Title: GAP FILLING SYSTEM

Abstract: A concrete construction (10) comprises a first slab (11) and a second slab (12), there being a gap (13) between the slabs. The gap (13) may be formed by removing form work or it may be an expansion joint or a crack induction joint which requires a surface finish. An expandable gap filler support member in the form of a spacer (14) is inserted into the gap before application of a caulking compound as filler. The spacer (14) is an extruded strip which has two opposing Y shaped sections (15) and (16) set back-to-back and formed as a symmetrical unit having divergent flanges (17), (18), (19) and (20) which are able to flex so that the spacer (14) may be inserted in the gap (13). As the slabs (11) and (12) expand and contract the arms (17), (18), (19) and (20) will flex with that movement. In the case of gaps of greater depth multiple spacers may inserted one atop the other.
GAP FILLING SYSTEM

FIELD OF THE INVENTION

THIS INVENTION relates to a gap filling system employing an expandable spacer and in particular but not limited to an expandable spacer adapted to receive and support a past-like filler in predetermined quantity as used in various constructions including floors, walls and the like.

BACKGROUND OF THE INVENTION

Historically, problems concerned with maintaining the integrity of concrete slabs is not a new thing, it being usual to provide some form of controlled cracking to induce subsurface cracking by a surface sawcut or crack inducer pushed into the surface.

Slabs are often equipped with various joints including contraction and expansion joints and some of these can leave a gap in the concrete surface as well.

In the case of a saw cut used to induce cracking, it is usual to fill the gap with some form of filler. Typically, this could be an extruded insert strip, paste filler or caulking compound applied to the gap or a combination of the two. An adhesive may be applied. Also it is usual to make provision in the gap filler for expansion and contraction.

Apart from concrete, gap fillers are widely used in all fields and the present invention while having application to gap filling in concrete has general application. The following are examples of what is typical in the prior art, it being appreciated that the art is a well developed one and a prior art search shows all manner of devices used to fill gaps. Gaps occur in other situations where fillers
are used, including tensioning fillers for fly screens in windowframes for holding
the screens, seals in doors and windows and so on.

The following prior art documents were located in the PCT Article 15/5
search and the inclusion herein should not be considered as any admission that
any of these documents are common general knowledge in the art. The
applicant considers these are merely exemplary of the wide variety of the prior
art to the extent that the present invention, being a simple one, should not be
viewed as obvious, but rather as inventive in a highly developed art it being more
difficult to invent in an art that is so highly developed.

US 6,336,300 (BABUCK) describes a gap filler system for use in a timber
deck to fill and seal gaps between planks in the deck. The filler is a strip made
from an elongate block of rubber shaped to suit the shape of the gap between
the planks depending on whether the planks have rounded or square edges. The
strip relies on its blockiness and is tight fitting being slightly wider than the gap
and physically fills the gap in a compressed into the gap state. Further it has an
enlarged bifurcated upper edge with flanges which form a channel for runoff. The
flanges are biassed out on to the tops of the planks to form a seal. An adhesive
may be applied between the flanges and the planks. In another embodiment the
opposite edge of the strip is enlarged and projects out on the opposite side of
the deck so the strip extends through the deck.

US 4,141,189 (BORJESON) describes a gap filler in the form of a seal
forced into a joint and able to expand and contract by reason of compression
applied at the time of insertion. The seal is an extruded section having opposed
V-shaped arms extending on opposite sides of a weakened region forming an
elongate hinge so that opposite edges of the arms may be forced together against the bias afforded by the V-shaped section of the arms. A flat insertion tool in the form of a rolling disc is placed between the arms at the time of insertion and the strip is forced into the gap with a rolling action of the disc. When the tool is removed the V-shaped section of the arms compressed against the wall of the gap, forces the upper edges of the arms together. The upper edges of the arms have interlocking grooves so they are keyed together. The arms may include outwardly projecting fingers or ribs to enhance sealing. As the joint expands and contracts the arms flex back and forth about the hinge. There is no caulking compound used with this strip.

WO 2003/048470 (REDDIPLEX GROUP PLC) describes an l-shaped sealing strip having curved ends and a narrow web between the ends. The ends wider than the gap being filled so they deform upon insertion. The strip is inserted into the gap and is stabilised and held straight by reason of its l-shape. The web is made from an expandible material that expands in case of fire.

US 4,290,249 (MASS) describes a sealing strip which operates similar to the BORJESON seal in so far as it is V-shaped, has two arms and a hinge between them. The arms are biassed apart by a V-shaped spring steel insert encapsulated in the strip.

As set out above there are many and varied arrangements for filling gaps, and the present invention comes into a field as a simple and useful alternative, it being non-obvious on the basis of it being more difficult to invent in a highly developed field where it was thought that "everything has been invented." accordingly the present invention has as its primary object to at least provide the
public with a useful alternative in a highly developed field. A further object is to provide a simple inexpensive extruded gap filler and caulking compound support as an alternative to the prior art.

**OUTLINE OF THE INVENTION**

In one aspect there is provided a filled gap in a concrete construction, including a space filling aid comprising an elongate body adapted for resilient insertion into a gap, the gap being of the type having confronting side walls separated by a space, the elongate body having an elongate paste receiving cavity of predetermined volume which bridges across the body to hold filler paste applied into the cavity, the elongate body being adapted to expand and retract as the space between the walls changes and a filler paste laid while flowable and allowed to harden being held in the cavity.

In another aspect there is provided a space filling aid comprising an elongate body adapted for resilient insertion into a gap, the gap being of the type having confronting side walls separated by a space, the elongate body having an elongate paste receiving cavity of predetermined volume which bridges across the body to hold filler paste applied into the cavity, the elongate body being adapted to expand and retract as the space between the walls changes, the body comprising a thin walled extruded member having an upper bifurcated longitudinally extending section joined at a juncture between the arms, with the opposed arms being adapted to flex inwardly about the juncture.

Preferably, the juncture between the arms comprises a transverse section extending between the arms and leading to a web extending away from the arms.
Preferably, the juncture between the arms comprises a transverse section extending between the arms and leading to a web extending away from the arms, the transverse section being sufficiently rigid to provide spring bias to the arms.

Preferably, the body comprises a pair of spaced longitudinal extending arm members adapted to flex inwardly upon insertion into the gap and to spring back against the walls.

Preferably, the body is generally cruciform in cross section.

Preferably, the body is generally dumbbell shaped in cross-section having back-to-back-pairs of arms in the form of divergent longitudinally extending pairs of resilient flange members.

Preferably, the body is generally symmetrical in transverse cross section.

Preferably, the body is generally dumbbell shaped in cross-section having back-to-back-pairs of arms in the form of divergent longitudinally extending pairs of resilient flange members and each flange having a turned over peripheral marginal edge portion.

Preferably, the body is generally dumbbell shaped in cross-section having back-to-back-pairs of arms in the form of divergent longitudinally extending pairs of resilient flange members having a space between adjacent arms, the space
between adjacent arms defining the cavity as a paste receiving channel which is V-shaped in profile and the paste being held in the channel as a strip.

In another aspect there is provided a method of gap filling whereby an elongate gap filler support member is initially positioned in a gap providing a seat for a filler paste laid while flowable and allowed to harden, the support member having an open channel of predetermined volume whereby gap filler may be located in the channel to finish filling the gap and be supported by the support member, the method comprising inserting the support member into a gap so that the open channel is just below the surface adjacent to the gap and subsequently applying the paste to the channel to complete filling of the gap.

Preferably, the support member has two opposite edges adapted to be self holding in the gap, the method including pushing the first edge into the gap followed by the second edge, the second edge having said open channel.

Preferably, the support member is itself supported by an auxiliary support member located underneath, the method including pushing the auxiliary support member into the gap first. Preferably, the method includes pushing the auxiliary support member into the gap first and the support member and auxiliary support member are functionally equivalent and interchangeable.

In practicing the method the preferred support member comprises a space filling aid according to the second aspect.
BRIEF DESCRIPTION OF THE DRAWINGS

In order that the present invention may be more readily understood and be put into practical effect reference will now be made to the accompanying drawings which illustrate various preferred embodiments and wherein:

Figures 1A and 1B illustrate the process whereby an expandable spacer according to the present invention is inserted into a gap;

Figure 2 illustrates application of a spacer to an expansion joint in the concrete slab where a dowel is employed;

Figure 3 illustrates the application of the invention to a slab where there is no dowel;

Figure 4 illustrates application of spacers in a back to back arrangement;

Figure 5 illustrates application of the invention in a wall panel;

Figure 6 is similar to the embodiment of Figure 5 but employing spacers in back-to-back relationship;

Figures 7A and 7B illustrate in greater detail the spacer of Figures 2, 4 and 6; and

Figures 8A and 8B illustrate in greater detail the other spacer of the type illustrated in Figures 1A, 1B, 3 and 5.

METHOD OF PERFORMANCE

Referring to the drawings and initially to Figures 1A and 1B there is illustrated a concrete construction 10 comprising a first slab 11 and a second slab 12, there being and a gap 13 between the slabs. The gap 13 may be formed by removing form work or it may be an expansion joint or a crack induction joint which requires a surface finish. This is often provided by putting
paste filler into the gap. In order to control the amount of gap filler delivered into the gap 13 the present invention is utilised whereby expandable gap filler support member in the form of a spacer 14 inserted into the gap before application of filler.

In this case the spacer 14 is an extruded strip which has two opposing Y shaped sections 15 and 16 set back-to-back and formed as a symmetrical unit having divergent arms in the form of flanges 17, 18, 19 and 20 which are able to flex as shown in Figure 2 so that the spacer 14 may be inserted in the gap 13. As the slabs 11 and 12 expand and contract the arms 17, 18, 19 and 20 will flex with that movement.

As can be seen a V-shaped channel 21 is formed between the flanges 17 and 18 in the spacer and this channel may be utilised to receive and hold a filler paste to complete and fill the gap. It will be appreciated that the amount of filler required will be limited by the volume of the channel 21 and that portion of the gap located above the channel. This is more easily seen in Figure 2. It will also be appreciated that the symmetrical construction of the spacer provides an opposing channel so that the spacer is reversible for ease of use and for applications to walls as described below but it will be appreciated that it need not be symmetrical. In fact there are clearly a large number of possible cross-sections that will work.

In Figure 2 a spacer 22 is seated upon a dowel 23 projecting into adjacent slabs 24 and 25. The spacer 22 comprises back-to-back V sections and the upper V section is shown filled with a suitable filler 26 to complete the filling of the gap. It will be appreciated that the expandable spacer 22 is able to flex with
relative movement of the slabs along the dowel 23 and also in response to any
downward pressure upon the filler 26, the arms will flex slightly but this will be
tempered due to the turned marginal edges 27 and 28 engaging the walls 29 and
30. It will be further appreciated that the volume of filler 26 will be economised
by utilising the spacer 22.

The flexing of the arms is afforded by the transverse juncture 31 between
the arms.

Figures 3, 4, 5, 6 illustrate further embodiments of the invention and
further applications the two types of spacers depicted in Figures 1A and 2; and
Figures 7A through 8B illustrate typical examples of typical spacers
showing the compressed position of the flanges of the spacer in phantom in
Figures 7B and 8B.

It will be appreciated that although the spacer is illustrated in the shapes
and configurations of Figures 7A through 8B that any form of expandable spacer
that may be located and secured in position in order to receive a defined volume
of filler to economise the amount of filler employed and function equivalent to the
embodiments illustrated may be utilised in practice of the method of the present
invention in terms of its gap filling function. The invention may be used in any
suitable situation, Figures 5 and 6 being in respect of wall panelling while the
other drawings are in respect of concrete.

Whilst the above has been given by way of illustrative example of the
present invention many variations and modifications thereto will be apparent to
those skilled in the art without departing from the broad ambit and scope of the
invention as set out in the appended claims. For example, where "comprising"
is used it is not intended to be exclusive but the features listed are the minimum and additional features added to the combination is still within the scope of the invention described and claimed. Also where the description refers to a pair of arms the arms need not be identical arms and pair does not exclude additional arms in addition to the pair.
1. A filled gap in a concrete construction, including a space filling aid comprising an elongate body adapted for resilient insertion into a gap, the gap being of the type having confronting side walls separated by a space, the elongate body having an elongate paste receiving cavity of predetermined volume which bridges across the body to hold filler paste applied into the cavity, the elongate body being adapted to expand and retract as the space between the walls changes and a filler paste layed while flowable and allowed to harden being held in the cavity.

2. A filled gap in a concrete construction according to claim 1 wherein the body comprises a pair of spaced longitudinal extending arm members adapted to flex inwardly upon insertion into the gap and to spring back against the walls.

3. A filled gap in a construction according to claim 1 wherein the body is generally cruciform in cross section.

4. A filled gap in a construction according to claim 1 wherein the body is generally dumbbell shaped in cross-section having back-to back-pairs of arms in the form of divergent longitudinally extending pairs of resilient flange members.

5. A filled gap in a construction according to claim 1 wherein the body is generally be symmetrical in transverse cross section.

6. A filled gap in a construction according to claim 1 wherein the body is generally dumbbell shaped in cross-section having back-to back-pairs of arms in the form of divergent longitudinally extending pairs of resilient flange members and each flange has a turned over peripheral marginal edge portion.
7. A filled gap in a construction according to claim 1 wherein the body is generally dumbbell shaped in cross-section having back-to-back-pairs of arms in the form of divergent longitudinally extending pairs of resilient flange members having a space between adjacent arms, the space between adjacent arms defining the cavity as a paste receiving channel which is V-shaped in profile and the paste being held in the channel as a strip.

8. A method of gap filling whereby an elongate gap filler support member is initially positioned in a gap providing a seat for a filler paste layed while flowable and allowed to harden, the support member having an open channel of predetermined volume whereby gap filler may be located in the channel to finish filling the gap and be supported by the support member, the method comprising inserting the support member into a gap so that the open channel is just below the surface adjacent to the gap and subsequently applying the paste to the channel to complete filling of the gap.

9. The method according to claim 8 where the support member has two opposite edges adapted to be self holding in the gap, the method including pushing the first edge into the gap followed by the second edge, the second edge having said open channel.

10. The method according to claim 8 where the support member is itself supported by an auxiliary support member located underneath, the method including pushing the auxiliary support member into the gap first.

11. The method according to claim 8 where the support member is itself supported by an auxiliary support member located underneath, the method including pushing the auxiliary support member into the gap first and the support
member and auxiliary support member are functionally equivalent and interchangeable.

12. A space filling aid comprising an elongate body adapted for resilient insertion into a gap, the gap being of the type having confronting side walls separated by a space, the elongate body having an elongate paste receiving cavity of predetermined volume which bridges across the body to hold filler paste applied into the cavity, the elongate body being adapted to expand and retract as the space between the walls changes, the body comprising a thin walled extruded member having an upper bifurcated longitudinally extending section joined at a juncture between the arms, with the opposed arms being adapted to flex inwardly about the juncture.

13. A space filling aid according to claim 12 wherein the arm members are adapted to flex inwardly upon insertion into the gap and to spring back against the walls.

14. A space filling aid according to claim 12 wherein the body is generally cruciform in cross section.

15. A space filling aid according to claim 12 wherein the body is generally dumbbell shaped in cross-section having back-to back-pairs of arms in the form of divergent longitudinally extending pairs of resilient flange members.

16. A space filling aid according to claim 12 wherein the body is generally be symmetrical in transverse cross section.

17. A space filling aid according to claim 12 wherein the body is generally dumbbell shaped in cross-section having back-to back-pairs of arms in the form
of divergent longitudinally extending pairs of resilient flange members and each flange has a turned over peripheral marginal edge portion.

18. A space filling aid according to claim 12 wherein the body is generally dumbbell shaped in cross-section having back-to-back-pairs of arms in the form of divergent longitudinally extending pairs of resilient flange members having a space between adjacent arms, the space between adjacent arms defining the cavity as a paste receiving channel which is V-shaped in profile.

19. A space filling aid according to claim 12 wherein the juncture between the arms comprises a transverse section extending between the arms and leading to a web extending away from the arms.

20. A space filling aid according to claim 12 wherein the juncture between the arms comprises a transverse section extending between the arms and leading to a web extending away from the arms, the transverse section being sufficiently rigid to provide spring bias to the arms.

21. A space filling aid according to claim 12 wherein the juncture between the arms comprises a transverse section extending between the arms and leading to a web extending away from the arms, the web extending to a further juncture and a further set of arms opposite the first set of arms.
INTERNATIONAL SEARCH REPORT

International application No. PCT/AU2006/001691

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.
E04B 1/68 (2006.01)  EOIC 11/12 (2006.01)  
EOIC 11/02 (2006.01)  E04F 15/14 (2006.01) 

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database consulted during the international search (name of database and, where practicable, search terms used)

Derwent File DWPI E04B V, E04F 15/14 & EOIC 11/ with keywords expansion, seal, joint, gap, space, cavity, cross, cruciform, arm, flange, 'X', 'Y', flex, compress, resilient, retract, elongate, strip, insert, spacer, seal, paste, gel, foam, mastic, paste, silicone, bucking rod, strip, insert, spacer, cruciform and the like

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>US 4141 189 (BORJESON) 27 February 1979 Full specification, All figures</td>
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<td>A</td>
<td>US 4290249 (MASS) 22 September 1981 Full specification, All figures</td>
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<td>A</td>
<td>US 6336300 B1 (BABUCKE) 8 January 2002 Full specification, All figures</td>
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[X] Further documents are listed in the continuation of Box C  [X] See patent family annex

* Special categories of cited documents:
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Date of the actual completion of the international search: 17 January 2007
Date of mailing of the international search report: 23 JAN 2007

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<td>A</td>
<td>WO 2003/048470 A1 (REDDIPLEX GROUP PLC) 12 June 2003 Full specification, Fig 2</td>
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This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.