June 9, 1964 M. R. DOHREN 3,136,022

JOINT FORMING DEVICE

Filed Dec. 12, 1960

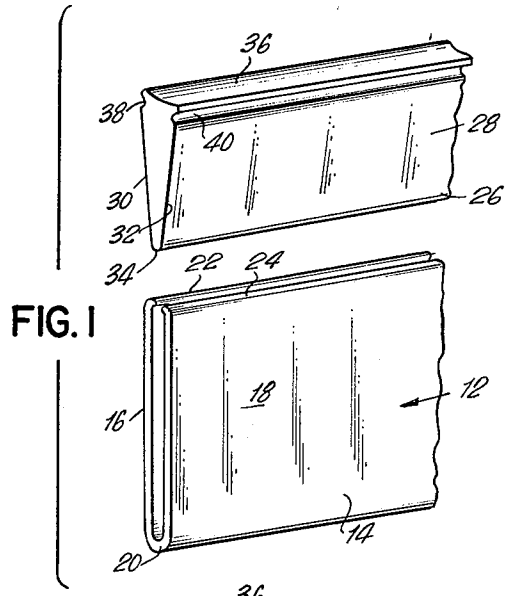


FIG. 1

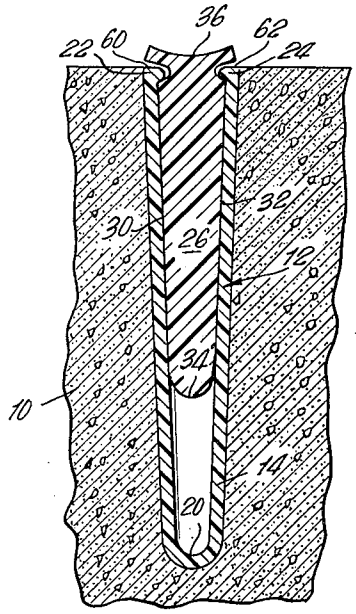


FIG. 2

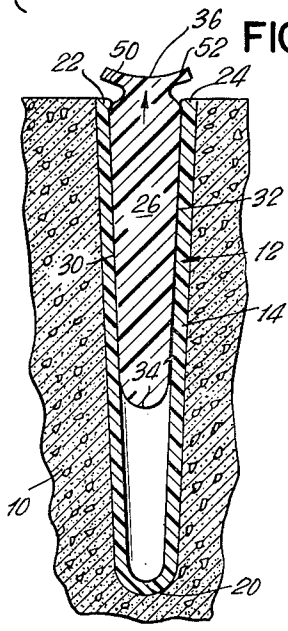


FIG. 3

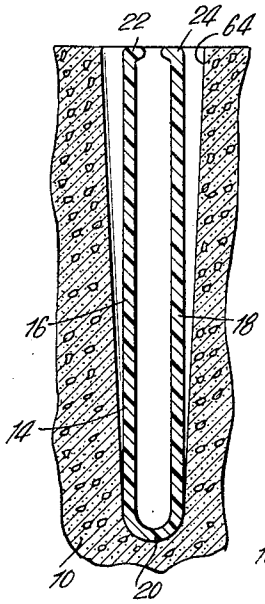


FIG. 4

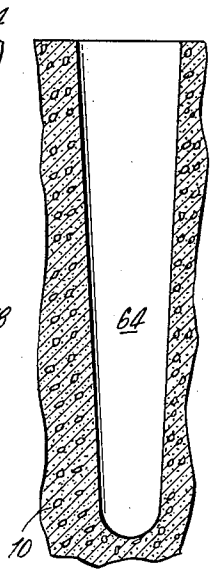


FIG. 5

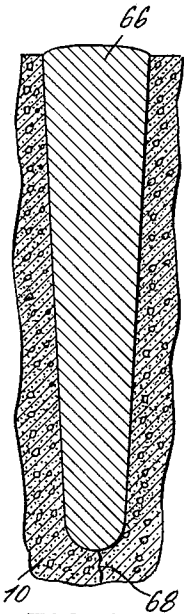


FIG. 6

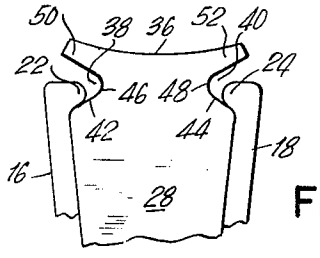


FIG. 7

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United States Patent Office 3,136,022 Patented June 9, 1964

3,136,022

JOINT FORMING DEVICE

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Filed Dec. 12, 1960, Ser. No. 75,393
1 Claim. (Cl. 25—118)

This invention relates to the class of masonry and concrete construction and more particularly to a joint forming device for use in roads, pavements, walls, and other types of concrete construction.

The construction of roads and pavement out of concrete is continuously increasing and is undertaken by complex machinery which serves to automatically mix, pour, and level the concrete in suitable strips. However, it is necessary to provide expansion joints in concrete roads, pavements and other types of concrete construction, to allow for thermal expansion and contraction. In the past it has been necessary to either cut grooves in the concrete using diamond tipped saws, or other suitable machinery, or else to place forms for the expansion strips in the concrete while the concrete is setting. These forms are generally very difficult to remove and because drastic measures must be undertaken to remove these forms from the concrete after the concrete has set, the forms are often not reusable thus greatly increasing the cost of constructing a road or pavement.

Various types of removable forms have been constructed which included inner and outer members so arranged as to permit the inner member to be removed which then enables the other members to be removed. However, these forms generally are constructed of metal, and are therefore quite heavy and unyielding while being very expensive and because they are subject to rust and corrosion, and often must be bent to enable withdrawal thereof, they cannot be used and reused more than just a few times.

Accordingly it is the primary object of the present invention to provide a joint forming device which may be used and reused upwards of 20 or more times yet which is constructed out of very inexpensive material such as extruded synthetic plastics and which is so constructed as to provide for enabling the ready withdrawal thereof from the groove which is formed in the concrete after the concrete has set.

A further object of the present invention resides in the provision of a joint forming device which may be extruded out of any readily available synthetic plastic material such as polyvinyl chloride, polystyrene, polyethylene, or the like, which is very light in weight, and which may be conveniently made in various sizes and stored for future use because of the relatively little bulk thereof.

Joint forming devices in the past have been constructed out of elongated strips of approximately 12 foot lengths so as to entirely span a strip of concrete pavement or the like. However, because of the long length of these joint forming devices, there has been considerable bowing of the joint forming devices. When the joint forming devices are made in two portions the bowing is often unequal and therefore when attempts are made to use the members together they are often entirely unsatisfactory or entirely useless. It is therefore one of the concepts of the present invention to provide an interlocking means between an inner and outer member whereby the joint forming device if it bows or warps at all will still be completely usable.

In the past it has been found that when an inner member is inserted within an outer member, upon pouring of the concrete, the pressure of the concrete will, when applied on the outer member, squeeze or force the inner member upwardly and out of the outer member which will render if difficult to retrieve the outer member after

the concrete has set. The present invention overcomes this disadvantage by providing a novel interlocking means which not only effectively holds the inner member in position, but also effectively seals the outer member against penetration thereof by any of the concrete mix.

One of the important features of the present invention lies in the utilization of a novel interlock having cam surfaces which facilitate the interlocking engagement of the tongue within the grooves yet which permit the ready withdrawal of an inner member from the outer member. Another feature of the invention resides in the utilization of an inner member provided with flanges along the top thereof which overlie the outer member so as to provide a seal while also providing means for facilitating the ready withdrawal of the inner member from within the outer member, after the concrete has set.

Still further objects and features of this present invention reside in the provision of a joint forming device of simple construction, capable of being rapidly manufactured especially by means of extrusion, which can be produced in any desired length, which is highly efficient in use, and which will result in a considerable decrease in the cost of constructing a concrete road, pavement, or other types of concrete structures.

These, together with the various ancillary objects and features of the invention which will become apparent as the following description proceeds, are attained by this joint forming device, a preferred embodiment of which has been illustrated in the accompanying drawing, by way of example only, wherein:

FIG. 1 is a partial exploded perspective view of a portion of the joint forming device constructed in accordance with the concepts of the present invention;

FIG. 2 is a sectional detail view illustrating the joint forming device as inserted in concrete pavement;

FIG. 3 is a view similar to FIG. 2 illustrating the manner in which the inner member is withdrawn from the outer member;

FIG. 4 is a sectional detail view similar to FIGS. 2 and 3 but illustrating the invention with the inner member withdrawn and with the spring action of the outer member causing it to withdraw from the sides of the groove of the joint formed in the concrete pavement;

FIG. 5 is a sectional detail view of a portion of a concrete pavement illustrating the joint after the joint forming device has been removed and prior to filling with asphalt or other suitable compound;

FIG. 6 is a view of the expansion joint constructed by utilizing the present invention; and

FIG. 7 is an enlarged partial elevational view of the invention.

With continuing reference to the accompanying drawing, wherein like reference numerals designate similar parts through the several views, reference numeral **10** generally designates a concrete road or pavement in which the joint forming device generally indicated as reference numeral **12** is adapted to be employed for the purpose of forming an expansion joint.

The joint forming device **12** include an outer member **14** and an inner member **26**. The outer member **14** is generally of a U-shape and has a pair of spaced side walls **16** and **18** which are interconnected by a lower connecting portion **20** which is substantially semi-cylindrical in configuration and which because of the material from which the outer member **14** is constructed normally urges the side walls **16** and **18** to a substantially parallel position. The outer member is provided with inwardly extending opposed tongues **22** and **24** at the upper edges thereof, which tongues can be best seen in FIG. 7, are generally of a semicylindrical arcuate shape.

The outer member **14** is adapted to be extruded in elongated lengths of synthetic plastic material which has suit-

able characteristics of resiliency, strength, durability, imperviousness to moisture, suitable temperature resistance and which is of a sufficient strength and durability to withstand use and reuse. Material such as polyvinyl chloride, polyethylene, polystyrene and the like, can be used. It is noted that the side walls **16** and **18** and the interconnected portion **20** are of a good thickness so as to withstand the pressure of the concrete as it is setting. It is also noted that the specific gravity of the material is less than that of most metals and is about that of concrete thereby assuring that the joint forming device **12** will neither be caused to sink because of its weight into the concrete nor to float too high because of too much buoyancy.

The inner member **26** is in the form of a body **28** which is of a tapered shape and provided with downwardly converging faces **30** and **32**. The lower edge **34** of the inner member **26** terminates at a point spaced above the lower connecting portion **20**.

The inner member **26** is preferably constructed of the same material from which the outer member **16** is manufactured and may be extruded in relatively long lengths. Spaced from the top surface **36** of the inner member are a pair of grooves **38** and **40**. As can be best seen in FIG. 7, the grooves are provided with planar downwardly slopingly diverging cam surfaces **42** and **44** which are adapted to be engaged in single line contact by the arcuate shape tongues **22** and **24**. The inner surfaces of the grooves **38** and **40** are defined by arcuate walls **46** and **48** interconnecting the main body portion **28** of the inner member **26** with inwardly and upwardly diverging flanges **50** and **52** which as can be seen best in FIG. 7 extend so as to overly the tongues **22** and **24** and portions of the outer member **14**. The top surface **36** of the inner member is therefore convex in shape.

We find now in FIG. 2 there is shown the joint forming device as inserted in a concrete pavement **10**. The joint forming device is inserted before the concrete has set as these assembled joint forming devices **12** are of substantially the same specific gravity as that of the concrete **10**, it will neither sink nor rise in the concrete, while the concrete is setting. The lower end **34** of the inner member **26** is spaced from the lower end **20** of the outer member **14** in order to save considerable material, to facilitate removal of the inner from the outer member by reducing the frictional interengagement between the inner and outer members, and also for the purpose of obtaining the best specific gravity for the entire assembly.

After the concrete has set, the inner member **26** is removed from the outer member **14** by insertion of a suitable tool beneath the flanges **50** and **52**. Further, it is to be recognized that the flanges **50** and **52** which are disposed above the level of the concrete **10** while the upper edges **60** and **62** defining the tongues **22** and **24** are positioned so as to be flush with the top surface of the concrete **10**. Thereby, the flanges prevent concrete from being placed on top of the edges **60** and **62** while also serving to prevent entrance of concrete between the inner member **26** and the outer member **14**.

After the inner member **26** has been removed, due to the action induced by the semicylindrical lower connecting portion **20**, the side walls **16** and **18** will spring together thus enabling the ready removal of the outer member **14** from the groove **64**. Then asphalt, tar, or the like can be packed into the groove **64**. Of course, the pavement may crack as indicated at **68** further enabling the groove **64** together with the filling **66** to serve as a suitable expansion joint for the concrete pavement **10**.

A latitude of modification, change and substitution is intended in the foregoing disclosure and in some instances some features of the invention will be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claim be construed broadly and in a manner consistent with the spirit and scope of the invention herein.

What I claim is:

A joint forming device comprising an elongated substantially U-shaped outer member of a resilient synthetic plastic material, said outer member having a pair of spaced side walls integrally interconnected by a lower semi-cylindrical connecting portion normally yieldingly urging said side walls to a substantialy parallel position, an inner member having a tapered body with downwardly converging faces engaging said side walls spreading said side walls apart against the action of said semi-cylindrical connecting portions, said inner member being substantially shorter than said outer member with the lower edge of said inner member being spaced well above said connecting portion, said side walls being provided with inwardly extending tongues at the upper edges of said side walls, said body being provided with grooves therein adjacent and spaced downwardly from the top of said inner member, said tongues being engaged in said grooves, said tongues being arcuate in shape, said grooves being arcuate in shape and being defined by flat downwardly and outwardly extending cam wall portions, said cam wall portions being engaged by said tongues, said top of said inner member extending above the said upper edges of said outer member, said top including a pair of upwardly and outwardly diverging flanges, said flanges at least partially overlying said upper edges of said outer member, said top having a concave surface including the top surfaces of said flanges.

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