Jan. 10, 1967 W. F. MIDDLESTADT 3,297,294

COLLAPSIBLE JOINT FORMING STRUCTURE

Filed April 9, 1965

Fig 1.

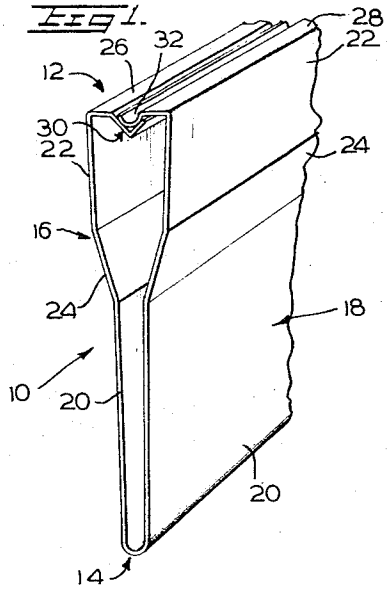



Fig 2.

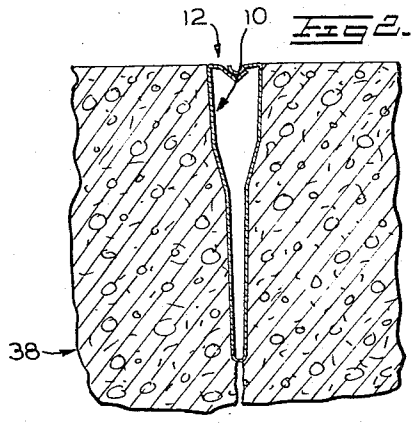



Fig 3.

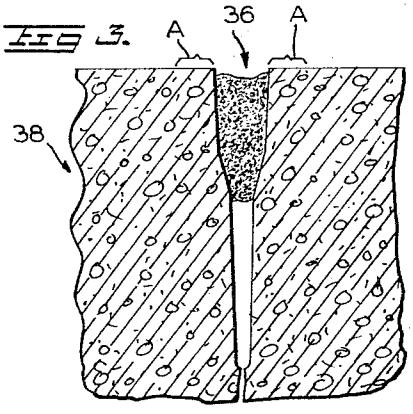



Fig 4.

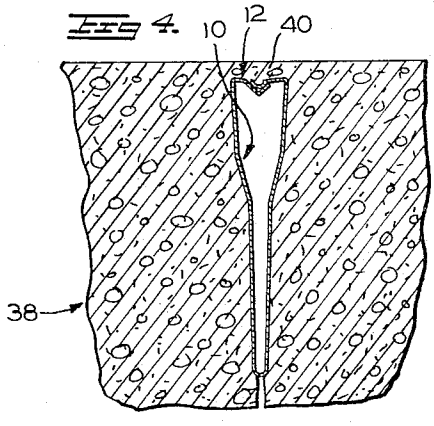



Fig 5.

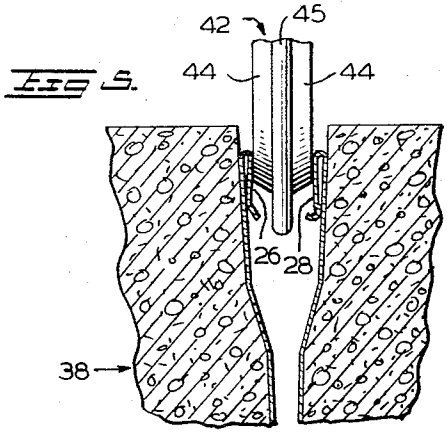
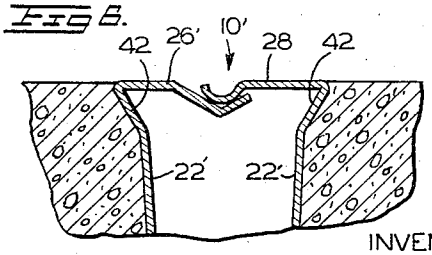



Fig 6.




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3,297,294

# COLLAPSIBLE JOINT FORMING STRUCTURE

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This invention relates to an improved method for forming joints in a settable composition and to an improved joint forming structure.

The invention has particular utility in forming joints in concrete roadways, air strips, and the like.

It is an object of the present invention to provide an improved method of forming joints in concrete pavement and the like wherein a disposable joint forming structure is collapsible and, therefore, readily removable from set concrete with a minimum of cracking adjacent the top edges of the joint to thereby provide a smooth uniform top surface for the pavement after the joint is filled with a sealing composition.

A further object is to provide such a method and structure which substantially reduces the on-the-job cost of forming joints in concrete pavements; the formation of the joints is not affected by the hardness of the aggregate in the concrete and concrete cracking is controlled to provide a smooth riding surface after the joint is suitably sealed.

A further object of the present invention is to provide an improved method of forming joints in concrete and the like which require a minimum of maintenance.

Another object is to provide an improved collapsible joint forming structure constructed from a single sheet of metal.

These and other objects and advantages are provided in a joint forming structure comprising a metallic sheet folded to form a hollow envelope, said envelope tapering inwardly from a top portion to the bottom thereof, said bottom being smoothly rounded in transverse section and said top portion being formed by overlapping and releasably interlocking the edges of said folded sheet to provide a zone of weakness for collapsing the envelope when an inwardly directed force is applied to the top portion.

The invention will be more particularly described with reference to the illustrated embodiments thereof shown in the accompanying drawings wherein:

FIG. 1 is a fragmentary perspective view of a joint forming structure embodying the principles of the present invention;

FIG. 2 is a sectional view of the structure illustrated in FIG. 1 embedded in a concrete roadway;

FIG. 3 is a sectional view similar to that illustrated in FIG. 2 with the joint forming member removed after the concrete has set;

FIG. 4 is a sectional view similar to that illustrated in FIG. 2 with the joint forming member set overly deep in the concrete roadway;

FIG. 5 is a diagrammatic, fragmentary sectional view of the joint forming structure illustrated in FIG. 4 being collapsed prior to its removal from the roadway; and,

FIG. 6 is a fragmentary sectional view, similar to FIG. 2, illustrating a modified form of the present invention.

Referring to the drawings and in particular FIG. 1 thereof, **10** generally designates a form of the improved joint forming structure of the invention.

The structure **10** is constructed of a single sheet of, for example, 30 gauge mild steel which is folded and formed to provide a hollow envelope having a top portion **12**, a bottom portion **14** and side walls **16** and **18**.

The bottom **14**, in transverse cross section, is smoothly outwardly rounded and the side walls **16** and **18** generally taper outwardly from the bottom **14** to the top portion **12**.



Specifically, each side wall includes a lower leg portion **20**, and an upper leg portion **22** jointed by an outwardly flaring midsection **24**.

The top portion **12** includes generally flat edge sections **26** and **28** which abut upper leg portions **20**, and overlapping and releasably interlocking edges **30** and **32**.

Edge **30**, in the preferred form of the invention, is V-shaped in transverse cross section while interlocking edge **32** is generally U-shaped in transverse cross section. The sizes of the V and U-shaped bends are such that the U-shaped bend is snuggly received in the recess formed by the V-shaped bend **30**.

The overlapping and interlocking portions **30** and **32** maintain the structure **10** in its formed shape during insertion in wet unset concrete, or during pouring of the concrete around the joint forming member, and during setting of the concrete.

Preferably, the structure **10** is inserted in the poured, unset concrete such that the top **12** is about flush with the top surface of the concrete, as illustrated in FIG. 2 of the drawings. When so inserted, as the concrete sets, and shrinks, the concrete pulls away from the side walls **16** and **18** and the structure can be lifted from the set concrete to leave a joint such as illustrated in FIG. 3, which joint is then filled with a suitable sealant **36** which keeps out moisture and solid particulate material from the joint.

Any suitable sealing composition may be used, as is well known in the art, such as settable liquid compositions, resilient strips or combinations of resilient strips and settable liquid compositions.

FIG. 4 illustrates an improved joint forming structure position in a concrete roadway with the top portion **12** thereof convered with layer **40** of concrete due to improper positioning of the structure **10**.

Where such improper installation has been made the joint forming structure **10** must be collapsed and the concrete overlay **40** removed prior to removal of the structure **10**.

The overlay **40** may be cracked off and the structure **10** collapsed by forcing by hand a blade-like tool along and into the space or joint formed by the structure **10**. However, very satisfactory results are obtained through the use of the deforming device disclosed and claimed in U.S. Patent 3,038,397, W. F. Middlestadt. As illustrated in FIG. 5 of the drawings, the device of said patent includes a deforming disc **42** having beveled shoulder portions **44** and an extended and narrow edge element **46**. The shoulder portions **44** and the edge element **46** cooperate in cracking away the concrete overlay and in deforming and collapsing the insert **10** whereby the insert may be readily removed and a suitable sealant **36** placed in the recess formed in the concrete.

While the use of the deforming tool **42** has been described primarily with reference to FIGS. 4 and 5, where a film or sheet **40** of concrete overlays the top **12** of the structure **10**, the deforming tool would, in practice, be used to collapse the structure **10** even when the structure is mounted with its top surface **12** flush with the upper surface of the concrete. Collapsing of the structure **10** insures that its side walls are cracked free of the set concrete so that the structure may be readily removed from the formed roadway joint. Further, through the use of the collapsing tool, such, as illustrated in the Middlestadt Patent 3,038,397, the likelihood of cracking the roadway adjacent the intersection of the upper ends of the side walls **16** and **18** and the upper surface of the concrete, zones A of FIG. 3, is reduced to a minimum.

While the specific dimensions of the metal joint forming structure may be varied to suit specific pavement specifications and the gauge of the metal employed in forming the structure may be from about 38 gauge to about 10 gauge,

the following specific example has proved to be very satisfactory:

Material: 30 gauge mild steel
Length: 12 feet per section
Overall height: 2.25 inches
Width of top portion: .40 inch
Length of lower leg portions **20**: 1.3 inches
Length of upper leg portions: .61 inch
Length of leg connecting portion **24**: .355 inch
Taper of upper leg portions: 2°
Taper of lower leg portions: 2°
Taper of leg connecting portion: 17°

Referring to FIG. 6 a modified form of joint forming structure is illustrated. The modified structure **10'** is like structure **10** and is formed from a single sheet of mild steel. Structure **10'** differs from the structure **10** in that that the upper ends **42** of each upper leg portion **22'** is bent outward whereby the angles formed between the upper ends of upper leg portions **22** and the respective generally flat edge sections **26'** and **28'** are about 60°.

When the joint forming structure **10'** is removed from the set concrete the upper edges of the sealant receiving slot are beveled thereby reducing cracking of the roadway along the joint edges during use of the roadway.

From the foregoing description of this invention it will be seen that the joint forming structure provides a very inexpensive means for forming uniform joints in concrete slabs and which materially reduces the on-the-job labor costs by eliminating the necessity of sawing joints in concrete or inserting, removing and cleaning expensive non-disposable joint forms. It will also be appreciated by those skilled in the art that various modifications may be made in the form of the joint forming structure and in particular in the type of releasable, interlocking means provided at the top of the structure without departing from the scope of the present invention.



I claim:

**1.** A joint forming structure comprising a metallic sheet folded to form a hollow envelope, said envelope tapering inwardly from a top portion to the bottom thereof, said bottom being smoothly rounded in transverse section and said top portion being formed by overlapping and releasably interlocking the edges of said folded sheet to provide a zone of weakness for collapsing the envelope when an inwardly directed force is applied to the top portion.

**2.** A joint forming structure comprising a metal sheet of from about 30 gauge to about 10 gauge folded to form an elongated hollow envelope, said envelope having side walls tapering inwardly from a top portion to the bottom thereof, said bottom being smoothly outwardly rounded in transverse cross section and said top portion being formed by overlapping and releasably interlocking the edges of said folded sheet to provide a zone of weakness for collapsing the envelope when an inwardly directed force is applied to the top portion along said zone of weakness.

**3.** The invention defined in claim **2** wherein the upper ends of the side walls flare outwardly.


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