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(54) **FIRE SEAL**

(57) A fire seal including an elongate housing and an elongate sealing member. The elongate sealing member is selectively movable relative to the elongate housing between an inactive position located at least to a significant extent within the elongate housing, and an active position. In the active position the elongate sealing member extends outwardly to a significant extent from the elongate housing, whereby a gap adjacent to the elon-

gate housing can be closed. The elongate sealing member is urged to the active position. The fire seal further includes a fusible restraint for retaining the elongate sealing member in the inactive position. The fusible restraint is configured to fail at a required raised temperature such that the elongate sealing member will automatically move to the active position, for instance in the event of a fire.

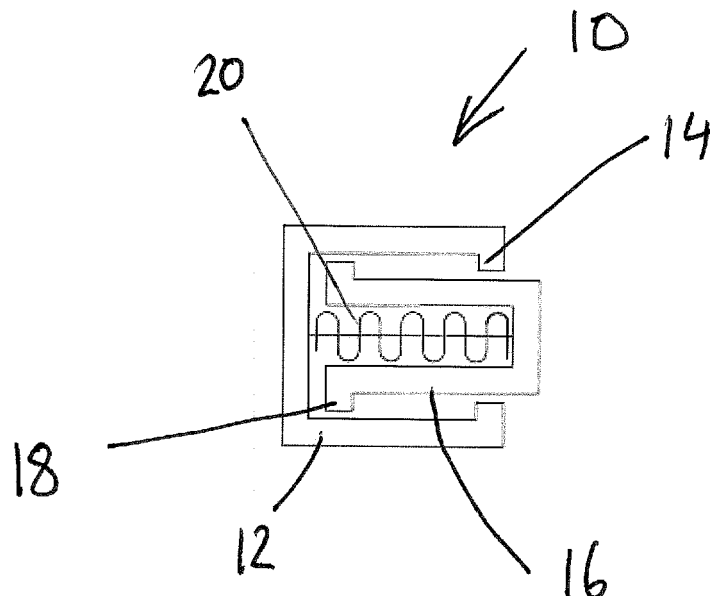


FIG. 1

Description

[0001] This invention concerns a fire seal, and particularly but not exclusively a fire seal selectively engageable between the side edge of a floor panel and a facing wall; and also a fire sealing assembly.

[0002] It is often desirable or required to prevent the passage of fire between floor slabs, and side walls or external facades or rain screens. Conventionally this is generally achieved using intumescent materials. This generally involves a certain time delay to provide a seal as the material intumesces in the event of a fire, and such seals may not always be wholly reliable.

[0003] According to a first aspect of the invention there is provided a fire seal, the fire seal including an elongate housing and an elongate sealing member, the elongate sealing member being selectively movable relative to the elongate housing between an inactive position located at least to a significant extent within the elongate housing, and an active position extending outwardly to a significant extent from the elongate housing, whereby a gap adjacent to the elongate housing can be closed, the elongate sealing member being urged to the active position, a fusible restraint being provided for retaining the elongate sealing member in the inactive position, the fusible restraint being configured to fail at a required raised temperature such that the elongate sealing member will automatically move to the active position, for instance in the event of a fire.

[0004] The elongate housing may be in the form of a channel section, which channel section may have internal lips either side of the opening, so as to prevent the elongate sealing member from fully moving out of the elongate housing.

[0005] The elongate housing may be made of any of steel, aluminium, or calcium silicate.

[0006] The elongate sealing member may be in the form of a channel section with an opening facing towards the elongate housing. The elongate sealing member channel section may have an external lip engageable with the internal lip on the elongate housing so as to prevent the elongate sealing member from fully moving out of the elongate housing.

[0007] The elongate sealing member may be made of any of steel, aluminium or calcium silicate.

[0008] A resilient member may be provided engageable between the elongate housing and the elongate sealing member, to urge the elongate sealing member away from the elongate housing. The resilient member may locate within the elongate housing. The resilient member may comprise one or more compression springs.

[0009] A sealing part may be provided on an outer face of the elongate sealing member. The sealing part may comprise any of a brush, vane seal, intumescent seal, or an elongate strip, which strip may be hollow and may be made of silicone or EPDM.

[0010] The fusible restraint may comprise a link extendible between the elongate housing and elongate

sealing member when in the active position. The fusible restraint may be made of nylon, EPDM, rubber, PVC or metal, and especially an alloy.

[0011] Alternatively the fusible restraint may comprise a sleeve extending at least partially around the elongate housing and elongate sealing member so as to restrain the elongate sealing member in the inactive position. The sleeve may be made of PVC, or the sleeve may be made of a paper material.

[0012] The fusible restraint may be configured to fail at a temperature of between 120 and 160°C.

[0013] A plurality of resilient members may be provided.

[0014] A guide may be provided, which is locatable inside the helical coil of one of the one or more compression springs, to maintain the alignment of the compression springs.

[0015] The fire seal may further include an extension arrangement for spacing the elongate housing and the elongate sealing member from a mounting point such as a floor panel. The extension arrangement may include an elongate spacer for location between the elongate housing and a bracket, wherein the bracket is for mounting to a floor panel, the spacer is mountable to the bracket, and the housing is mountable to the spacer.

[0016] The invention still further provides a fire sealing assembly, the assembly including a fire seal according to any of the preceding paragraphs provided on a side edge of a floor panel and facing towards a wall, with the fire seal configured such that in the inactive position a space is provided between the floor panel and the wall, but in the active position the sealing member engages against the wall to close the space.

[0017] Embodiments of the present invention will now be described by way of example only and with reference to the accompanying drawing, in which:-

Fig. 1 is a diagrammatic end view of a first fire seal according to the invention in an inactive position;

Fig. 2 is a similar view to Fig. 1 but with the fire seal in an active position;

Fig. 3 is a diagrammatic end view showing the fire seal of Fig. 1 in use in an inactive position;

Fig. 4 is a similar view to Fig. 3 but with the fire seal in an active position.

Fig. 5 is a diagrammatic perspective end view of the fire seal of Fig. 1 in an inactive position;

Fig. 6 is a similar view to Fig. 1 but showing a further feature;

Fig. 7 is a similar view to Fig. 6 but in an inactive condition;

Figs. 8, 9, 10 and 11 are diagrammatic side views of different possible components of the fire seal of the invention;

Figs. 12 and 13 are respectively similar views to Figs. 1 and 2 but of a second fire seal according to the invention;

Figs. 14 and 15 are respectively similar views to Figs. 1 and 2 but of a third fire seal according to the invention;

Figs. 16 and 17 are respectively similar views to Figs. 1 and 2 but of a fourth fire seal according to the invention;

Figs. 18 and 19 are respectively similar views to Figs. 1 and 2 but of a fifth fire seal according to the invention;

Figs. 20 and 21 are respectively similar views to Figs. 6 and 7 but of a sixth fire seal according to the invention;

Figs. 22 and 23 are respectively similar views to Figs. 6 and 7 but of a seventh fire seal according to the invention;

Figs. 24 and 25 are see-through top views of the seventh fire seal according to the invention in inactive and active positions respectively;

Figs. 24 and 25 are see-through top views of the seventh fire seal in inactive and active positions respectively;

Fig. 26 is a diagrammatic end view of an eighth fire seal according to the invention;

Fig. 27 is a diagrammatic side view of part of the eighth fire seal;

Figs. 28A to D are schematic side views demonstrating the assembly of the eighth fire seal;

Fig. 29 is a diagrammatic end view of part of the eighth fire seal in an active condition;

Fig. 30 is a diagrammatic end view of a ninth fire seal according to the invention; and

Fig. 31 is a diagrammatic end view of part of the ninth fire seal in an active condition.

[0018] Figs. 1 to 5 show a first fire seal 10 which has an elongate housing 12 in the form of a channel section with inwardly extending lips 14 on an open side. An elongate sealing member 16 is provided which is of narrower

channel section than the housing 12 so as to be slidably movable in and out of the housing 12. The sealing member 16 is arranged with the recess therein facing towards the elongate housing 12. Outwardly extending lips 18 are provided on the elongate sealing member either side of the opening therein, so as to be engageable with the inwardly extending lips 14 on the housing 12 so as to prevent the elongate sealing member 16 from fully coming out of the elongate housing 12.

[0019] A resilient member in the form of a compression spring 20 is provided within the elongate housing 12 and engageable against the closed end of the elongate sealing member 16, to urge the elongate sealing member 16 out of the elongate housing 12. The compression spring 20 may be in the form of a linear compression spring, or could comprise a plurality of discreet compression springs.

[0020] Figs. 3, 4 and 5 show the first fire seal 10 mounted in the side of a floor panel 24, which faces a vertical wall 26 with a gap 28 therebetween. In the active position shown in Fig. 4, the first fire seal 10 closes the gap 28.

[0021] Figs. 6 and 7 show the first fire seal 10, and with a fusible link 22 extending between the elongate housing 12 and the elongate sealing member 16 so as to in Fig. 6 restrain the elongate sealing member 16 in an inactive position just protruding to a small amount from the elongate housing 12.

[0022] In Fig. 7 the fusible link 22 has been broken such that the elongate sealing member 16 extends out of the elongate housing 12, with the external lips on the sealing member engageable 18 with the internal lips 14 on the housing member.

[0023] The fusible link may take a number of different forms, and four examples are shown respectively in Figs. 8 - 11. Figs. 8 and 9 show fusible links 30, 32 made for example of nylon, EPDM, rubber or PVC. Figs. 10 and 11 show metal alloy fusible links 34, 36, and include a central part 38 which is intended to fail in the event of a fire. The fusible links 22, 30, 32, 34, 36 are intended to fail at temperatures of between 120 - 160°C, and within less than 30 seconds.

[0024] A sealing part may be provided on the outer end of the sealing member 16 to provide a good seal for instance against the wall 26. Four examples of sealing parts are shown in Figs. 12 to 19. In the second sealing member 38 in Figs. 12 and 13, an elongate sealing part 40 is provided which is essentially dome shaped and may be hollow. This may be made of silicone or EPDM.

[0025] Figs. 14 and 15 show a third sealing member 42 with an intumescent sealing part 44 in the form of a strip of intumescent material on the outer end of the sealing member 16.

[0026] Figs. 16 and 17 show a fourth fire seal 46 where the sealing part 48 is in the form of a brush seal.

[0027] Figs. 18 and 19 show a fifth fire seal 50 in which the sealing member is in the form of a vane seal 52 mounted to a distal end of the compression spring 54. As can be seen the vane seal 52 is held in a spiral within the

elongate housing 12 until it uncoils when a fusible link 56 has been broken.

[0028] Figs. 20 and 21 show a sixth fire seal 58. In this instance no lips are provided on the elongate housing 12 or elongate sealing member 16, and the compression spring 20 retains a link from the housing 12 to the sealing member 16 when in active position. Figs. 20 and 21 illustrate another form of fusible link in the form of a sleeve 60 which in this instance is made of PVC, that surrounds the housing 12 and sealing member 16, to retain sealing member 16 in the housing 12 an inactive position, until the sleeve 60 fails for instance in the event of a fire.

[0029] Figs. 22 to 25 show a seventh fire seal 62 which is similar to the sixth fire seal 58, but includes a plurality of compression springs 20. In this example, the seventh fire seal 62 includes three compression springs 20 spaced along the length of the fire seal 62, to ensure a uniform transition along the length of the fire seal from an inactive to an active position. The compression springs 20 can be fastened to the elongate housing 12 and the elongate sealing member 16 using fixing screws 64 and/or rivets. The alignment of the compression springs 20 is maintained by one or more guides 66. The one or more guides 66 may be in the form of rods which are locatable inside the helical coil of the compression springs 20 to maintain the alignment of the compression springs 20.

[0030] Figs. 22 and 24 show the seventh fire seal 62 in an inactive position. The sealing member 16 is restrained in the elongate housing 12 an inactive position by a sleeve (not shown) extending partially around the elongate housing 12 and elongate sealing member 16 between the elongate housing 12 and the sealing member 16. The sleeve may be made from a paper material such that it fails in the event of a fire. Once the sleeve fails, the seventh fire seal 62 transitions to an active position, which is shown in Figs. 23 and 25.

[0031] Fig. 26 shows an eighth fire seal 68, which is similar to the first fire seal 10, but includes an extension arrangement 70. The extension arrangement 70 is for spacing the elongate housing 92 and the elongate sealing member 16 from a mounting point such as a floor panel 24 as shown in Fig. 3 & 4, thereby enabling the elongate housing 92 and the elongate sealing member 16 to be positioned closer to a wall 26. This can be useful where the gap between the floor panel 24 and the wall 26 is too large to seal using only the elongate housing 92 and the sealing member 16.

[0032] The extension arrangement 70 includes a bracket 72, shown in Fig. 27, for mounting to the floor panel 24. The bracket 72 includes one or more holes 74 for receiving fasteners such as screws, to enable the bracket to be secured to the floor panel 24. The extension arrangement 70 further includes an elongate spacer 80, which is mountable to the bracket 72. The mounting bracket 72 includes a channel 76 which locates a mounting part 82 of the elongate spacer 80. The channel 76 of the mounting bracket 72 includes two recesses 78 which

locate two corresponding projections 84 on the mounting part 80. One or more of the projections 84 may include a tapered portion 86 to enable the respective projection to more readily be inserted into the corresponding recess 78.

[0033] The elongate spacer 80 is locatable between the bracket 72 and the housing 92, and is configured to extend outwardly from the bracket 72 to space the housing 92 from the side of a floor panel 24. The elongate spacer 80 includes a cavity 88 extending along the length of the elongate spacer 80, to lower the weight of the elongate spacer 80 and reduce the quantity of materials used. The elongate spacer 80 includes a channel 90, which in this example is the same shape as the channel 76 of the mounting bracket 72. The channel 90 of the elongate spacer 80 is positioned on an opposite side of the elongate spacer 80 to the mounting part 80.

[0034] The elongate housing 92 of the eighth fire seal 68 is mountable to the elongate spacer 80. The elongate housing 92 includes a mounting part 94, which is of the same shape as the mounting part 82 of the elongate spacer 80. The mounting part 94 of the elongate housing 92 forms part of the extension arrangement 70, and is locatable in either the channel 76 of the mounting bracket or the channel 90 of the elongate spacer 80. Figs. 28A to 28D schematically illustrate the mounting of the elongate spacer 80 to the bracket 72, and the mounting of the elongate housing 92 to the elongate spacer 80. Fig. 29 illustrates the elongate housing 92, the elongate sealing member 16, and the compression spring 20 of the eighth fire seal 68 in an active position.

[0035] It is to be appreciated that a plurality of elongate spacers 80 may be provided in the extension arrangement 70, for further spacing the elongate housing 92 from the floor panel 24. The extension arrangement 70 could be utilised with any of the fire seals describe herein.

[0036] Figs. 30 to 31 illustrate a ninth fire seal 94, which is similar to the eighth fire seal 68, but includes an intumescent material 96 inside the elongate sealing member 97. The intumescent material 96 expands upon heating and retains the ninth fire seal 94 in an active position.

[0037] There are thus described fire seals which can be active quite quickly, and in many instances significantly more quickly than conventional intumescent seals. As indicated the fire seals may take a number of different forms as required. The fire seal should provide long term maintenance free operation when required, and will not degrade in a similar manner to intumescent materials. Also inconsistencies along the fire seal should not be encountered unlike with intumescent materials. The fire seal is though of relatively straightforward mechanical construction and can thus be inexpensively produced for long term reliable operation.

[0038] The elongate spacer, the elongate housing and elongate sealing member may be made of steel, aluminium or calcium silicate.

[0039] It is to be realised that any of the above combinations can be combined as required. A number of other

modifications may be made without departing from the scope of the invention.

[0040] For example a resilient arrangement may take a different form, and could for instance include sprung fingers engageable between the elongate housing and elongate sealing member. Different materials could be used than those described.

[0041] Whilst endeavouring in the foregoing specification to draw attention to those features of the invention believed to be of particular importance it should be understood that the Applicant claims protection in respect of any patentable feature or combination of features hereinbefore referred to and/or shown in the drawings whether or not particular emphasis has been placed thereon.

Claims

1. A fire seal, the fire seal including:

an elongate housing;
 an elongate sealing member, the elongate sealing member being selectively movable relative to the elongate housing between an inactive position located at least to a significant extent within the elongate housing, and an active position extending outwardly to a significant extent from the elongate housing, whereby a gap adjacent to the elongate housing can be closed, the elongate sealing member being urged to the active position; and
 a fusible restraint being provided for retaining the elongate sealing member in the inactive position, the fusible restraint being configured to fail at a required raised temperature such that the elongate sealing member will automatically move to the active position, for instance in the event of a fire.

2. A fire seal according to claim 1, in which the elongate housing is in the form of a channel section.
3. A fire seal according to claim 2, in which the channel section has internal lips either side of an opening of the channel section, so as to prevent the elongate sealing member from fully moving out of the elongate housing.
4. A fire seal according to any of the preceding claims, in which the elongate sealing member is in the form of a channel section with an opening facing towards the elongate housing.
5. A fire seal according to claim 4, in which the elongate sealing member channel section has an external lip engageable with the internal lip on the elongate housing so as to prevent the elongate sealing member from fully moving out of the elongate housing

6. A fire seal according to any of the preceding claims, in which a resilient member is provided engageable between the elongate housing and the elongate sealing member, to urge the elongate sealing member away from the elongate housing, the resilient member may locate within the elongate housing, and a plurality of resilient members may be provided.
7. A fire seal according to claim 6, in which the resilient member comprises one or more compression springs.
8. A fire seal according to any of the preceding claims, in which a sealing part is provided on an outer face of the elongate sealing member, and the sealing part may comprise any of a brush, vane seal, intumescent seal, an elongate strip, a hollow elongate strip, or an elongate strip made of silicone or EPDM.
9. A fire seal according to any of the preceding claims, in which the fusible restraint comprises a link extendible between the elongate housing and elongate sealing member when in the active position, and the fusible restraint may be made of nylon, EPDM, rubber, PVC, metal, or an alloy.
10. A fire seal according to any of the preceding claims, in which the fusible restraint comprises a sleeve extending at least partially around the elongate housing and elongate sealing member so as to restrain the elongate sealing member in the inactive position, and the sleeve may be made from paper or PVC.
11. A fire seal according to any of the preceding claims, in which the fusible restraint is configured to fail at a temperature of between 120 and 160°C.
12. A fire seal according to claim 7, or any of claims 8 to 11 when dependent on claim 7, wherein a guide is provided, which is locatable inside the helical coil of one of the one or more compression springs to maintain the alignment of the compression springs.
13. A fire seal according to any of the preceding claims, wherein the fire seal further includes an extension arrangement for spacing the elongate housing and the elongate sealing member from a mounting point such as a floor panel.
14. A fire seal according to claim 13, wherein the extension arrangement includes an elongate spacer for location between the elongate housing and a bracket, wherein the bracket is for mounting to a floor panel, the spacer is mountable to the bracket, and the housing is mountable to the spacer.
15. A fire sealing assembly, the assembly including a fire seal according to any of the preceding claims

provided on a side edge of a floor panel and facing towards a wall, with the fire seal configured such that in the inactive position a space is provided between the floor panel and the wall, but in the active position the sealing member engages against the wall to close the space. 5

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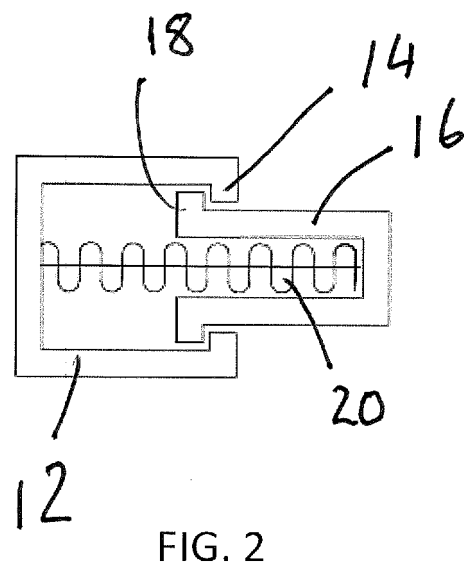
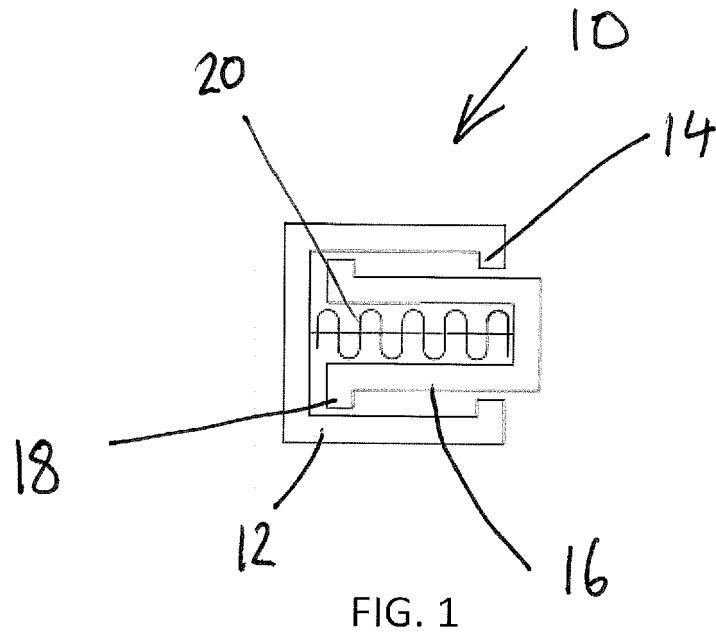
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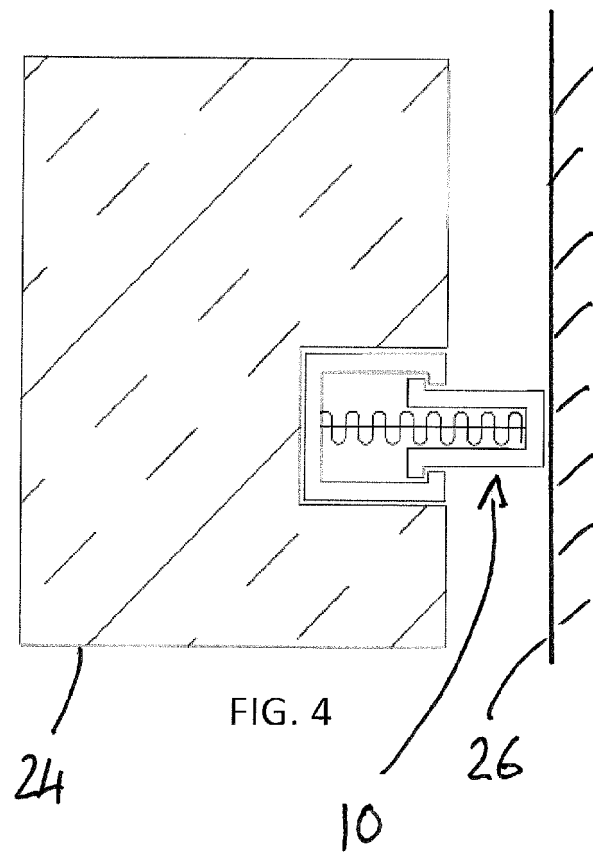
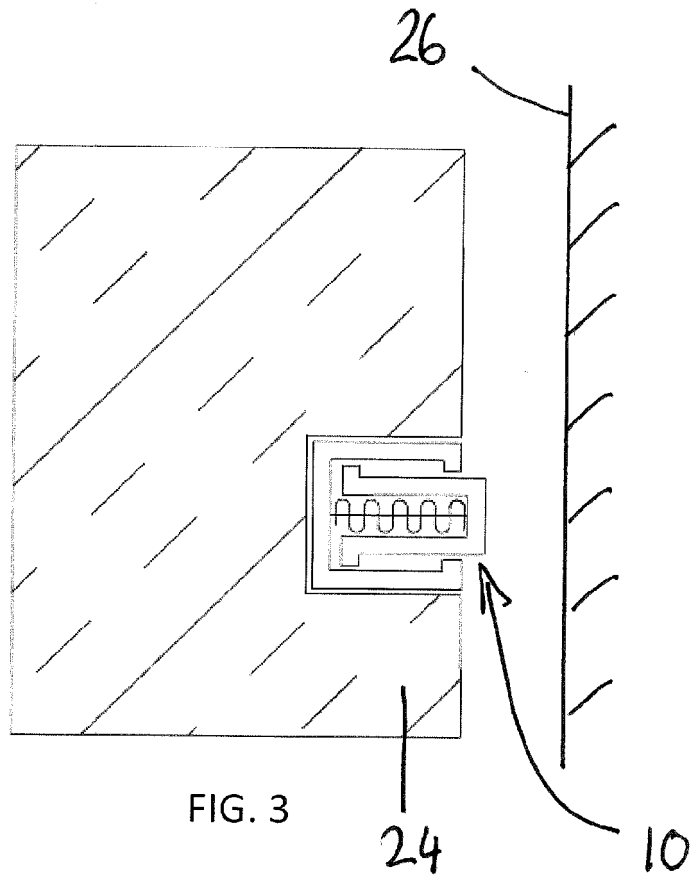
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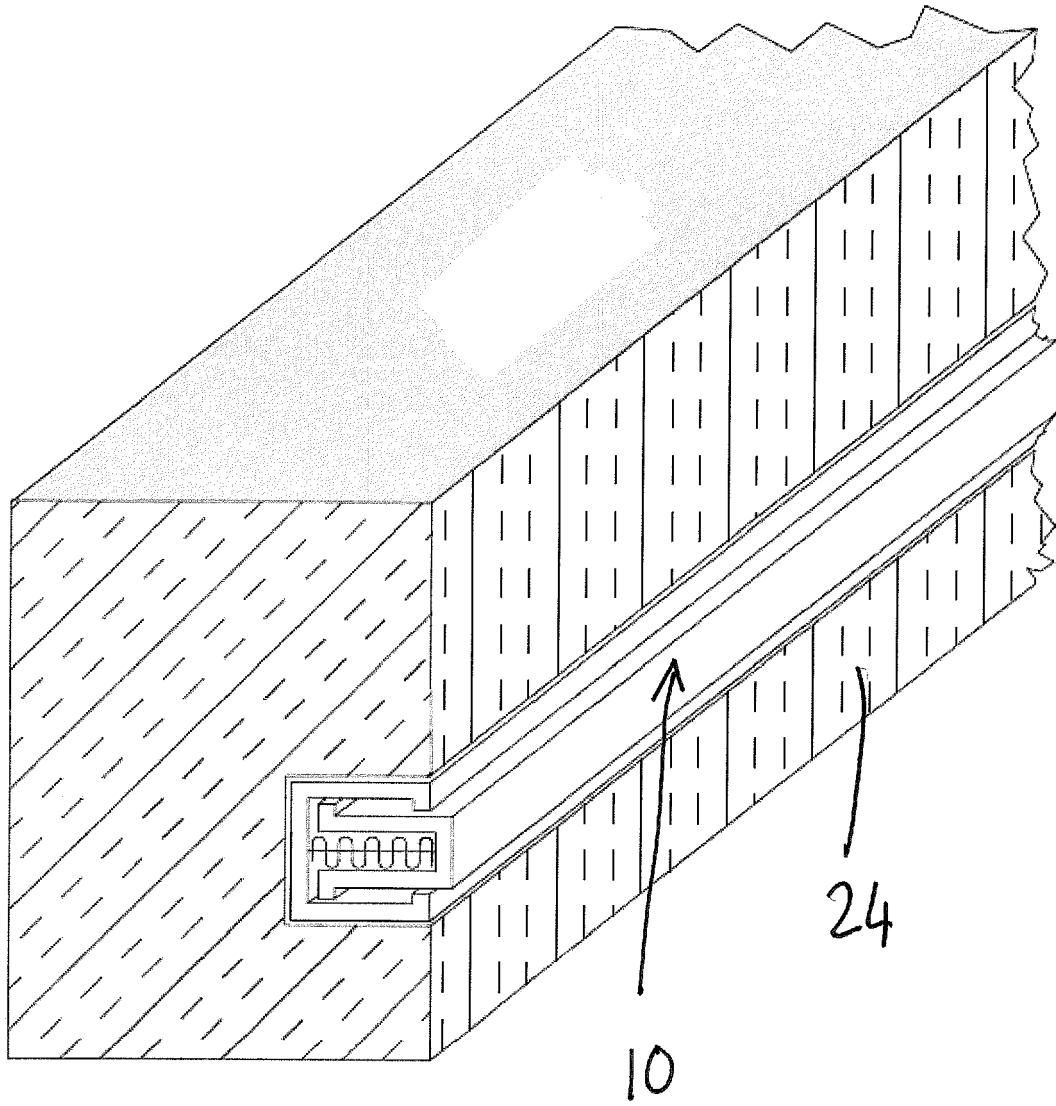
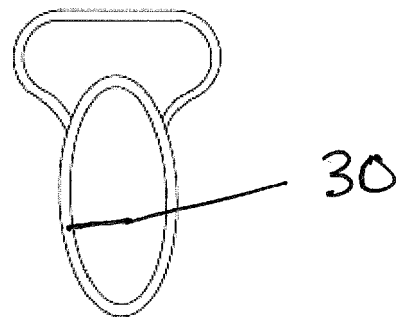
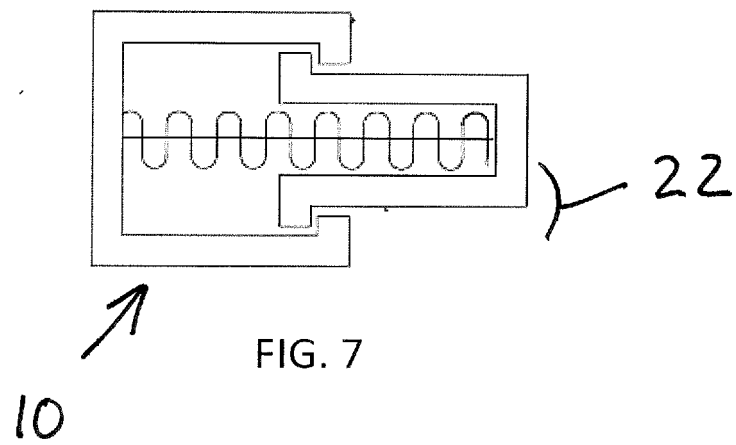
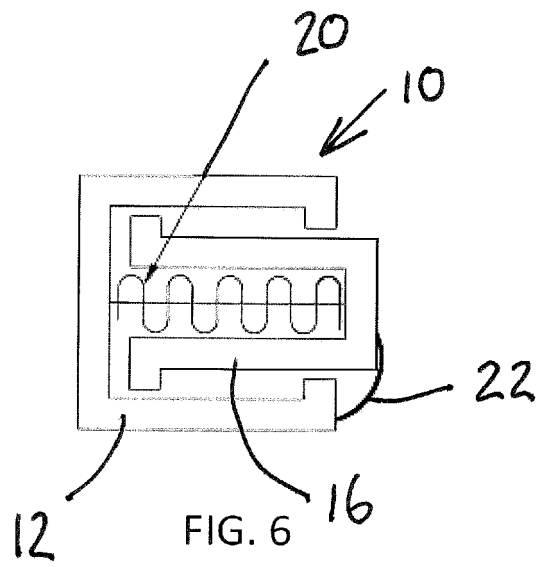


FIG. 5



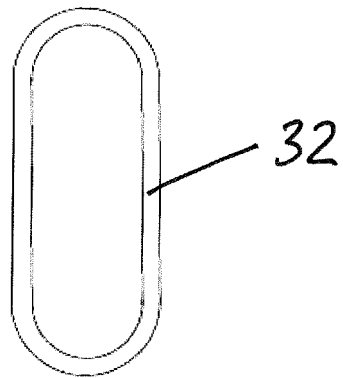


FIG. 9

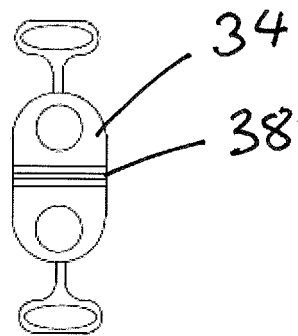


FIG. 10

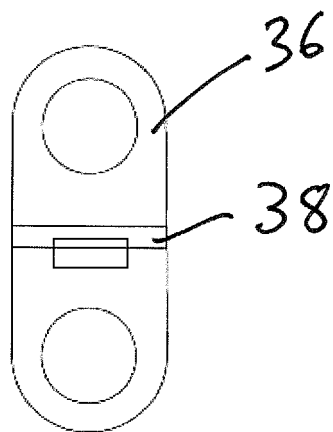


FIG. 11

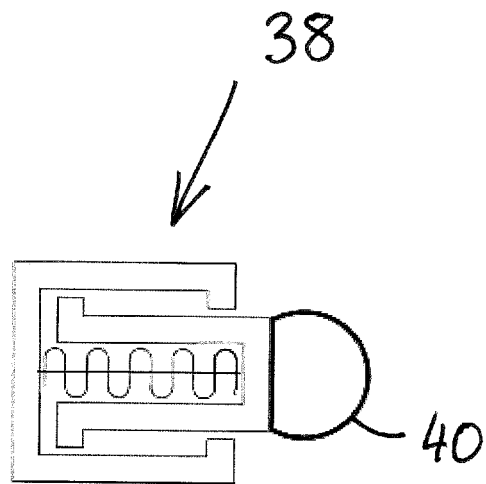


FIG. 12

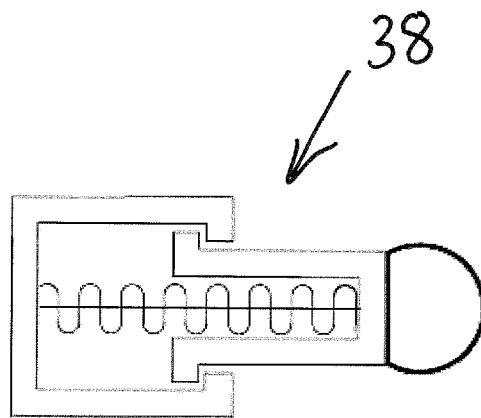


FIG. 13

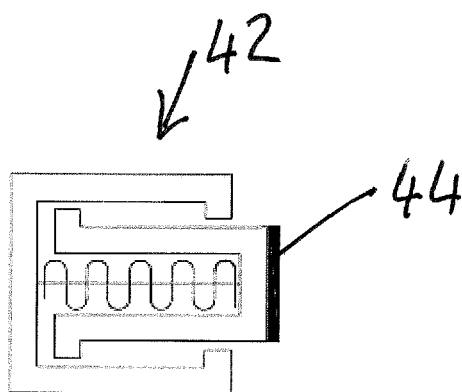


FIG. 14

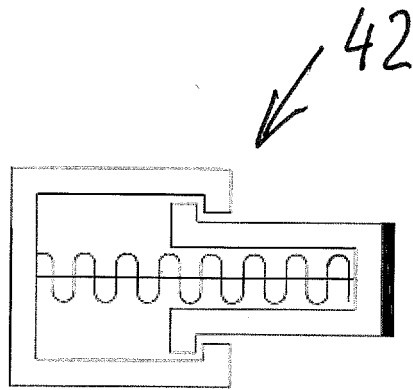


FIG. 15

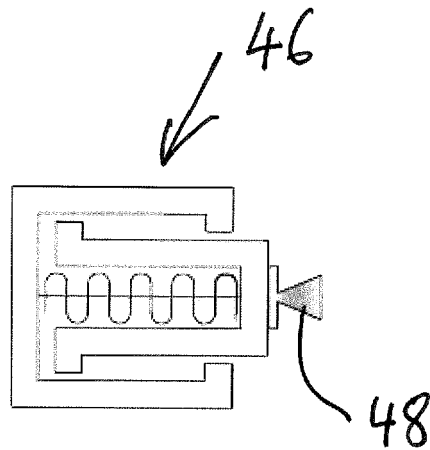


FIG. 16

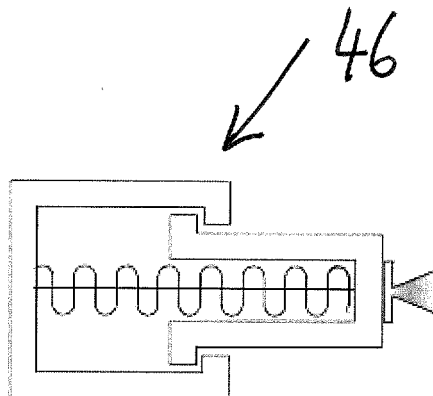


FIG. 17

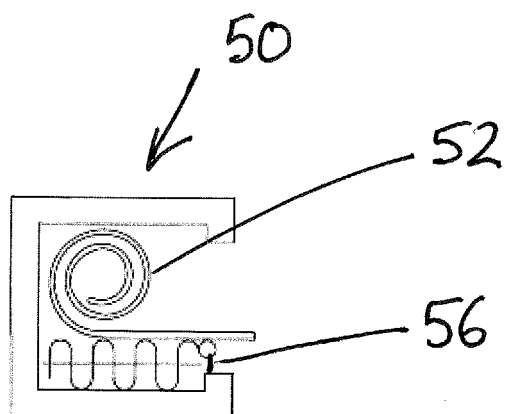


FIG. 18

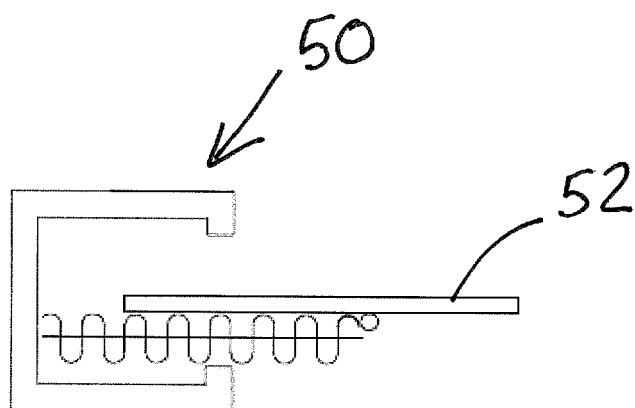


FIG. 19

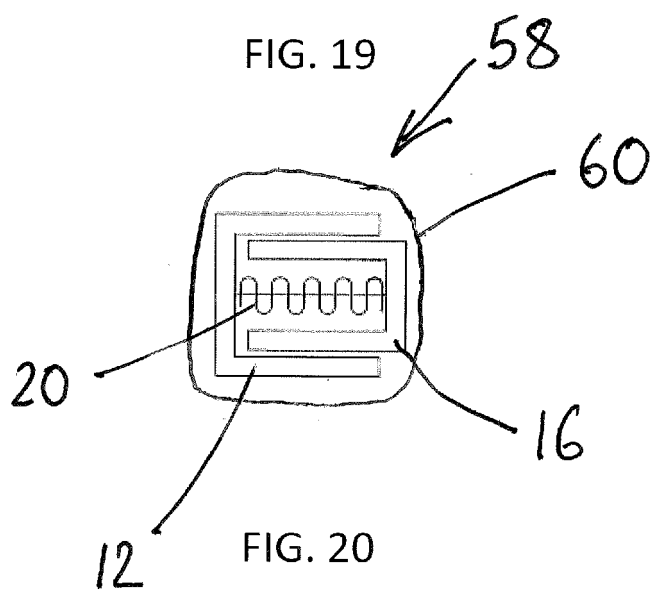
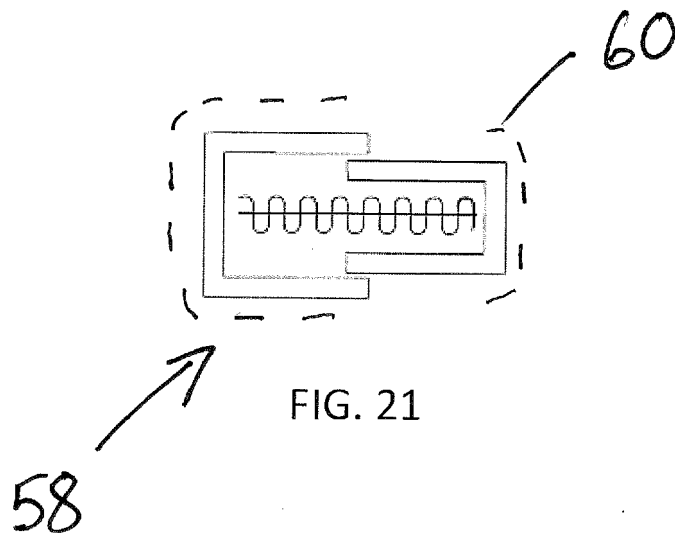


FIG. 20



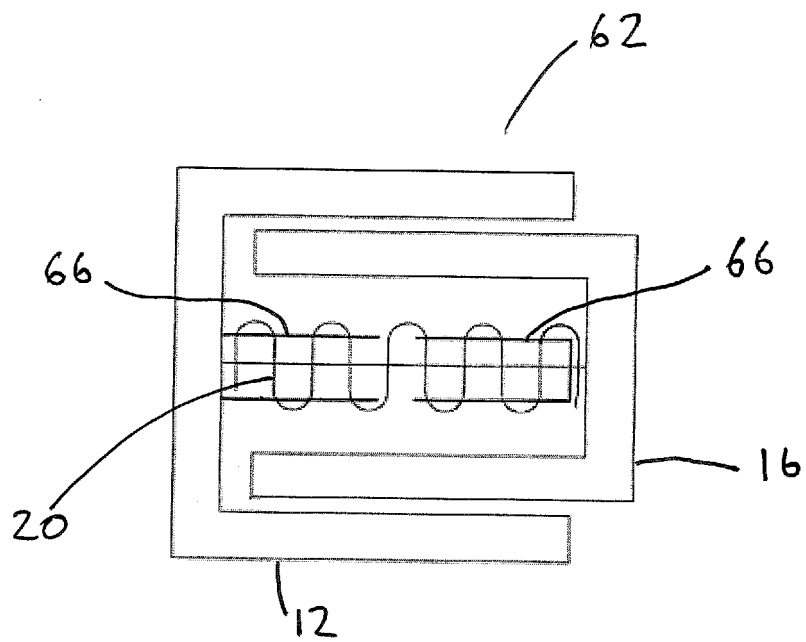


FIG. 22

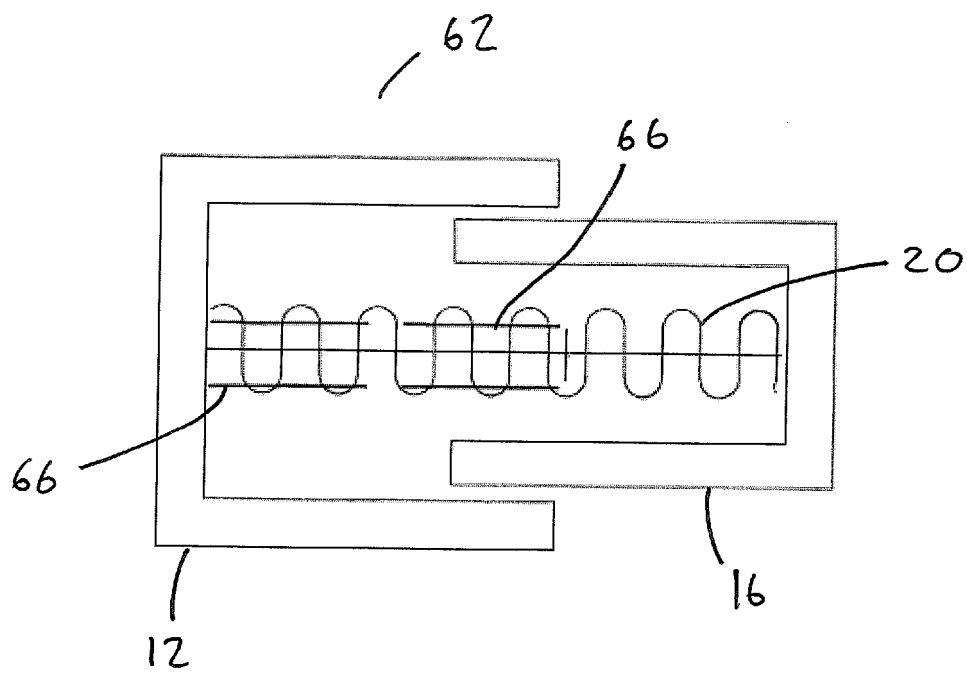


FIG. 23

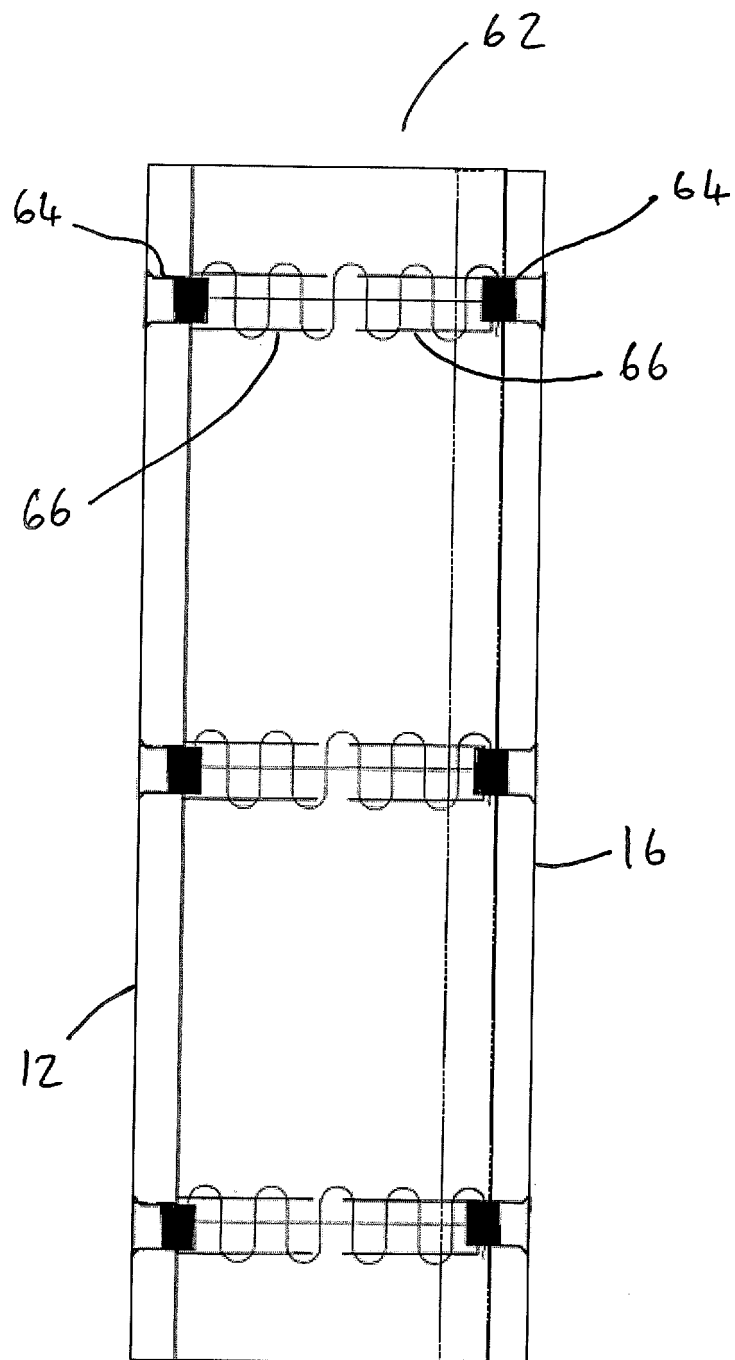


FIG. 24

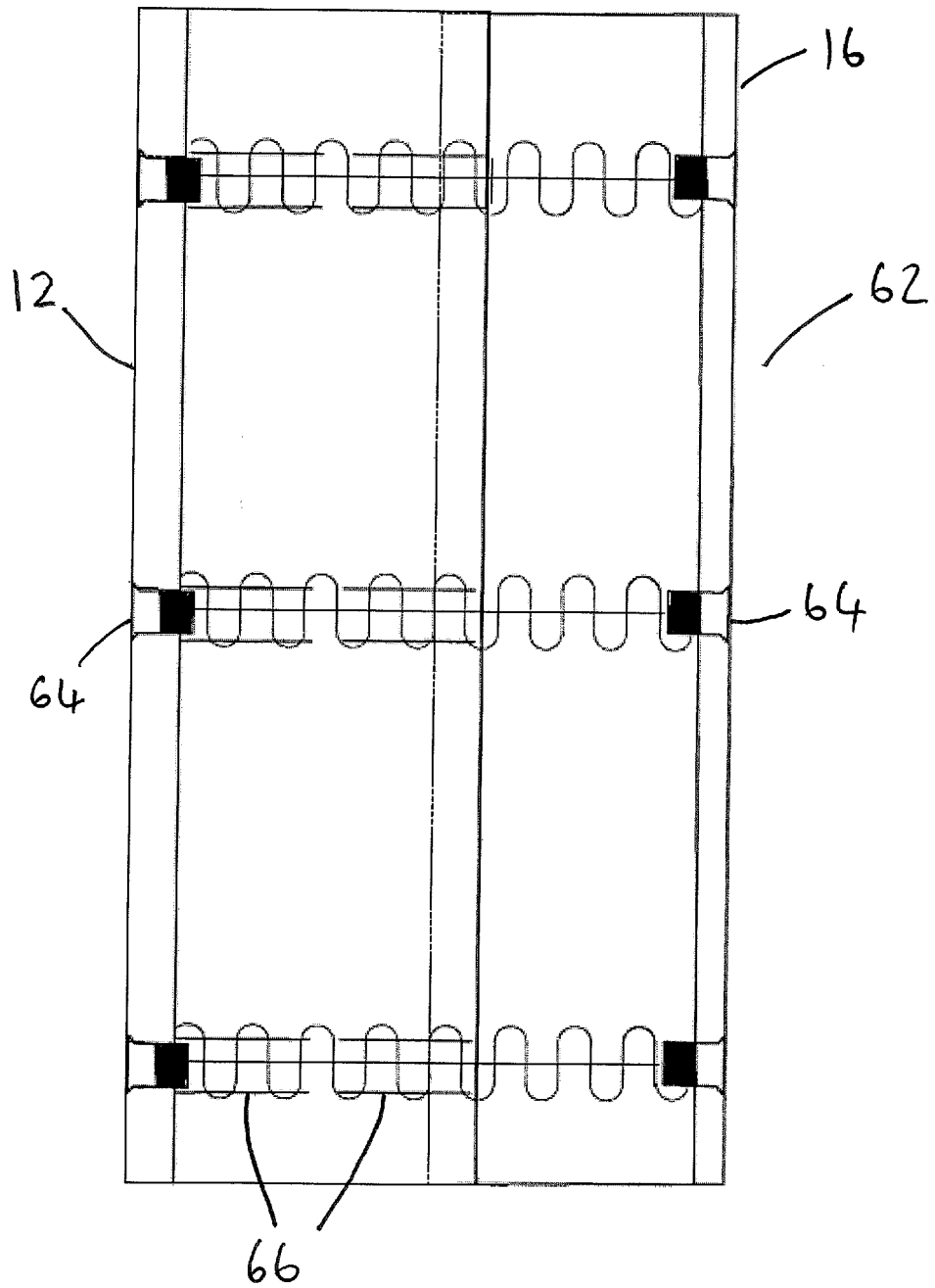


FIG. 25

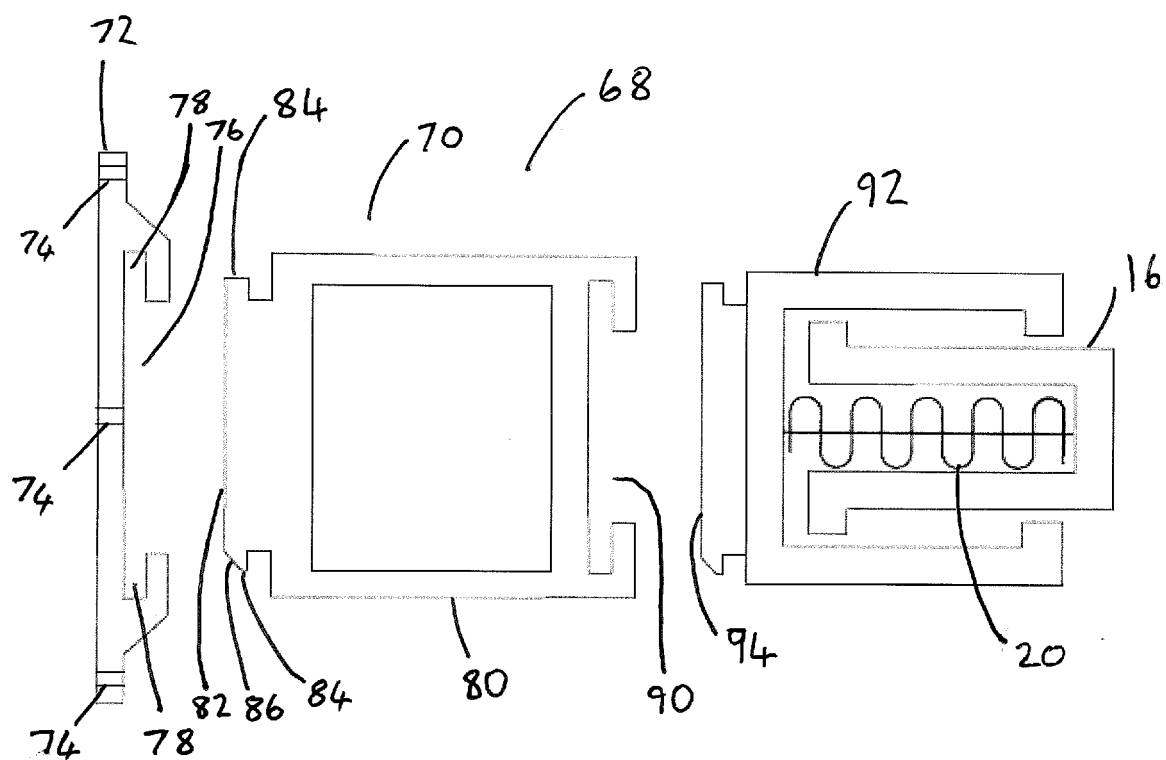


FIG. 26

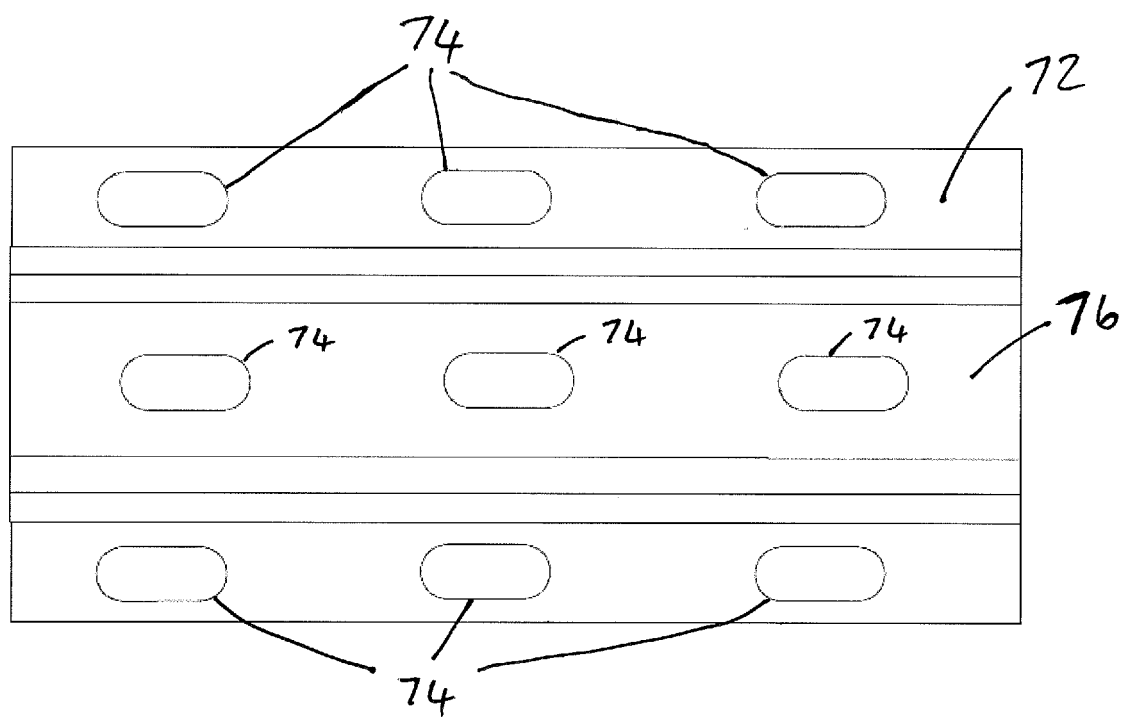
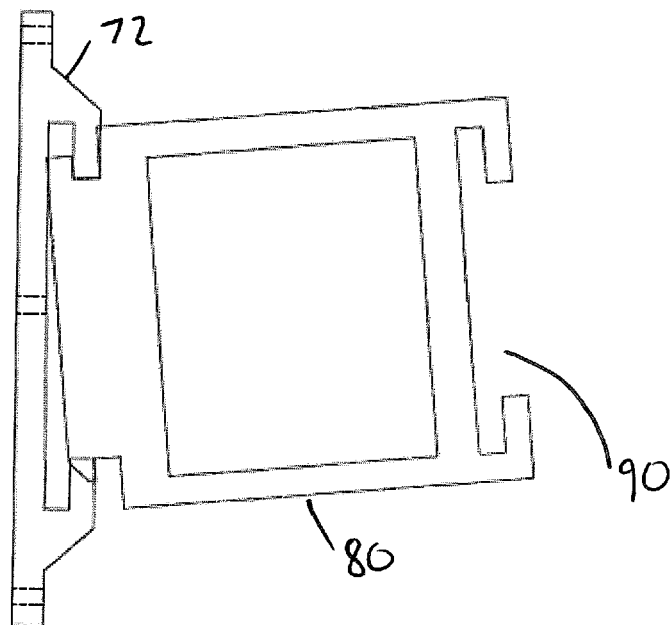
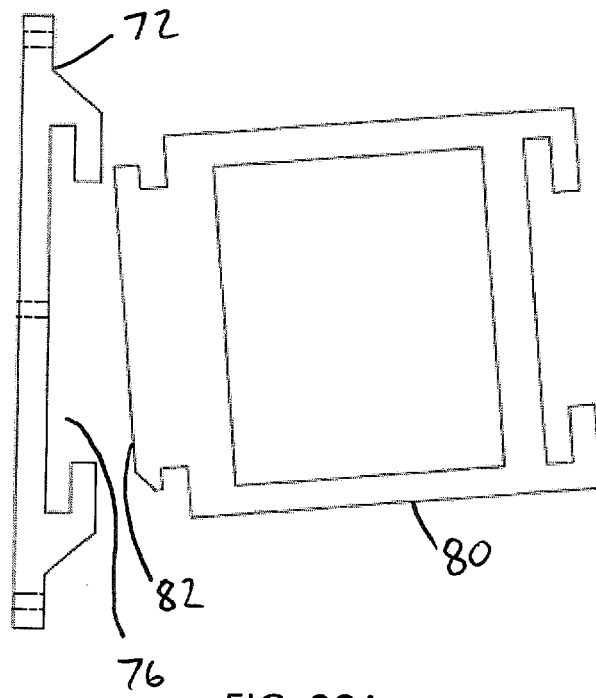


FIG. 27



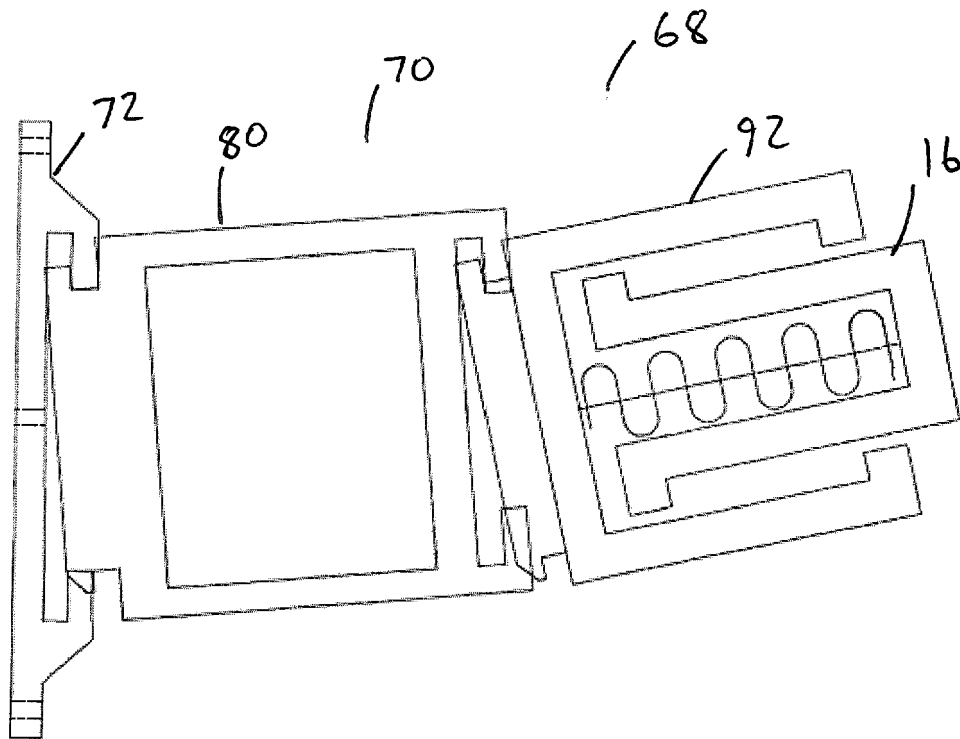


FIG. 28C

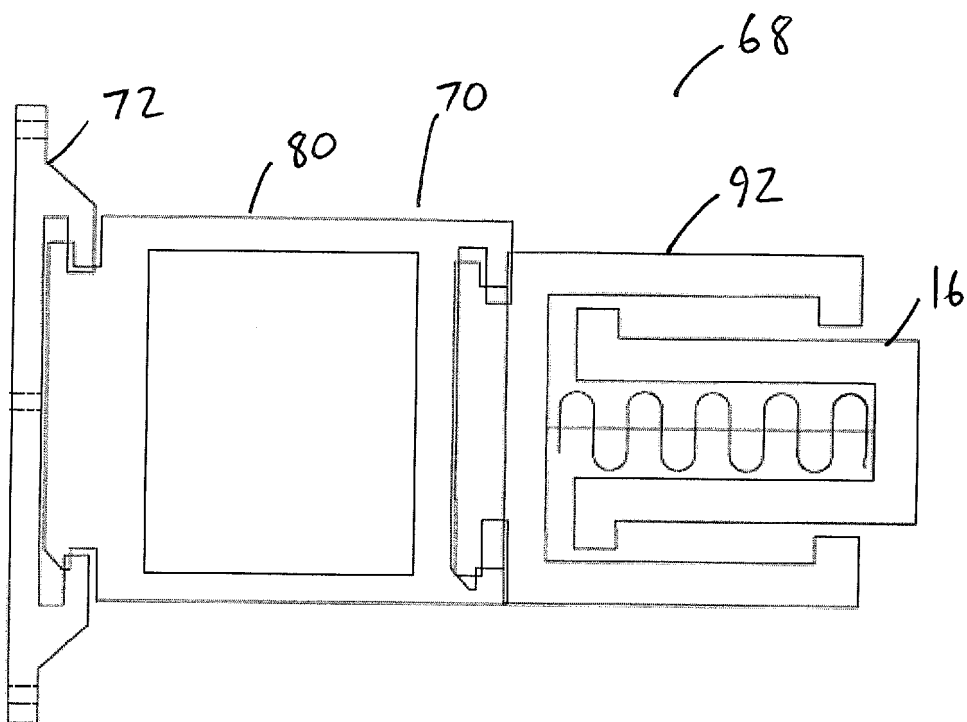


FIG. 28D

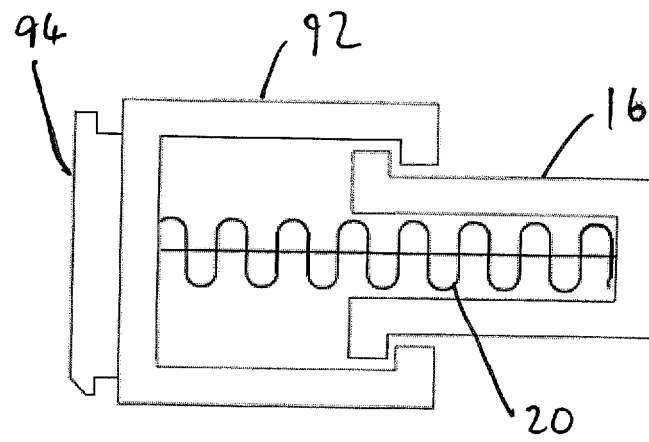


FIG. 29

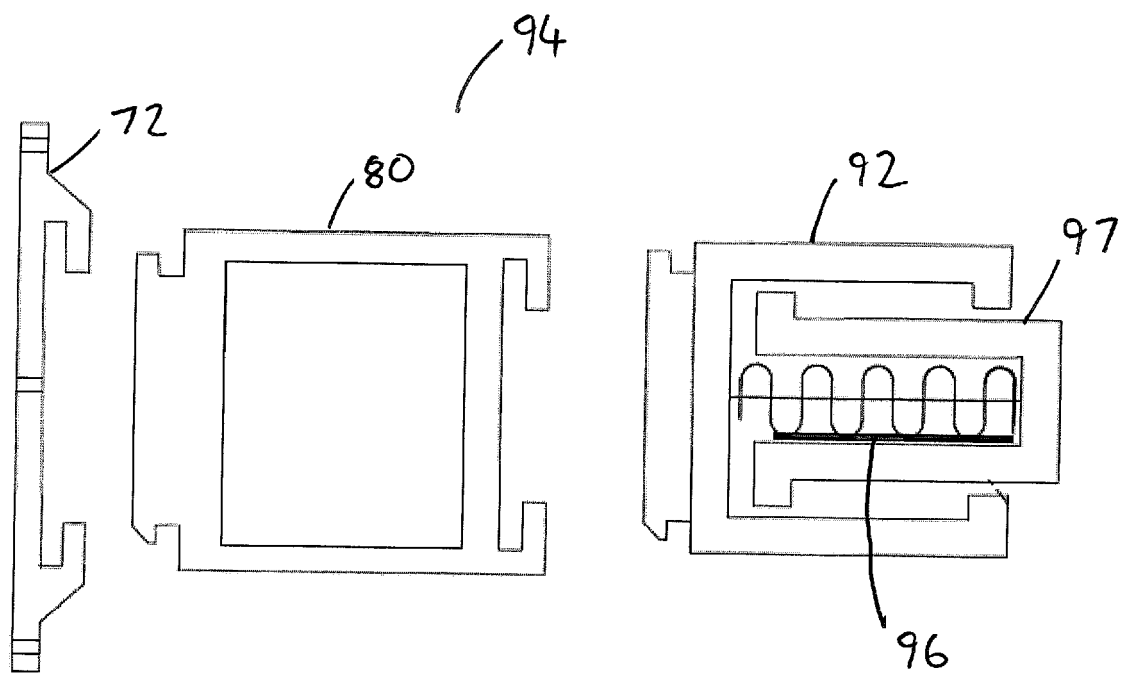


FIG. 30

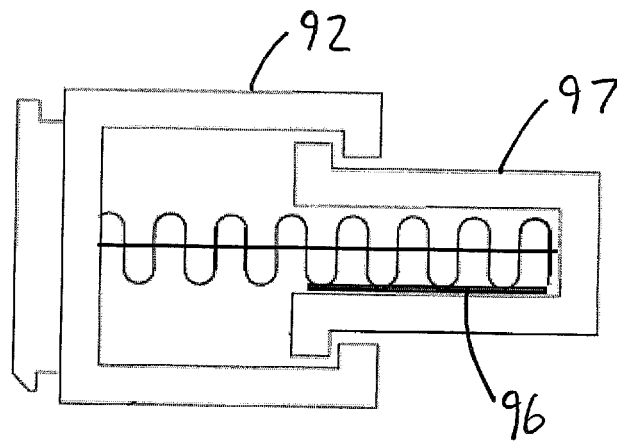


FIG. 31



EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 30 April 2020	Examiner Andlauer, Dominique
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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