

Description

Background of the Invention

1. Field of the Invention

This invention relates to a burst panel assembly having two frangible panels disposed in spaced, face-to-face relationship with an initially flowable synthetic resin material that is disposed in the space between the panels and which expands while curing for continuously exerting pressure on both of the panels for subsequently dampening vibrations thereon. The panel assembly is particularly useful for venting dangerously high internal pressures in an area that is normally exposed to relatively low operating pressures, such as baghouses, dust collectors and the like.

Description of the Prior Art

Frangible panels and disks have long been used for providing a degree of protection to the chambers of vessels, structures or fluid conduits which are subject to the buildup of dangerously high internal pressures that are significantly greater than the operating pressures normally experienced within the structure. Frangible membranes or panels are constructed to burst when the pressure within the structure exceeds a predetermined amount, and thereby vent the area to preclude damage to the structure or to nearby operating personnel.

Burst panels are often used in association with dust collecting equipment, such as baghouses and cyclone-type separators. Additionally, burst panels are useful for protecting drying equipment such as, for instance, coal dryers and the like. Moreover, burst panels and membranes are often provided with lines of weakness which form a burst pattern to ensure that the panel will rupture along the predetermined pattern whenever the pressure within the area to be protected reaches a predetermined level. The weakness lines are typically constructed so that substantially the entire area of the vent opening is quickly exposed to atmosphere. Additionally, the weakness lines are usually formed to allow the panel to open without fragmenting which could otherwise cause panel fragments to be projected from the vent opening during a high pressure explosion at speeds that are extremely dangerous to nearby personnel.

Unfortunately, one problem that has long been associated with burst membranes assemblies is premature failure of the membrane due to vibration that is caused by the equipment or structure to be protected. Commonly, vibration from the equipment causes fatigue stress along the lines of weakness

of the frangible membranes, particularly where the weakness lines comprise elongated slots that are separated by relatively narrow tabs which flex repeatedly under vibration until the material comprising the tabs reaches its fatigue limit and breaks. As a result, the burst panel will thereafter open at a pressure substantially below the desired burst pressure, enabling materials within the structure or the equipment to accidentally escape to the atmosphere, often without the knowledge of the operator.

For instance, vibration emanating from equipment associated with baghouses often causes such severe stress on the burst panels that the latter prematurely fracture within three days of use.

FR-A-2 402 046 discloses a burst panel assembly for normally covering a vent opening. It comprises a composite panel having only one frangible portion defined by the skin that is provided with discontinuities therein. The opposed skin includes no provisions for permitting collapse thereof.

Obviously, there is a serious need for a burst panel assembly that can withstand vibrations over extended periods of time while providing full protection against buildup of dangerously high internal pressures and suitable for resisting vibrations.

SUMMARY OF THE INVENTION

The invention relates to a vibration resistant burst panel assembly for normally covering a vent opening of structure defining an area which is to be protected from the buildup of dangerously high internal pressures, wherein the structure is subject to vibration that is at least partially transmitted to the burst panel assembly, the assembly including a first panel, a second panel disposed in spaced, face-to-face relationship to the first panel to define a chamber between the panels, and an initially flowable, cured synthetic resin material filling at least a substantial portion of the chamber and being self-expanding while curing to a solidified condition, the first panel being provided with a frangible portion adapted to extend across the vent opening of the structure; characterized by:

the second panel being provided with a frangible portion which is in an opposed, face-to-face relationship relative to the frangible portion of the first panel and which is also adapted to extend across the vent opening of the structure; and

the material in the solidified condition in the chamber being expanded to a configuration for continuously exerting uniform pressure on the opposed frangible portions of the first and second panels, thereby putting the cured material under prestress for dampening vibrations transmitted to the first and second panels by the structure.

Brief Description of the Drawings

Figure 1 is a top view of the vibration resistant burst panel assembly of the present invention, with parts broken away to reveal an internal flexible membrane and a filled core comprising polyurethane foam;

Fig. 2 is a bottom view of the burst panel assembly shown in Fig. 1 with a frangible panel broken away for clarity to reveal the polyurethane core; and

Fig. 3 is an enlarged, fragmentary, cross-sectional view taken along line 3-3 of Fig. 2.

Detailed Description of the Drawings

A vibration resistant burst panel assembly 10, as shown in Figs. 1-3, is adapted to normally cover a vent opening of a structure (not shown) defining an area which is to be protected from the buildup of dangerously high internal pressures, wherein the structure is subject to vibrations from motors or other moving machinery. Although the burst panel assembly 10 as illustrated for exemplary purposes is normally associated with structures such as baghouses that normally operate at relatively low pressures, such as fifteen pounds per square inch and below, it is to be understood that the principles of the present invention can also be employed for use with frangible membranes such as rupture disks that are often used on reaction vessels and the like and normally seal the vessel at substantially higher operational pressures.

The burst panel assembly 10 has a first panel 12 (Figs. 1 and 3) with a frangible portion 14 for extension across the vent opening of the structure to be protected. A second panel 16 (Figs. 2 and 3) has a frangible portion 18 disposed in spaced, face-to-face relationship to the frangible portion 14 of the first panel 12 to define a chamber 20 between the frangible portions 14,18.

Viewing Fig. 1, the first panel 12 has a burst pattern 22 of a configuration as shown and comprising lines of weakness which include a number of elongated slots 24 with relatively narrow tabs 26 of the frangible portion 14 between each adjacent pair of slots 24. Similarly, as depicted in Fig. 2, the frangible portion 18 of the second panel 16 has a burst pattern 28 comprising lines of weakness which include a plurality of elongated slots 30 with relatively narrow tabs 32 of the frangible portion 18 located between the ends of adjacent slots 30. The burst pattern 28 of the second panel 16 is substantially in registration with the burst pattern 22 of the first panel 12.

Both of the panels 12,16 have marginal edge portions 34,36 respectively, and a number of holes 38 are formed around the entirety of the edge

portions 34,36 for bolting the assembly 10 to a frame or the like surrounding the vent opening of the structure to be protected. Referring to Figs. 2 and 3, the second panel 16 has a plurality of apertures 40, for purposes which will become clear hereinafter.

A relatively thin, flexible sheet 42, as shown in Figs. 1 and 3, is disposed between the frangible portions 14,18 for substantially precluding leakage of pressurized fluid from the structure to be protected through the slots 24 in the first panel 12 and the slots 30 in the second panel 16. A slot cover 44 is aligned along the burst pattern 22 between the sheet 42 and the first panel 12 for protecting the sheet 42 from abrasive wear from the edges of the frangible portions 14 which define the slot 24, which edges can be relatively sharp in practice. The slot cover 44 is preferably a teflon film that is fixed to the first panel 12 by an adhesive, although a strip of metallic material may also be used for covering the slot 24. Viewing Fig. 2, a slot cover 46, similar to slot cover 44, lies against the inner face of the frangible portion 18 to cover slot 30 in the second panel 16.

A core of initially flowable, cured synthetic resin material 48 fills the chamber 20 and is of a type which self-expands while curing to a solidified condition. The material 48 in the solidified condition is expanded to a configuration for continuously exerting pressure directly on the frangible portion 14 of the first panel 12, as well as directly to the sheet 42 which in turn transmits the pressure from the material 48 to the frangible portion 18 of the second panel 16. The material 48 once cured is compressible and somewhat resilient for dampening vibrations transmitted by the panels 12,16 in order to substantially reduce fatigue stress that would otherwise be exerted on tabs 26,32 and likely prematurely rupture the latter.

The preferred composition of the synthetic resin material 38 is a low density polyurethane foam sold under the name Instapak®-40 manufactured by Sealed Air Corporation of Danbury, Connecticut. Typically, polyurethane foams such as Instapak®-40 are prepared by reacting a polymeric isocyanate with a hydrogen-containing compound having a reactive hydroxyl group, such as polyoxyalkylated glycol. The reaction occurs in the presence of a catalyst, and a blowing agent, such as chlorofluorocarbon is added which vaporizes at the outset of the reaction to produce an expanded, cellular product. The blowing agent vaporizes at a temperature well below the temperature reached during the reaction of the isocyanate and polyoxyalkylated glycol, and the latter reaction is exothermic and thus supplies the heat for vaporization of the blowing agent necessary to form the expanded foam product. Polyurethane foam systems are

commonly supplied in two components, the isocyanate component being maintained separate from the polyoxyalkylated glycol-catalyst-blowing agent component until the time of use.

In preferred forms of the invention, the polyurethane foam material 48 has a free-rise core density of less than 64kg m^3 (four pounds per cubic foot). However, better results are observed when the polyurethane foam 48 has a free-rise core density less than about 16kg m^3 (one pound per cubic foot), and best results have been observed by utilization of the foam manufactured under the name Instapak®-40 which has a free-rise core density of $6,4\text{kg m}^3$ (0.40 pounds per cubic foot). The relatively low density of the preferred foam 48 reduces the weight of the latter which would otherwise be carried by the panels 12,16 and consequently cause unnecessary stress to be exerted on tabs 26,32.

In practice, good results have been observed when the average thickness of the cured polyurethane foam 48 in the chamber 20 is in the range of about ten times to about 50 times the thickness of either of the frangible portions 14,18. However, better results have been observed when the average thickness of the cured polyurethane foam 48 is in the range of about eighteen times to about thirty times the thickness of the frangible portions 14,18. The panels 12,16 are formed of a flexible, metallic material such as aluminum or stainless steel, the thickness of the latter preferably being approximately 0,46mm (0.018 inch) for a panel of approximately $35,5 \times 35,5\text{cm}$ (14" x 14") or approximately 0,9mm (0.037 inch) for a larger panel of approximately 283cm^2 (forty four inches square).

In the preferred method of assembling the first panel assembly 10, the sheet 42 is placed between the panels 12,16 which are then secured to each other in aligned relationship by a plurality of spot welds or the like. The panels 12,16 are then clamped in a fixture, and pressurized air is next directed into the apertures 40 to pressurize the chamber 20 and shift the second panel 16 outwardly away from the chamber 20 to a bulged configuration. During the time that pressurized air is directed into the chamber 20, sheet 42 precludes leakage of air through slots 24, and slot cover 46 substantially prevents the escape of air through slots 30.

Next, the air pressure within chamber 20 is vented to atmospheric, and a negative pressure of vacuum is applied to the outer face of the frangible portion 14 of panel 12 to shift the portion 14 outwardly in a direction away from chamber 20. During application of the vacuum to the first panel 12, the polyurethane foam material 48, being presently in a flowable condition, is directed through the apertures 40 and into the chamber 20. The

foam material 48 expands rapidly upon entering the chamber 20, and once a sufficient quantity of the polyurethane foam 48 is introduced into each chamber 20, introduction of additional foam material ceases. The vacuum is continuously applied to the frangible portion 14 until the polyurethane foam material 48 is fully expanded and cured to a solidified condition, which typically occurs within one minute of entering the chamber 20. Finally, the negative pressure is relieved and the inherent resiliency of the frangible portion 14 urges the latter to thereafter bear against the solidified foam material 48.

As can now be appreciated, the cured, expanded foam material 48 is of a configuration to provide an interference fit with the frangible portions 14,18 defining the chamber 20. A sufficient quantity of the foam material 48 is introduced into the chamber 20 to ensure that the material 48 when cured and expanded completely fills the entire chamber 20 and also bears uniformly across the entire area of the frangible portions 14,18. Moreover, by applying a negative pressure to the first panel 12 to shift the latter outwardly while introducing the foam material 48 into the chamber 20, the foam material 48 expands somewhat farther than would be otherwise possible to thereby "pre-stress" the cured foam material 48 thereafter against the frangible portion 14 once the application of negative pressure to the first panel 12 is ceased.

Once the foam material 48 is cured, the latter is somewhat rigid and provides strength to the assembly 10, possibly by functioning as a coupling member between the middle portions of panels 12,16. At the same time, the foam material 48 is compressible so that vibrations that are transmitted to either of the panels 12,16 from structure or equipment to which the assembly 10 is mounted are effectively dampened, thus relieving the relatively narrow tabs 26,32 from repeated vibratory flexing which could otherwise cause the tabs 26,32 to fracture due to fatigue stress.

In use of the assembly 10, the frangible portions 14,18 remain in an unruptured condition whenever the pressure within the area to be protected remains below a certain predetermined value, and the sheet 42 substantially precludes the leakage of pressurized materials through the assembly 10. However, as soon as the pressure within the area rises to exceed a certain value, both of the panels 12,16 simultaneously rupture along burst patterns 22,28 respectively and the frangible portions 14,18 thereafter shift outwardly to immediately vent the area within the structure or equipment to the atmosphere.

Advantageously, the first panel 12 is the pressure or working side of the assembly 10 which faces the area that is to be protected against the

buildup of dangerously high pressures, while the second panel 16 presents the vent or atmospheric side of the assembly 10. As such, the sheet 42 which is preferably comprised of teflon normally prevents materials within the area of the structure or equipment from contacting and reacting with the polyurethane foam material 48. Where relatively high temperatures or combustible particulates are encountered, the teflon material normally comprising the slot cover 44 can be replaced with a metallic material.

Although the preferred method as set forth hereinabove utilizes both positive and negative pressures to bulge the panels 12,16 outwardly in opposite directions, it should be appreciated that the panels 12,16 may be pre-bulged by a forming process or, alternatively, bulged solely by the expansion of the foam material 48 within chamber 20.

Claims

1. A vibration resistant burst panel assembly (10) for normally covering a vent opening of structure defining an area which is to be protected from the buildup of dangerously high internal pressures, wherein the structure is subject to vibration that is at least partially transmitted to the burst panel assembly (10), the assembly including a first panel (12), a second panel (16) disposed in spaced, face-to-face relationship to the first panel (12) to define a chamber (20) between the panels, and an initially flowable, cured synthetic resin material (48) filling at least a substantial portion of the chamber and being self-expanding while curing to a solidified condition, the first panel (12) being provided with a frangible portion (14) adapted to extend across the vent opening of the structure; **characterized by:**
the second panel (16) being provided with a frangible portion (18) which is in an opposed, face-to-face relationship relative to the frangible portion (14) of the first panel (12) and which is also adapted to extend across the vent opening of the structure; and
the material (48) in the solidified condition in the chamber (20) being expanded to a configuration for continuously exerting uniform pressure on the opposed frangible portions (14, 18) of the first and second panels (12, 16), the cured material (48) being thereby under prestress and compressible for dampening vibrations transmitted to the first and second panels by the structure.
2. The invention of Claim 1, wherein said material comprises a polyurethane foam.
3. The invention of Claim 1, wherein said frangible portions (14,18) of said first panel (12) and said second panel (16) each have lines of weakness defining a burst pattern (22).
4. The invention of Claim 3, wherein said lines of weakness comprise slots (24); and including a thin, flexible sheet (42) disposed between said frangible portions (14;18) of said first panel (12) and said second panel (16) for substantially precluding leakage of fluid through said slots (24) in said first panel (12) and said second panel (16).
5. The invention of Claim 4, including cover member (44) extending across at least a portion of said slots (24) for preventing damage to said flexible sheet (42).
6. The invention of Claim 1, wherein said synthetic resin material has a thickness in the range of about ten times to about fifty times the thickness of said frangible portion (14) of said first panel (12).
7. The invention of Claim 6, wherein said synthetic resin material has a thickness in the range of about eighteen times to about thirty times the thickness of said frangible portion (14) of said first panel (12).
8. The invention of Claim 1, wherein said synthetic resin material has a free-rise density of less than approximately 64kg/m^3 (4.0 pounds per cubic foot).
9. The invention of Claim 8, wherein said synthetic resin material has a free-rise density of less than approximately 16kg/m^3 (1.0 pounds per cubic foot).
10. The invention of Claim 9, wherein said synthetic resin material has a free-rise density of approximately 6.4kg/m^3 (0.40 pounds per cubic foot).
11. A method of assembling a vibration resistant burst panel assembly (10) for use in normally covering a vent opening of structure defining an area which is to be protected from the buildup of dangerously high internal pressures, wherein the structure is subject to vibration that is at least partially transmitted to the burst panel assembly (10), the method including the steps of placing a first panel (12) in spaced, face-to-face relationship to a second panel (16), directing a quantity of flowable synthetic resin material (48) which is self-expanding

buildup of dangerously high pressures, while the second panel 16 presents the vent or atmospheric side of the assembly 10. As such, the sheet 42 which is preferably comprised of teflon normally prevents materials within the area of the structure or equipment from contacting and reacting with the polyurethane foam material 48. Where relatively high temperatures or combustible particulates are encountered, the teflon material normally comprising the slot cover 44 can be replaced with a metallic material.

Although the preferred method as set forth hereinabove utilizes both positive and negative pressures to bulge the panels 12,16 outwardly in opposite directions, it should be appreciated that the panels 12,16 may be pre-bulged by a forming process or, alternatively, bulged solely by the expansion of the foam material 48 within chamber 20.

Claims

1. A vibration resistant burst panel assembly (10) for normally covering a vent opening of structure defining an area which is to be protected from the buildup of dangerously high internal pressures, wherein the structure is subject to vibration that is at least partially transmitted to the burst panel assembly (10), the assembly including a first panel (12), a second panel (16) disposed in spaced, face-to-face relationship to the first panel (12) to define a chamber (20) between the panels, and an initially flowable, cured synthetic resin material (48) filling at least a substantial portion of the chamber and being self-expanding while curing to a solidified condition, the first panel (12) being provided with a frangible portion (14) adapted to extend across the vent opening of the structure; characterized by:
the second panel (16) being provided with a frangible portion (18) which is in an opposed, face-to-face relationship relative to the frangible portion (14) of the first panel (12) and which is also adapted to extend across the vent opening of the structure; and
the material (48) in the solidified condition in the chamber (20) being expanded to a configuration for continuously exerting uniform pressure on the opposed frangible portions (14, 18) of the first and second panels (12, 16), the cured material (48) being thereby under prestress and compressible for dampening vibrations transmitted to the first and second panels by the structure.
2. The invention of Claim 1, wherein said material comprises a polyurethane foam.
3. The invention of Claim 1, wherein said frangible portions (14,18) of said first panel (12) and said second panel (16) each have lines of weakness defining a burst pattern (22).
4. The invention of Claim 3, wherein said lines of weakness comprise slots (24); and including a thin, flexible sheet (42) disposed between said frangible portions (14,18) of said first panel (12) and said second panel (16) for substantially precluding leakage of fluid through said slots (24) in said first panel (12) and said second panel (16).
5. The invention of Claim 4, including cover member (44) extending across at least a portion of said slots (24) for preventing damage to said flexible sheet (42).
6. The invention of Claim 1, wherein said synthetic resin material has a thickness in the range of about ten times to about fifty times the thickness of said frangible portion (14) of said first panel (12).
7. The invention of Claim 6, wherein said synthetic resin material has a thickness in the range of about eighteen times to about thirty times the thickness of said frangible portion (14) of said first panel (12).
8. The invention of Claim 1, wherein said synthetic resin material has a free-rise density of less than approximately 64kg/m^3 (4.0 pounds per cubic foot).
9. The invention of Claim 8, wherein said synthetic resin material has a free-rise density of less than approximately 16kg/m^3 (1.0 pounds per cubic foot).
10. The invention of Claim 9, wherein said synthetic resin material has a free-rise density of approximately $6,4\text{kg/m}^3$ (0.40 pounds per cubic foot).
11. A method of assembling a vibration resistant burst panel assembly (10) for use in normally covering a vent opening of structure defining an area which is to be protected from the buildup of dangerously high internal pressures, wherein the structure is subject to vibration that is at least partially transmitted to the burst panel assembly (10), the method including the steps of placing a first panel (12) in spaced, face-to-face relationship to a second panel (16), directing a quantity of flowable synthetic resin material (48) which is self-expanding



while curing into the space (20) between the first panel (12) and the second panel (16), and curing the quantity of material (48) to a solidified condition as the material expands to substantially fill the space (20) between the panels, **characterized by:**

pressurizing the space (20) defined between a frangible portion (14) provided on the first panel (12) and a frangible portion (18) provided on the second panel (16) which is in spaced, face-to-face relationship to the frangible portion of the first panel to shift one of the frangible portions (14, 18) outwardly from the space (20) prior to the step of directing the quantity of flowable synthetic resin material (48) into the space, the quantity of material, when solidified, dampening vibrations transmitted to the first and second panel (12, 16) by the structure.

12. The method as set forth in Claim 11; including the step of applying a negative pressure to a face of one of said frangible portions (14) which is opposite a face of said one frangible portion (18) facing said space for shifting said one frangible portion (14) outwardly away from said space (20).

13. The method as set forth in Claim 11, wherein said step of applying a negative pressure occurs simultaneously with said step of directing said quantity of flowable synthetic - said resin material into said space (20) between said frangible portions (14;18).

Revendications

Ensemble (10) formant panneau déchirable, résistant aux vibrations, pour recouvrir normalement une ouverture de passage des gaz d'une structure définissant une zone qui doit être protégée à l'égard de l'établissement de pressions intérieures dangereusement élevées, ensemble dans lequel la structure est soumise à des vibrations qui sont, au moins partiellement, transmises à l'ensemble (10) formant panneau déchirable, cet ensemble comportant un premier panneau (12), et un second panneau (16) disposé à distance et face à face avec le premier panneau (12) pour définir une chambre (20) entre les panneaux, ainsi qu'un matériau (48) du type résine synthétique, pouvant initialement couler et ayant fait prise, remplissant au moins une portion substantielle de la chambre et pouvant s'auto-expanser pendant sa prise pour passer en condition solidifiée, le premier panneau (12) étant muni d'une portion déchirable (14) conçue pour s'étendre de part

et d'autre de l'ouverture de passage des gaz de la structure; ensemble caractérisé:

par le fait que le second panneau (16) est muni d'une portion déchirable (18) opposée et située face à face par rapport à la portion déchirable (14) du premier panneau (12) et également conçue pour s'étendre de part et d'autre de l'ouverture de passage des gaz de la structure; et

par le fait que le matériau (48), dans sa condition solidifiée dans la chambre (20), s'expande pour prendre une configuration qui exerce de façon continue une pression uniforme sur les portions déchirables opposées (14, 18) du premier et du second panneaux (12, 16), le matériau ayant fait prise (48) étant sous précontrainte et étant compressible pour amortir les vibrations transmises au premier et au second panneaux pour la structure.

2. Invention de la revendication 1, dans laquelle ledit matériau est constitué d'une mousse de polyuréthane.

3. Invention de la revendication 1, dans laquelle lesdites portions déchirables (14, 18) dudit premier panneau (12) et dudit second panneau (16) présentent chacune des lignes de faiblesse définissant un dessin de déchirure (22).

4. Invention de la revendication 3, dans laquelle lesdites lignes de faiblesse comportent des fentes (24); et comprenant en outre, une feuille fine et flexible (42) disposée entre lesdites portions déchirables (14, 18) dudit premier panneau (12) et dudit second panneau (16) pour empêcher substantiellement une fuite de fluide à travers lesdites fentes (24) dudit premier panneau (12) et dudit second panneau (16).

5. Invention de la revendication 4, comportant un élément formant couverture (44) qui s'étend de part et d'autre d'au moins une portion desdites fentes (24) pour empêcher d'endommager ladite feuille flexible (42).

6. Invention de la revendication 6, dans laquelle ledit matériau du type résine synthétique a une épaisseur allant d'environ dix fois à environ cinquante fois l'épaisseur de ladite portion déchirable (14) dudit premier panneau (12).

7. Invention de la revendication 6, dans laquelle ledit matériau du type résine synthétique a une épaisseur allant d'environ dix-huit fois à environ trente fois l'épaisseur de ladite portion déchirable (14) dudit premier panneau (12).



8. Invention de la revendication 1, dans laquelle ledit matériau du type résine synthétique a une densité, en expansion libre, inférieure à environ 64 kg/m^3 (4,0 livres par pied cube).
9. Invention de la revendication 8, dans laquelle ledit matériau du type résine synthétique a une densité, en expansion libre, inférieure à environ 16 kg/m^3 (1,0 livre par pied cube).
10. Invention de la revendication 9, dans laquelle ledit matériau du type résine synthétique a une densité, en expansion libre d'environ $6,4 \text{ kg/m}^3$ (0,40 livre par pied cube).
11. Procédé d'assemblage d'un ensemble (10) formant panneau déchirable, résistant aux vibrations, à employer pour recouvrir normalement une ouverture de passage des gaz d'une structure définissant une zone qui doit être protégée à l'égard de l'établissement de pressions intérieures dangereusement élevées, ensemble dans lequel la structure est soumise à des vibrations qui sont, au moins partiellement, transmises à l'ensemble formant panneau déchirable, le procédé comportant les étapes consistant à placer un premier panneau (12) à une certaine distance et face à face à un second panneau (16), à envoyer une certaine quantité de matériaux (48) du type résine synthétique pouvant couler, qui s'auto-expandent tout en faisant prise dans l'espace (20) existant entre le premier panneau (12) et le second panneau (16), et à faire prendre la quantité de matériau (48) pour passer en condition solidifiée au fur et à mesure que le matériau s'expand pour remplir substantiellement l'espace (20) existant entre les panneaux, procédé caractérisé par l'étape consistant à mettre sous pression l'espace (20) défini entre une portion déchirable (14), prévue sur le premier panneau (12), et une portion déchirable (18), prévue sur le second panneau (16) et située à une certaine distance et face à face à la portion déchirable du premier panneau pour repousser l'une des portions déchirables (14, 18) vers l'extérieur de l'espace (20) avant l'étape consistant à envoyer dans cet espace ladite quantité de matériau (48) du type résine synthétique pouvant couler, ladite quantité de matériau, une fois solidifiée, amortissant les vibrations transmises au premier et au second panneaux (12, 16) par la structure.
12. Procédé comme indiqué dans la revendication 11, comportant l'étape consistant à appliquer une dépression à la face de l'une (14) desdites portions déchirables qui est opposée à la face

de ladite portion déchirable (14) qui fait face audit espace pour repousser ladite portion déchirable (14) vers l'extérieur en l'écartant dudit espace (20).

13. Procédé comme indiqué dans la revendication 11, dans lequel ladite étape consistant à appliquer une dépression se produit simultanément avec ladite étape consistant à envoyer dans ledit espace (20), entre lesdites portions déchirables (14, 18), ladite quantité de matériau du type résine synthétique pouvant couler.

Patentansprüche

1. Schwingungsbeständige Sprengplattenbaugruppe (10), um normalerweise eine Entlüftungsöffnung einer Konstruktion abzudecken, die einen Bereich definiert, welcher vor dem Aufbauen gefährlich hoher Innendrücke zu schützen ist, wobei die Konstruktion einer Schwingung unterliegt, die zumindest teilweise auf die Sprengplattenbaugruppe (10) übertragen wird, wobei die Baugruppe eine erste Platte (12), eine zweite Platte (16), die in einem gewissen Abstand Seite gegen Seite zu der ersten Platte (12) angeordnet ist, um eine Kammer (20) zwischen den Platten zu definieren und ein anfänglich fließfähiges synthetisches Harzmaterial (48) umfaßt, welches zumindest einen wesentlichen Teil der Kammer füllt und selbstexpandierend ist, während es zu einem verfestigten Zustand aushärtet, wobei die erste Platte (12) mit einem zerbrechlichen Teil (14) versehen ist, der so angepaßt ist, daß er sich über die Entlüftungsöffnung der Konstruktion erstreckt, **dadurch gekennzeichnet**, daß die zweite Platte (16) mit einem zerbrechlichen Teil (18) versehen ist, der sich Seite an Seite gegenüberliegend zu dem zerbrechlichen Teil (14) der ersten Platte (12) befindet und welcher ebenfalls so angepaßt ist, daß er sich quer über die Entlüftungsöffnung der Konstruktion erstreckt; und das Material (48) im verfestigten Zustand in der Kammer (20) zu einer solchen Konfiguration expandiert ist, daß es beständig einen einheitlichen Druck auf die gegenüberliegenden zerbrechlichen Teile (14; 18) der ersten und der zweiten Platte (12; 16) ausübt und das ausgehärtete Material (48) dadurch unter Vorspannung steht und kompressibel ist, um Schwingungen zu dämpfen, die durch die Konstruktion auf die erste und die zweite Platte übertragen werden.
2. Erfindung nach Anspruch 1, **dadurch gekennzeichnet**, daß sich das besagte Material als



Polyurethanschaumstoff darstellt.

3. Erfindung nach Anspruch 1, **dadurch gekennzeichnet**, daß die zerbrechlichen Teile(14;18) der ersten Platte (12) und der zweiten Platte (16) jeweils Sollbruchlinien aufweisen, die ein Sprengmuster(22) definieren. 5
4. Erfindung nach Anspruch 3, **dadurch gekennzeichnet**, daß die besagten Sollbruchlinien Schlitze (24) umfassen und eine dünne, flexible Scheibe(42) einschließen, die zwischen den zerbrechlichen Teilen(14;18) der ersten Platte(12) und der zweiten Platte (16) angeordnet sind, um im wesentlichen eine Leckage von Flüssigkeit durch die Schlitze(24) der ersten Platte (12) und der zweiten Platte (16) auszuschließen. 10 15
5. Erfindung nach Anspruch 4, **dadurch gekennzeichnet**, daß sich ein Abdeckelement(44) quer über mindestens einen Teil der Schlitze (24) erstreckt, um eine Beschädigung an der flexiblen Scheibe (42) zu verhüten. 20 25
6. Erfindung nach Anspruch 1, **dadurch gekennzeichnet**, daß das besagte synthetische Harzmaterial eine Dicke im Bereich von etwa dem Zehnfachen bis zu etwa dem Fünzigfachen der Dicke des zerbrechlichen Teils(14) der ersten Platte (12) aufweist. 30
7. Erfindung nach Anspruch 6, **dadurch gekennzeichnet**, daß das besagte synthetische Material eine Dicke in dem Bereich von etwa dem Achtzehnfachen bis zu etwa dem Dreißigfachen der Dicke des zerbrechlichen Teils (14) der ersten Platte (12) hat. 35
8. Erfindung nach Anspruch 1, **dadurch gekennzeichnet**, daß das besagte synthetische Material eine Freianstiegsdichte von weniger als etwa 64 kg/m³ (4,0 lbs pro Kubikfuß) hat. 40
9. Erfindung nach Anspruch 8, **dadurch gekennzeichnet**, daß das besagte synthetische Material eine Freianstiegsdichte von weniger als etwa 16 kg/m³ (1,0 lbs pro Kubikfuß) hat. 45
10. Erfindung nach Anspruch 9, **dadurch gekennzeichnet**, daß das besagte synthetische Material eine Freianstiegsdichte von etwa 6,4 kg/m³ (0,40 lbs pro Kubikfuß) hat. 50
11. Verfahren zur Montage einer schwingungsbeständigen Sprengplattenbaugruppe(10), um diese normalerweise für das Abdecken einer Konstruktion zu verwenden, die einen Bereich 55

definiert, welcher vor dem Aufbau gefährlich hoher Innendrucke zu schützen ist, wobei die Konstruktion einer Schwingung ausgesetzt ist, die zumindest teilweise auf die Sprengplattenbaugruppe (10) übertragen wird, wobei das Verfahren folgende Schritte einschließt: das Plazieren einer ersten Platte (12) in einem gewissen Abstand der Seite zu der Seite einer zweiten Platte (16), das Einleiten einer Menge an fließfähigem synthetischen Harzmaterial (48), welches während des Aushärtens selbst-expandierend ist, in den Raum (20) zwischen der ersten Platte (12) und der zweiten Platte (16) und das Aushärten des Materials (48) in einen verfestigten Zustand, wobei das Material so expandiert, daß es im wesentlichen den Raum (20) zwischen den Platten füllt, **dadurch gekennzeichnet**, daß der Raum (20) unter Druck gesetzt wird, der zwischen einem zerbrechlichen Teil (14), der an der ersten Platte (12) vorgesehen ist und einem zerbrechlichen Teil (18), der an der zweiten Platte vorgesehen ist, der sich in einem gewissen Seitenabstand zum zerbrechlichen Teil der ersten Platte befindet, definiert wird, um einen der zerbrechlichen Teile (14;18) von dem Raum (20) nach außen zu schieben, bevor der Schritt des Einleitens der Menge des fließfähigen synthetischen Harzmaterials (48) in den Raum beginnt, wobei die Materialmenge, wenn sie verfestigt ist, Schwingungen dämpft, die durch die Konstruktion auf die erste und die zweite Platte (12;16) übertragen werden.

12. Verfahren nach Anspruch 11, **dadurch gekennzeichnet**, daß es den Schritt des Aufbringens eines negativen Druckes auf die Fläche des zerbrechlichen Teils (14) einschließt, die eine gegenüberliegende Seite des zerbrechlichen Teils (18) ist, die zu dem besagten Raum hinzeigt, um den zerbrechlichen Teil (14) nach außen von dem Raum (20) weg zu verschieben.

13. Verfahren nach Anspruch 11, **dadurch gekennzeichnet**, daß der besagte Schritt des Aufbringens eines negativen Druckes gleichzeitig mit dem Schritt des Einleitens der besagten Menge an fließfähigem synthetischen Harzmaterial in den Raum (20) zwischen den zerbrechlichen Teilen (14;18) auftritt.

