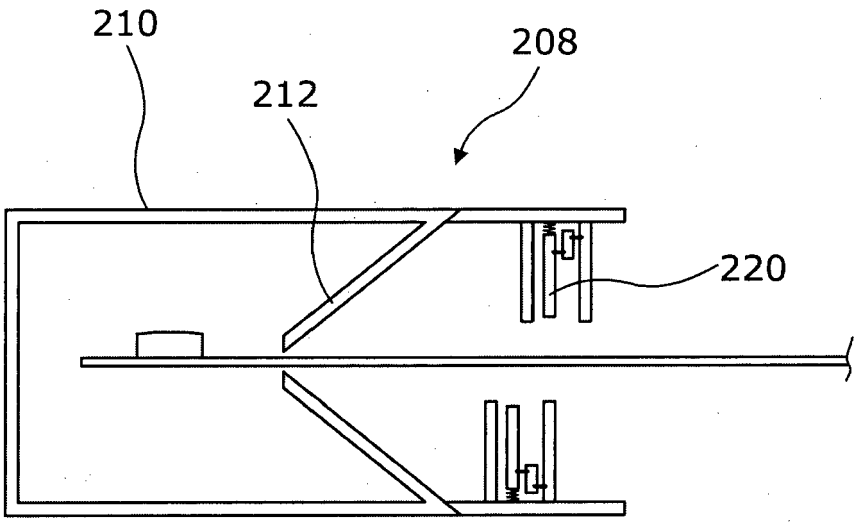


Figure 9

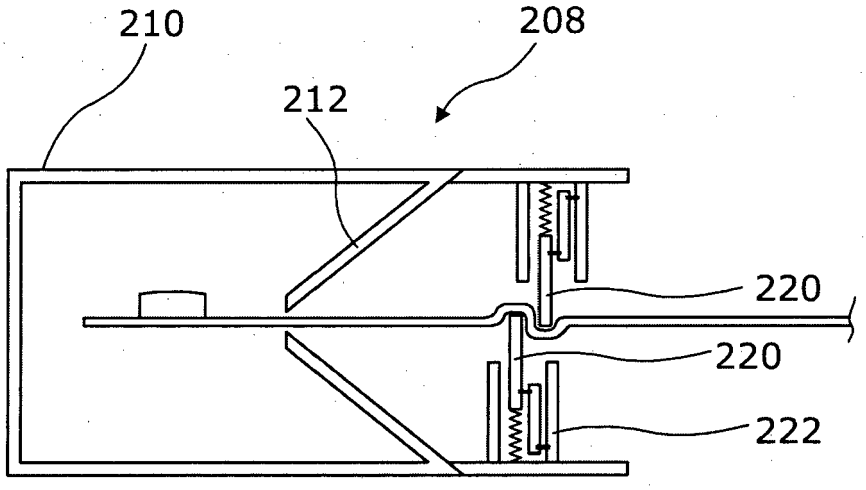


Figure 10

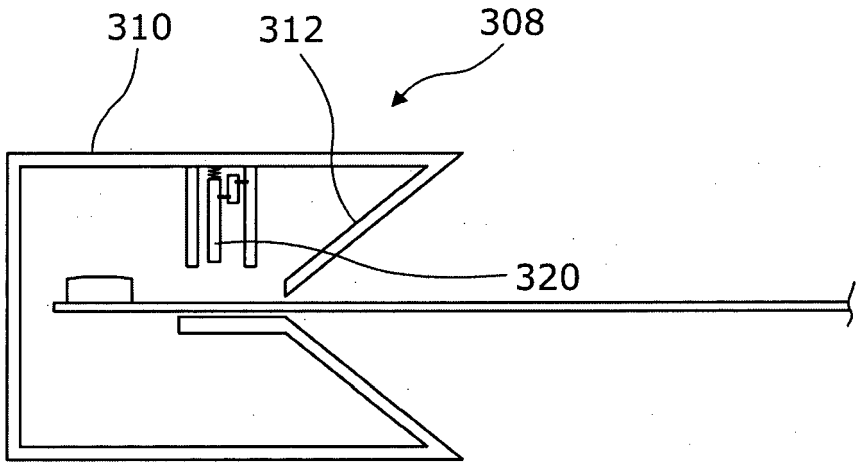


Figure 11

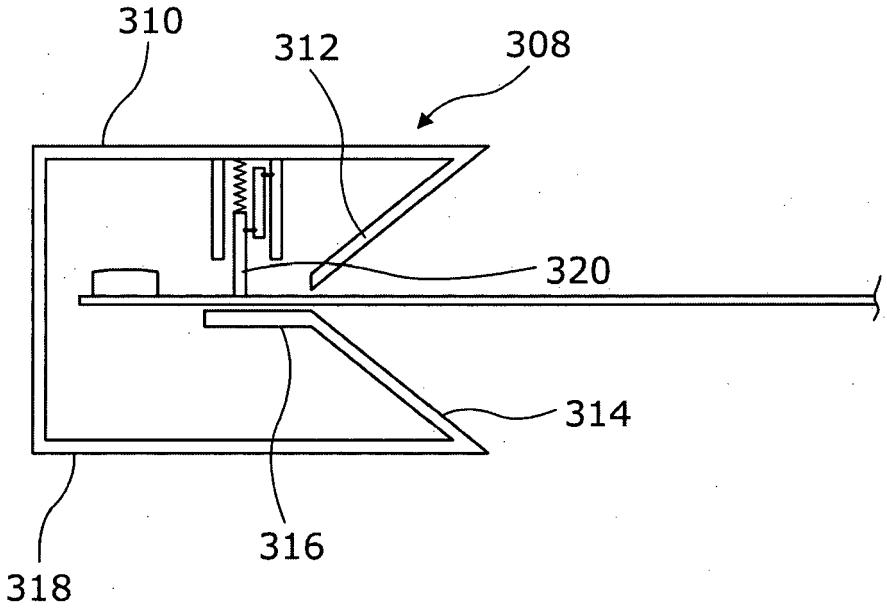


Figure 12

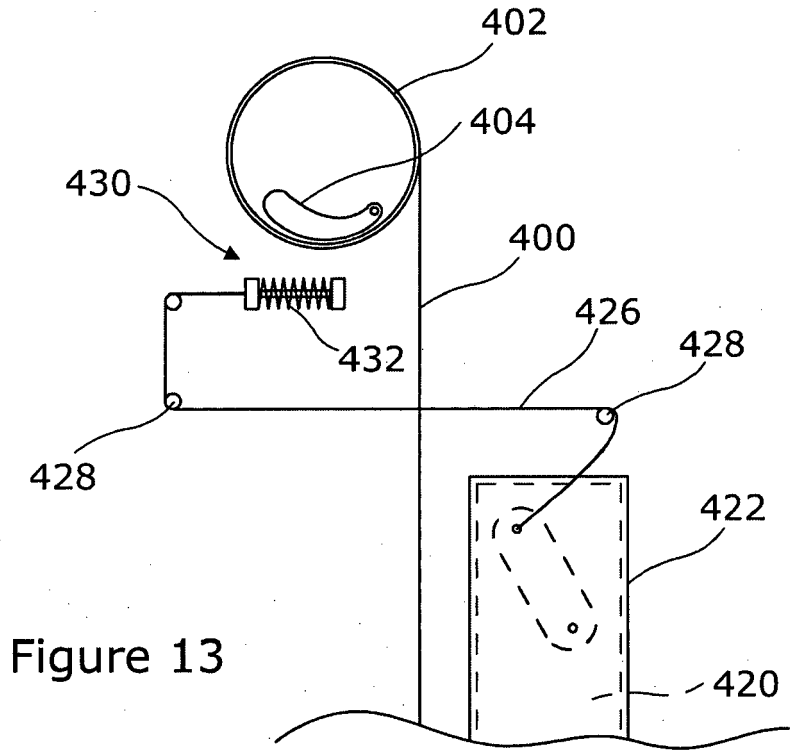


Figure 13

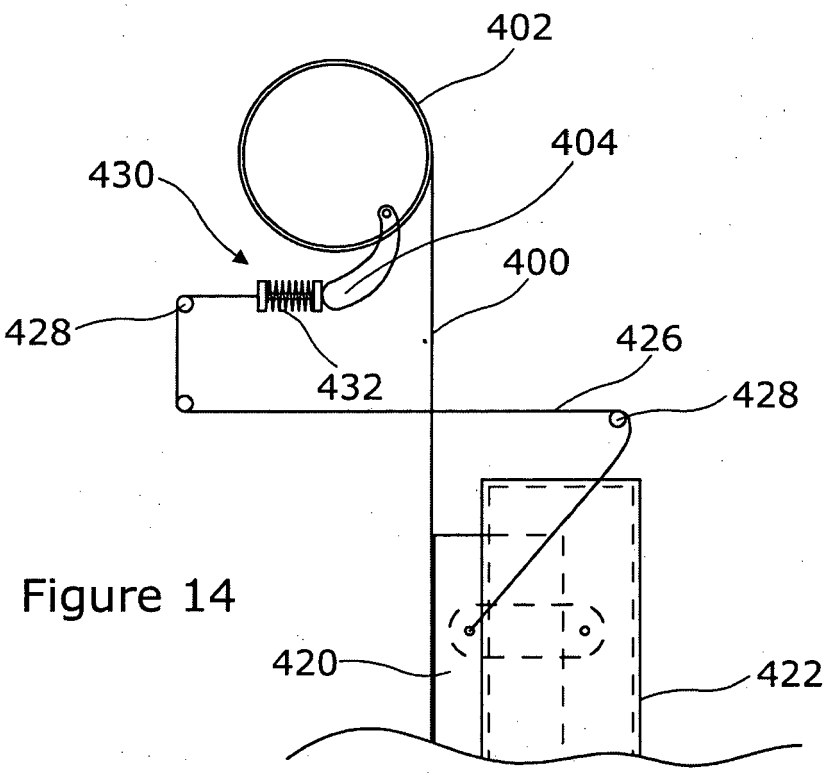


Figure 14

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# EUROPEAN SEARCH REPORT

Application Number
EP 13 16 8097

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| X | EP 1 029 557 A1 (RAESONTEC N V [AN])<br>23 August 2000 (2000-08-23)<br>* paragraph [0029]; figure 4 *<br>* paragraphs [0030] - [0031]; figure 5 *<br>* paragraph [0032]; figure 6 *<br>----- | 1,2,6,7 | INV.<br>E06B9/13<br>E06B9/58 |
| X | DE 20 2004 018977 U1 (STOEBICH BRANDSCHUTZ GMBH & CO [DE])<br>10 February 2005 (2005-02-10)<br>* Bezugszeichenliste;<br>claims 1-2; figure 3 *<br>----- | 1,3,6,7 | |

TECHNICAL FIELDS SEARCHED (IPC)

E06B

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Munich | 12 November 2013 | Kofoed, Peter |

CATEGORY OF CITED DOCUMENTS

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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 13 16 8097

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12-11-2013

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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