# United States Patent [19]

**Burton**

[11] **3,770,237**

[45] **Nov. 6, 1973**


[54] **CONCRETE FORM**


[76] Inventor: **Duane C. Burton,** 145 Mohawk Dr., Boulder, Colo. 80303



[22] Filed: **Sept. 23, 1971**

[21] Appl. No.: **183,200**

**Related U.S. Application Data**

[63] Continuation-in-part of Ser. No. 12,611, Feb. 19, 1970, abandoned.

[52] **U.S. Cl.** ..... **249/3**

[51] **Int. Cl.** ..... **E01c 7/00**

[58] **Field of Search** ..... 249/3, 2, 5, 9, 98, 249/100, 219; 52/150; 94/17, 51



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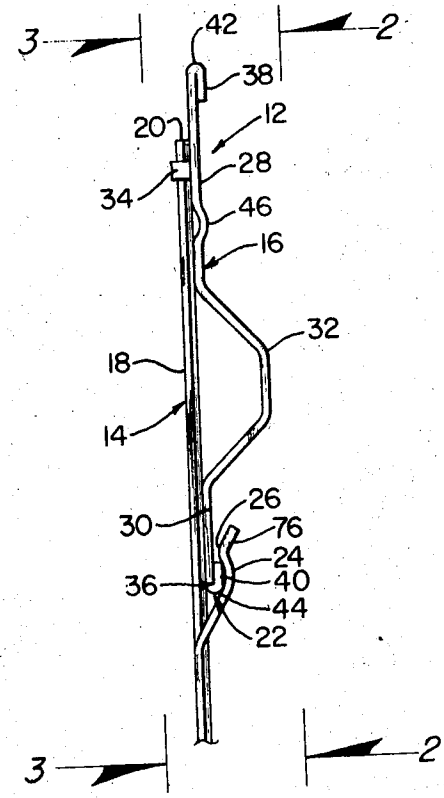
*Primary Examiner*—H. A. Kilby, Jr.



[57] **ABSTRACT**

A concrete form useful in forming a key contraction joint between concrete slabs. The concrete form comprises a plurality of spaced-apart, aligned stakes and an elongate rigid sheet material member having upper and lower longitudinally extending, generally coplanar portions and a longitudinally key deformation portion interposed between and connected to said planar portions. At least some of the stakes have a pocket means formed thereon. Each pocket means includes an edge engaging surface. The sheet material member has a plurality of longitudinally spaced strap means formed within one of the planar portions and said member includes a plurality of parts, each part including an edge portion which is disposed within a corresponding one of said pocket means to contact the edge engaging surface thereof to prevent movement of said member in an upwardly direction by utilizing the shear properties of the material from which said member is formed. Each strap means is disposed in partial encompassing engagement about a portion of a corresponding one of said stakes. Each pocket means includes a tab means having a portion thereof biasedly disposed in a direction toward the body portion of its corresponding stakes. Each of the parts of said member has a planform projection, taken in a direction normal to the body portion of the stakes, that is greater than the thickness of the material from which the member is formed.


**8 Claims, 10 Drawing Figures**



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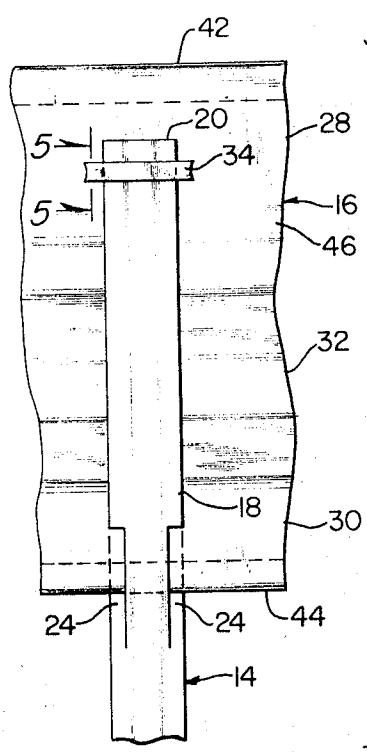



FIG. 3

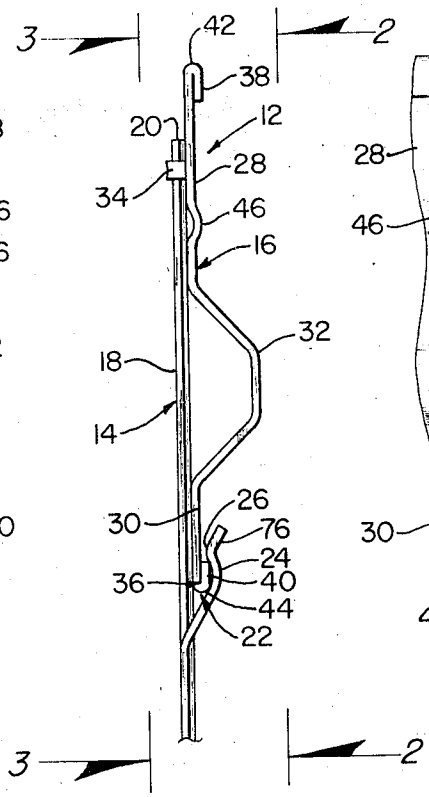



FIG. 1

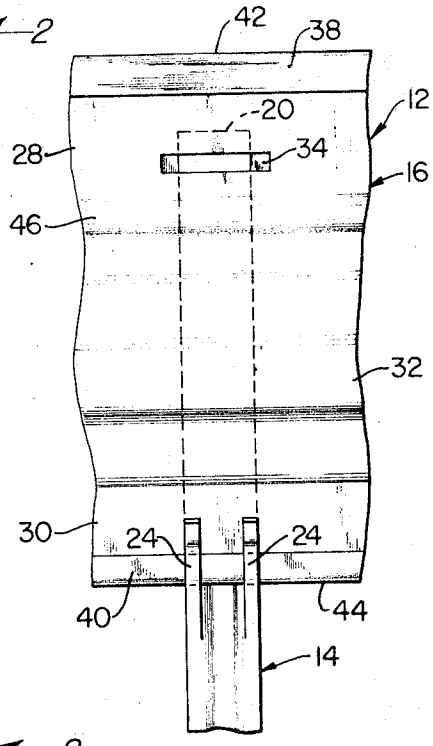
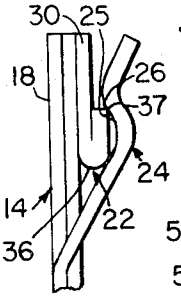



FIG. 2



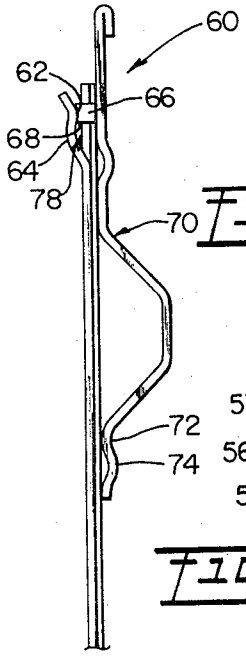




FIG. 7

FIG. 1A

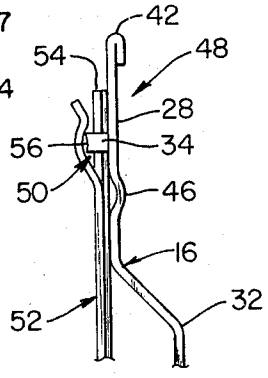



FIG. 6

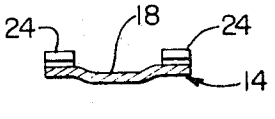



FIG. 4

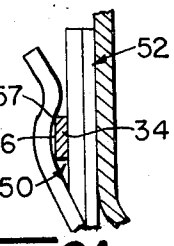



FIG. 6A

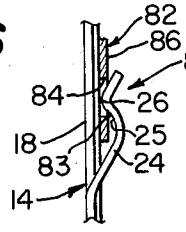



FIG. 8

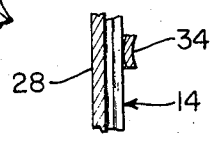



FIG. 5

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# CONCRETE FORM

## CROSS-REFERENCE TO RELATED APPLICATION

This is a continuation-in-part patent application of U.S. Pat. application Ser. No. 12,611 filed Feb. 19, 1970 now abandoned.

## BACKGROUND OF THE INVENTION

Heretofore, many concrete forms have been proposed comprising the use of a plurality of spaced-apart, aligned stakes which are used to support a sheet material member having a configuration suitable to form a longitudinally extending key contraction joint between concrete slabs. Although some of the prior art concrete forms found useful application in the field, each of these forms suffered from one or more drawbacks. For example, some of the concrete forms were expensive to manufacture, others could not be easily and quickly installed by a single individual in the field, others lacked an inexpensively constructed means quickly and easily used for preventing vertical movement of the sheet material member relative to the stakes during the pouring of the concrete, others experienced undesirable cracking and spalling along the upper surface of the concrete slab adjacent the top of the sheet material member, and others could not be used in concrete slabs which had to support heavy vehicle wheel loads. It has been discovered, however, that each of the foregoing disadvantages can be overcome through the use of a concrete form comprising a plurality of spaced-apart, aligned stakes, at least some of which have a pocket means formed thereon, each of said pocket means including an edge engaging surface, and an elongate rigid sheet material member having strap means formed therein, each of said strap means being disposed in partial encompassing engagement about a corresponding one of said stakes, said member also including a plurality of parts, each part including an edge portion which is disposed within a corresponding one of said pocket means to contact the edge engaging surface thereof whereby said pocket means utilizes the shear characteristics of the material from which said member is made to secure said member to prevent undesirable vertical movement thereof relative to the stakes.

## SUMMARY OF THE INVENTION

This invention relates to a concrete form of a type used in forming a key contraction joint between concrete slabs wherein said joint comprises a plurality of spaced-apart aligned stakes, each of said stakes having a generally vertically disposed body portion and a top, at least some of said stakes having a pocket means formed thereon, each of said pocket means including an edge engaging surface, each of said stakes adapted to be driven to a predetermined height so that the tops thereof are disposed along a predetermined grade level; and an elongate rigid sheet material member having upper and lower longitudinally extending, generally coplanar portions and a longitudinally extending key deformation portion interposed between and connected to said planar portion, said member having a plurality of longitudinally spaced strap means formed within one of said planar portions, the spacing of said strap means corresponding to the longitudinal spacing of said stakes, each of said strap means being disposed at least in partial encompassing engagement about a portion of a corresponding one of said stakes, said member including a plurality of parts, each part including an edge portion which is disposed within a corresponding one of said pocket means to contact the edge engaging surface thereof, said pocket means utilizing the shear characteristics of the material from which the member is made to secure said member to prevent vertical movement thereof relative to said stakes, said strap means securing said member to prevent horizontal movement thereof relative to said stakes. Each pocket means includes a tab means having a portion thereof biasedly disposed in a direction toward the body portion of its corresponding stake. The edge engaging surface is preferably formed on said tab means. Each tab means of each pocket means, during installation of said parts of said member within said pocket means, is adapted to move away from the body portion of its corresponding stake. Each of the parts of said member disposed within said pocket means has a planform projection, taken in a direction normal to the body portion of said stakes, that is thicker than the thickness of the material from which the member is formed. Each strap means is, in vertical cross-section, generally C-shaped in configuration and a portion of each strap means may include one of the parts of said member. Each edge engaging surface of each pocket means is formed to lie in a plane that intersects a plane disposed normal to the longitudinal axis of the associated stake to form an included angle the tangent of which is less than the coefficient of friction between said edge engaging surface and said edge portion.

Accordingly, one of the principal objects of this invention is to provide an improved concrete form.

Another object of this invention is to provide a concrete form that is inexpensive to manufacture, may be quickly and easily installed by a single individual in the field, includes novel, inexpensive means for securing the member to the stakes, utilizes the shear properties of the material used to make said member to prevent undesirable vertical movement of said member relative to said stakes, uses strap means to secure said member to prevent horizontal movement thereof relative to said stakes, and permits the construction of concrete slabs which may be used to support heavy vehicles wheel loads without spalling or cracking occurring adjacent the concrete form installed therein.

## BRIEF DESCRIPTION OF THE DRAWINGS

Further objects and advantages of the invention will become apparent from the following description and claims and from the accompanying drawings, wherein:

FIG. 1 is an end elevational view of a preferred embodiment of the concrete form constructed in accordance with the subject invention;

FIG. 1A is an enlarged view illustrating the edge portion and edge engaging surface of the concrete form shown in FIG. 1;

FIG. 2 is an elevational view taken along line 2—2 of FIG. 1;

FIG. 3 is an elevational view taken along line 3—3 of FIG. 1;

FIG. 4 is a horizontal, cross-sectional view of the stake shown in FIG. 1;

FIG. 5 is a cross-sectional view taken along line 5—5 of FIG. 3;

FIG. 6 is a partial and elevational view of another embodiment of a concrete form constructed in accordance with the subject invention;

FIG. 6A is an enlarged view illustrating the edge portion and edge engaging surface of the concrete form shown in FIG. 6;

FIG. 7 is a view similar to that shown in FIG. 1 of another embodiment of a concrete form constructed in accordance with the subject invention; and

FIG. 8 is a partial cross-sectional view showing a portion of another concrete form.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, in FIGS. 1–5 is shown one embodiment of a concrete form **12** constructed in accordance with the subject invention. The concrete form **12** is of the type used in forming a key contraction joint between adjacent concrete slabs (not shown) and comprises a plurality (only one of which is shown) of spaced-apart, aligned stakes **14** and an elongate rigid sheet material member **16.** Each of the stakes **14** has a generally vertically disposed body portion **18** and a top **20.** At least some of the stakes have a pocket means **22,** see FIG. **1,** formed thereon. Each pocket means **22** includes one or more tab means **24.** Each tab means **24** includes an edge engaging surface **25,** see FIG. 1A. Each tab means **24** has a portion **26,** see FIG. **1,** biasedly disposed in a direction toward the body portion **18** of the stake **14.** Each tab means **24** of each pocket means **22** is adapted to move away from the body portion **18** during installation of the member **16** as will hereinafter be described. Each of the stakes **14** is adapted to be driven to a predetermined height so that the tops **20** thereof are disposed along a predetermined grade level.

The elongate rigid sheet material member **16** has upper and lower longitudinally extending, generally coplanar portions **28** and **30** and a longitudinally extending key deformation portion **32** interposed between and connected to said planar portions **28** and **30.** The member **16** has a plurality of longitudinally spaced strap means **34** (only one of which is shown) formed within one of said planar portions. The spacing of said strap means **34** corresponds to the longitudinal spacing of said stakes **14.** Each of said strap means **34** is disposed at least in partial encompassing engagement about a portion of a corresponding one of said stakes. The member **16** includes a plurality of parts **36** (only one of which is shown), see FIGS. **1** and 1A. Each of said parts includes an edge portion **37** which is disposed within a corresponding one of said pockets **22** to contact the edge engaging surface thereof whereby said pocket means utilizes the shear properties of the material from which said member is made to prevent upward vertical movement thereof relative to the stakes **14.** As shown, each edge portion **37** is formed by a pair of intersecting surfaces disposed normal one to the other wherein one of said surfaces is disposed parallel to the body portion of its corresponding stake. It will be understood that each edge engaging surface of each pocket means is formed to lie in a plane that intersects a plane disposed normal to the longitudinal axis of its associated stake to form an included angle the tangent of which is less than the coefficient of friction between said edge engaging surface and said edge portion. The use of a larger angle is to be avoided if the shear properties of the material used to form the member is to be utilized. The strap means **34** and the pocket means **22** cooperate to secure the member **16** to prevent horizontal movement thereof relative to the stakes **14.**

As shown in FIG. **5,** the strap means **34** preferably is, in vertical cross-section, generally C-shaped in configuration. The formation of the strap means **34** in this configuration facilitates the mounting of the member **16** upon the stakes **14** since the lower portion of the strap means **34** extends outwardly from the stake **14.** The sheet material member **16** preferably has folded over portions **38** and **40** adjacent, respectively, the upper and lower edges **42** and **44** of said sheet material member **16.** Said sheet material member **16** also includes a longitudinally extending corrugation or rib **46** located in the upper planar portion. The purpose of utilizing the folded over portions **38** and **40** and the longitudinally extending corrugation **46** is to increase the overall rigidity of the member **16.**

As shown in FIG. **1,** the thickness or planform projection, taken in a direction normal to the body portion **18** of the stake **14,** of the part **36** is greater than the thickness of the material from which the member is formed as well as the horizontal distance separating the portion **26** of the tab means **24** from the adjacent body portion **18.** Normally, the horizontal distance separating the portion **26** of the tab means from the adjacent body portion **18** is less than the thickness of the material from which the member **16** is made. In view of the construction of the pocket means **22** and each part **36** of said member coupled with the further fact that the portion **26** is biased in a direction toward the adjacent body portion **18,** it will now be readily appreciated that the pocket means **22** and the part **36** cooperate to prevent vertical movement of the member **16** relative to the stakes **14.** As a result, a concrete form constructed in accordance with this invention overcomes, through the use of an inexpensive and novel means, the problem heretofore encountered of the sheet material member **16** rising vertically upwardly relative to the stakes **14** during the pouring of the concrete on one side of the form **12** such as when concrete is poured on the right side of the concrete form **12** shown in FIG. **1.**

A concrete form **48** is shown in FIGS. **6** and **6A** which is similar to the concrete form **12** shown in FIG. **1** except that each pocket means **50** and its corresponding edge engaging surface **51** formed on the stake **52** is located immediately below the top **54** of the stake. Secured within each pocket means **50** is a portion of the strap means **34.** As a result, it will be understood that said portion of the strap means **34** includes one of the parts **56** of the member **16** and each of the parts **56** includes an edge portion **57.**

In FIG. **7** is shown concrete form **60** which is similar to concrete form **48** shown in FIG. **6.** However, the portion **62** of the tab means **64** seats within the concave surface of the strap means **66** and a lower portion of the strap means **34** includes one of the part **68** of the member **70.** It will also be noted that the lower planar portion **72** and the member **70** includes a longitudinally extending corrugation or rib **74** in lieu of the folded over portion **40** as shown in FIG. **1** for member **16.** However, it will be understood that a folded over portion may be used in lieu of or in combination with the longitudinally extending corrugation **74.**

Referring now to FIGS. **1–5,** the installation of the concrete form **12** as shown in FIG. **1** is now described. After the subgrade or sub-base (not shown) has been formed and suitable side forming (not shown) has been

installed, a string or line (not shown) is extended from one side of the sub-base to the other side thereof at a predetermined grade level, preferably the grade level to be associated with the tops **20** of the stakes **14.** Next, a section or sections of joint forming members **16** are laid adjacent the line established by the string. The purpose for this is to facilitate the spacing of the stakes along the line established by the string. However, it will be appreciated that the spacing may be determined in any of several other ways since the spacing between the strap means **34** will admit of some variation in installation thereby precluding an exact, precise spacing of the stakes. For example, where a 2 foot spacing interval is desired or required, the length of the strap means **36** is made sufficiently long to permit center-to-center spacing between the strap means **34** to vary up to approximately 4 to 5 inches. After the member or members **16,** depending on the width of the concrete slabs, are positioned upon the subgrade as described, the stakes are installed one at a time along the line established by the string at the desired spacing interval. Each stake **14** is driven into the subgrade until the top thereof is disposed along a predetermined grade level. Next, each of the members **16** is mounted upon the stakes **14** by positioning the member **16** with the lower edge of **44** thereof disposed adjacent the part **76** which is above the portion **26** of the tab means **24** and with the strap means **34** disposed above the tops **20** of the stakes **14.** The member **16** is then urged downwardly with sufficient force such that the parts **36** pass between the portion **26** of the tab means **24** and the adjacent body portion **18** of the stake **14** and each strap means **34** encompasses a corresponding one of the stakes **14.** When the upper surface of the folded over portion **44** moves below the portion **26** of the tab means **24,** the portion **26** moves toward the adjacent body portion **18** thereby securing the part **36** within the pocket means **22.** In this manner, the member **16** is easily and quickly mounted upon the stakes **14** and secured relative thereto to prevent undesirable movement either horizontally or vertically relative to said stakes **14.** It will be noted that the part **76** of the tab means **24** extends upwardly from the portion **26** of the said tab means **24** and, proceeding vertically upwardly, diverges away from the adjacent body portion **18** of the stake **14.** This construction facilitates the positioning and the entry of part **36** into the pocket means **22.**

The distance separating the top **20** of the stake **14** and the portion **26** of the tab means preferably equals the distance separating the lower edge **44** of the member **16** and the lower surface strap means **34** whereby the strap means **34** passes around the stake **14** substantially at the same time the part **36** enters into the pocket means **22.** This minimizes the tendency of the member **16** to buckle or deform upon being mounted on the stakes **14.**

The installation of the concrete forms **48** and **60** as shown in FIGS. **6** and **7** is substantially similar to the installation of the concrete form **12** shown in FIG. **1** except, of course, no problem exists with respect to coordinating the disposition of the parts **56** or **68** within the pocket means relative to the time the strap means **34** is slipped over the stakes since the parts **56** or **68** become disposed within the pocket means following the time that the strap means **34** is slipped over the tops of the stakes.

Normally, the height of the strap means **66** exceeds the height of the strap means **34** and the depth of the pocket means **78,** see FIG. **7,** is less than the depth of the pocket means **50** of the concrete form **48** shown in FIG. **6.**

It will be understood that the upper and lower planar portions **28** and **30** of the member **16** shown in FIG. **1** are readily maintained against the adjacent side of the stake **14.** In the concrete forms **48** and **60** the upper and lower planar portions are also maintained against the adjacent side of the stakes; however, the lower planar portions of said members are better maintained against the adjacent side of the stakes where one part of the key deformation portion is biasedly urged toward another part of said key deformation portion. To effect this, the upper and lower planar portions of such a member are, prior to installation of the member upon the stakes, not coplanar since said upper and lower planar portions are disposed within separate planes, the extensions of which form an included angle of slightly less than 180°. However, upon mounting such a member upon a set of stakes, said upper and lower planar portions become generally coplanarly disposed.

In FIG. **8** is shown a portion of another concrete form **80** constructed in accordance with this invention. The concrete form **80** comprises a sheet material member **82** having a plurality of longitudinally extending apertures **84** (only one of which is shown) formed in the lower planar portion **86** thereof. The portion **26** of each tab means **24** is disposed within a corresponding aperture **84.** The horizontal distance separating the portion **26** from the adjacent body portion **18** of the stake **14** is less than the thickness of the material from which the member **82** is formed. The portion **26** is biasedly disposed in the same manner as described above in connection with the stake **14** shown in concrete form **12.** The part of member **82** disposed within the pocket formed on the stake has an edge portion **83** disposed to contact the edge engaging surface **25** as described above in connection with FIG. **1.** Said part of member **82** may include a longitudinally extending rib (not shown) to facilitate mounting of the member **82** on the stakes without buckling. With this construction, the apertures **84** are formed in the upper portion of such a rib. Concrete form **80** is installed much in the same manner as concrete form **12** shown in FIG. **1.**

Although several embodiments of the herein invention have been shown and described, at the present time the concrete form **12** shown in FIG. **1** is the preferred concrete form while the concrete form **48** shown in FIG. **6** is the next preferred embodiment of this invention.

In view of the foregoing, it will now be readily apparent that a vastly improved concrete form has been described. For example, it will be readily appreciated that a concrete form has been described which may be quickly and easily installed in the field by a single individual and that same may be used for monolithically poured concrete slabs without resort to "checkerboard" pouring. Further, concrete forms constructed in accordance with the subject invention may be used for relatively thick concrete slabs, i.e., 8 inches or more, without experiencing detrimental spalling or cracking thereof adjacent the upper surfaces of the concrete form. Additionally, concrete forms constructed in accordance with the subject invention provide inexpensive, novel means for securing the sheet

material member to the stakes to prevent vertical movement thereof relative to the stakes thereby assuring that the upper edge of such sheet material member is properly positioned to function as a screed following pouring of the concrete. Also, concrete forms constructed in accordance with the subject invention may be used in conjunction with concrete slabs which are subjected to relatively heavy loading, and beneficial results are obtained for both relatively thick concrete slabs and relatively thin concrete slabs.

It is to be understood that this invention is not limited to the exact embodiments of the concrete forms shown, which are merely by way of illustration and not limitation, as various other forms and modifications will be apparent to those skilled in the art. For example, the tops of the stakes and the upper edge of the member may be installed at the same grade level. Further, the member is normally formed from sheet metal but may be formed from plastic as well. Also, it will be understood that the friction developed between the stakes and the strap means will further assist in preventing vertical movement of the member relative to the stakes.

I claim:

**1.** A concrete form of the type used in forming a key contraction joint between concrete slabs, said joint comprising:

a plurality of spaced-apart, aligned stakes,

each of said stakes having a generally vertically disposed body portion and a top,

at least some of said stakes having a pocket means formed thereon,

each pocket means including a tab means,

each of said tab means having an edge engaging surface formed thereon,

each tab means having a portion thereof biasedly disposed in a direction toward the body portion of its corresponding stake,

each of said stakes adapted to be driven to a predetermined height so that the tops thereof are disposed along a predetermined grade level; and

an elongate rigid sheet material member having upper and lower longitudinally extending, generally co-planar portions and a longitudinally extending key deformation portion interposed between and connected to said co-planar portions,

said member having a plurality of longitudinally spaced strap means formed within one of said planar portions,

the spacing of said strap means corresponding to the longitudinal spacing of said stakes,

each of said strap means being disposed at least in partial encompassing engagement about a portion of a corresponding one of said stakes,

said member including a plurality of parts each of which is disposed within a corresponding one of said pocket means,

each of said parts including an edge portion,

said edge portion being formed by a pair of intersecting surfaces disposed normal one to the other wherein one of said surfaces lies in a plane disposed generally parallel to the body portion of its corresponding stake,

each edge portion being disposed within a corresponding one of said pocket means to contact the edge engaging surface thereof thereby resisting movement of said member in an upwardly direction by utilizing the shear properties of the material from which said member is formed,

the horizontal distance separating the portion of said tab means and the adjacent body portion of its corresponding stake being less than the thickness of the part disposed within the pocket means associated with each said tab means.

**2.** A concrete form as described in claim **1** in which each tab means of each pocket means, during installation of said parts of said member within said pocket means, is adapted to move away from the body portion of its corresponding stake.

**3.** A concrete form as described in claim **1** in which each part has a planform projection, taken in a direction generally normal to the body portion of said stakes, that is thicker than the thickness of the material from which the member is formed.

**4.** A concrete form as described in claim **1** in which each strap means is, in vertical cross-section, generally C-shaped in configuration and a portion of each strap means includes one of the parts of said member.

**5.** A concrete form as described in claim **1** in which each edge engaging surface is disposed to lie in a plane that intersects a plane disposed normal to the longitudinal axis of its associated stake to form an included angle the tangent of which is less than the coefficient of friction between said edge engaging surface and said edge portion.

**6.** A concrete form as described in claim **1** in which said strap means are formed within said upper planar portion of said member, and said parts of said members are disposed within said lower planar portion of said member.

**7.** A concrete form as described in claim **6** in which each part has a planform projection, taken in a direction normal to the body portion of said stakes, that is thicker than the thickness of the material from which the member is formed.

**8.** A concrete form as described in claim **1** in which said sheet material member includes a plurality of longitudinally spaced apertures formed within the lower planar portion, and the portion of each tab means is disposed within a corresponding one of said apertures.

* * * * *

# UNITED STATES PATENT OFFICE
# CERTIFICATE OF CORRECTION

Patent No. 3,770,237 Dated November 6, 1973

Inventor(s) Duane C. Burton

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 8, Line 42, "members" should read -- member --.

Signed and sealed this 29th day of October 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334.