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54 Sealing method and device.

57 Process for sealing a joint between adjacent members, for example expansion/contraction joints in highways, wherein the sealant composition is injected close to the floor of the joint and is shaped by a following shaping tool integral with the injection nozzle member. The process eliminates the separate tooling step.

Also disclosed is a combined application nozzle and shaping tool for carrying out the process comprising a nozzle member (1) having a lower discharge orifice (3), a shaping tool (7) integral with the nozzle member (1), the shaping edge or surface extending downwardly but not coextensively with the discharge orifice (3).

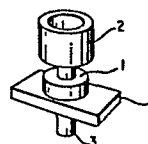
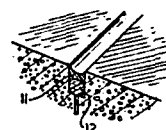


FIG. 4.



SEALING METHOD AND DEVICE

This invention relates to a method for sealing joints and to a device suitable for use in such a method.

It is often desired to seal joints between adjacent structural members for example the joints between the
5 walls of buildings or expansion channels between adjacent slabs of a concrete highway. A widely practised method of forming an elastic or plastic seal capable of withstanding the expansion, contraction and weathering to which such joints are subjected comprises introducing
10 into the joint a paste-like sealant or caulking material. Such material may be silicone or organic and may cure or otherwise harden to an elastic solid, or it may remain in a non-cured plastic state. Generally such materials are applied to the joint through a conical- or
15 cylindrical-shaped nozzle which may be detachable and re-usable or which may be permanently attached to the sealant reservoir. According to the recommended technique the sealant is pushed ahead as it emerges from the nozzle so that a uniform bead is obtained. Although this
20 technique is satisfactory for certain applications, such as sealing around window frames it is impractical for sealing joints of the type formed between sections of highway pavement. In such an application it is desirable that the sealant should not project above the level of
25 of the pavement where it would be subject to damage by abrasion and impact. It has thus been the practice to seal joints of this kind by first injecting the sealant into the joint and thereafter hand finishing the surface of the sealant with a tool which imparts the necessary
30 pressure to wet the joint and recess and profile the surface of the sealant. Such a procedure is time consuming and results in some waste of sealant. As far as is known there has thus far existed no means of sealing

expansion/contraction joints in highways which reduces or overcomes the disadvantages associated with the above described methods.

5 According to this invention there is provided a process for the sealing of a joint between adjacent members, the said joint having walls and a floor, which comprises introducing a sealant composition into the joint by means of an applicator nozzle member and thereafter shaping the exposed surface of the sealant with a shaping tool characterised in that the sealant composition is injected
10 under pressure in proximity to the floor of the joint, the shaping tool is integral with the applicator nozzle member and positioned in a trailing spaced relationship thereto, and the shaping edge or surface of the shaping tool is
15 positioned such that its depth of penetration into the joint is less than the depth of penetration of the discharge orifice of the application nozzle member.

In accordance with the process of this invention the sealant composition is injected into the joint in proximity to the floor thereof. The floor of the joint may be
20 the normal constriction or closure formed at the bottom of the joint during the building of the structure, and may be for example of cement, earth or other inorganic material. More preferably, however, the floor of the
25 joint is formed of a material which acts as a bond breaker. The use of such bond breakers involves placing in the joint an extensible and/or non-adherent material which prevents sticking of the sealant to the natural floor of the joint and thereby allows the seal to stretch freely
30 during expansion. Ideally the packing material also presents a convex surface to the sealant thereby causing the sealant to assume a concave profile. Suitable bond breaking materials include glass fibres, jute, pvc, urethane foam and polyethylene foam rod, the latter being

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preferred when a silicone sealant is employed.

Prior to the injection of the sealant composition the joint may, if necessary, be prepared employing conventional practices. For example, the joint may be sawn
5 or abraded to achieve the desired shape and dimensions or to remove contaminants which may prevent satisfactory adhesion of the sealant to the wall portions.

Injection of the sealant composition should take place sufficiently close to the floor of the joint that
10 the injection pressure employed causes the sealant to rise in the joint and contact the shaping tool following behind. The shaping tool is integral with the applicator nozzle member and preferably has a shaping edge which imparts a smooth surface to the applied sealant while press-
15 ing the sealant against the surfaces of the joint. Thus, depending on the profile desired in the shaped seal, the shaping edge may be convex toward the sealant or may be, for example, substantially straight with rounded corners, the latter being more suitable for use in wide joints.

20 The process of this invention is particularly suitable for use with silicone-based sealant compositions. It may, however, also be employed in the application of other paste-like sealant or caulking materials, for example polysulphides, polyurethanes and rubber mastic compounds.
25 The process of this invention is particularly suitable for sealing joints in highway pavement, for example expansion/contraction joints and longitudinal joints; but can also be applied to other structures where adjacent members define therebetween a narrow space having wall and floor portions,
30 for example floors of industrial buildings, drives, parking areas, airfields and other military installations, terraces bridges, footpaths and docks.

A novel combined applicator nozzle and shaping tool which is adapted for attachment to a sealant dispensing

reservoir and is particularly suitable for carrying out the process of this invention comprises a nozzle member having an upper attachment portion and a lower discharge orifice and a shaping tool integral with the said nozzle member in a trailing spaced relationship, the said shaping tool having a shaping edge extending downward but having a depth such that its lowest point lies above the discharge orifice.

One embodiment of the combined application nozzle and shaping tool device of this invention is illustrated in the accompanying drawings wherein Figure 1 is a cross section of the device viewed from one side, Figure 2 is a front elevation of the shaping tool, Figure 3 is a perspective view of an elongated form of the shaping tool and Figure 4 is a perspective view of the device according to this invention above a sealed joint shown partly in section.

In Figure 1 there is shown an application nozzle member 1 having an upper portion 2, adapted for attachment directly or indirectly to a reservoir for storing the sealant composition, and a discharge orifice 3. A plate 4 is slidably mounted on the applicator nozzle 1 and contains a grub screw 5 set into a collar portion 6. Fixed to, or made part of, the plate 4 is a shaping tool 7 as shown in front view in Figure 2. The member 1 may be of any appropriate cross section but is most conveniently cylindrical in shape.

In use the device is connected to the sealant reservoir by way of the attachment portion 2 which may, if desired, be internally threaded for this purpose. The plate 4 is laid across the joint and, if necessary, the depth of penetration of the discharge orifice 3 into the joint is adjusted by raising or lowering the nozzle member in the plate and fixing its position by tightening the

grub screw 5. When the device is intended for use in joints of constant fixed depth the grub screw 5 may be omitted and the plate 4 made integral with or permanently fixed to the applicator nozzle. The relative positions of the discharge orifice 3 and the edge of the shaping tool 7 may also be rendered adjustable, for example by providing the tool 7 with a fixing slot in place of a round screw hole.

The shaping tool may be made removable and supplied in a range of sizes and shapes to match joints of various widths. In general, joints between adjacent members of constructions, such as highway pavements, vary from about 5 mm to about 40 mm. Also the trailing surface of the shaping tool may be extended as illustrated in Figure 3 to provide for an increased contact time with the sealant.

Similarly the outer dimensions of the discharge orifice portion should be such as to permit appropriate penetration into the joint. If desired the tip portion of the orifice may be formed into a flattened, ellipsoidal section to permit such penetration.

Figure 4 represents a front perspective view of one embodiment of a device according to this invention above a sealed joint shown partly in section. In Figure 4 the numbers correspond to those employed in Figure 1 and in the sealed joint portion of the figure there is shown the concavely-profiled sealant 11 which has been injected over a bond breaker 12 (e.g. a rod of polyethylene foam).

CLAIMS

1. A process for the sealing of a joint between adjacent members, the said joint having walls and a floor, which comprises introducing a sealant composition into the joint by means of an applicator nozzle member and thereafter shaping the exposed surface of the sealant composition with a shaping tool characterised in that the sealant composition is injected under pressure in proximity to the floor of the joint, the shaping tool is integral with the applicator nozzle member and positioned in a trailing spaced relationship thereto, and the shaping edge or surface of the shaping tool is positioned such that its depth of penetration into the joint is less than the depth of penetration of the discharge orifice of the application nozzle member.
2. A process as claimed in Claim 1 wherein the joint is present between adjacent members of a highway structure.
3. A process as claimed in Claim 1 or Claim 2 wherein the sealant composition is silicone-based.
4. A process as claimed in any one of the preceding claims wherein the floor of the joint comprises a bond breaking material.
5. A combined applicator nozzle and shaping tool adapted for attachment to a sealant dispensing reservoir and comprising a nozzle member (1) having an upper attachment portion (2) and a lower discharge orifice (3), and a shaping tool (7) integral with the said nozzle member in a trailing spaced relationship, the said shaping tool

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having a shaping edge and/or surface extending downward but having a depth such that its lowest point lies above the discharge orifice.

6. A combined applicator nozzle and shaping tool as claimed in Claim 1 wherein the shaping tool (7) is fixed to or part of a plate member (4) slidably mounted on the nozzle member (1).

7. A combined applicator nozzle and shaping tool as claimed in Claim 6 wherein the shaping tool (7) is adjustably mounted on the plate member (4).

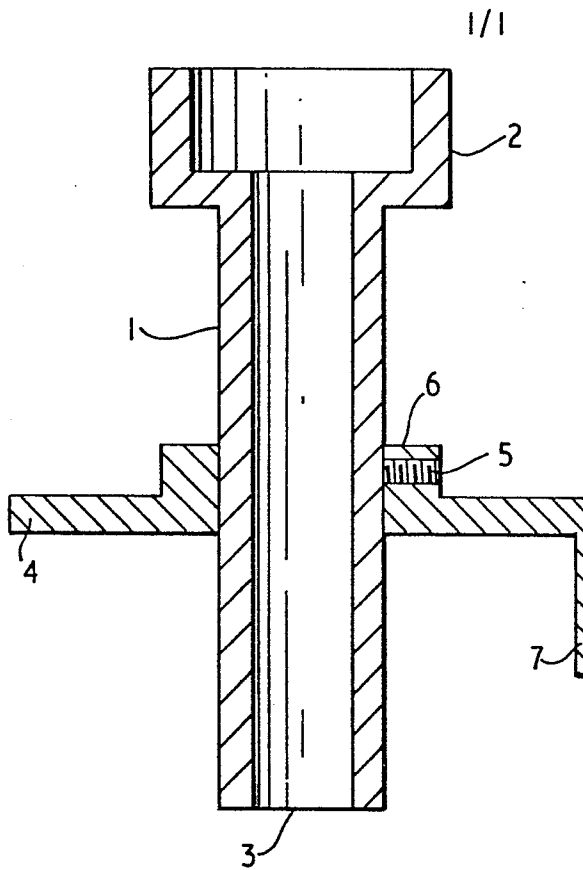


FIG.1.

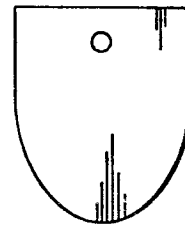


FIG.2.

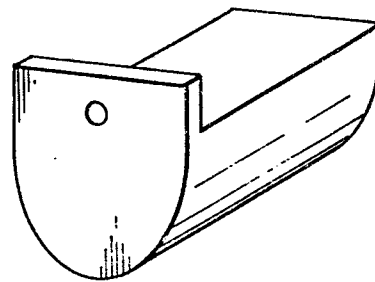


FIG.3.

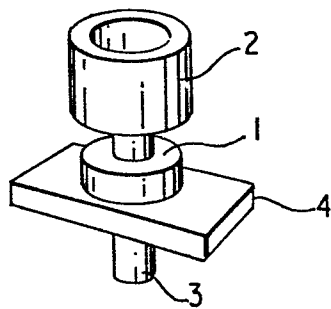
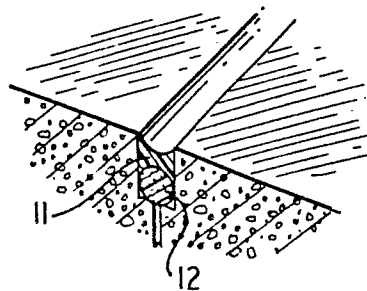


FIG.4.





European Patent
Office

EUROPEAN SEARCH REPORT

0074731

Application number

EP 82 30 4432

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
A	--- CH-A- 398 942 (UNITED SHOE MACHINERY CORP.) * complete document * & US - A - 3145413	1, 5, 6	E 04 B 1/68 E 01 C 23/09
A	--- DD-A- 130 268 (H. HAACK) * claim 1 *	1, 2	
A	--- GB-A-1 406 539 (THIOKOL CORP.) * page 3, lines 32-35; figure 1 * -----	4	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
			E 01 C 11/00 E 01 C 23/00 E 04 B 1/00 E 04 F 21/00
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 13-10-1982	Examiner KRABEL A.W.G.
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	