Nov. 7, 1939. J. E. WILLETTS 2,179,019

CONSTRUCTION UNIT

Filed May 6, 1936

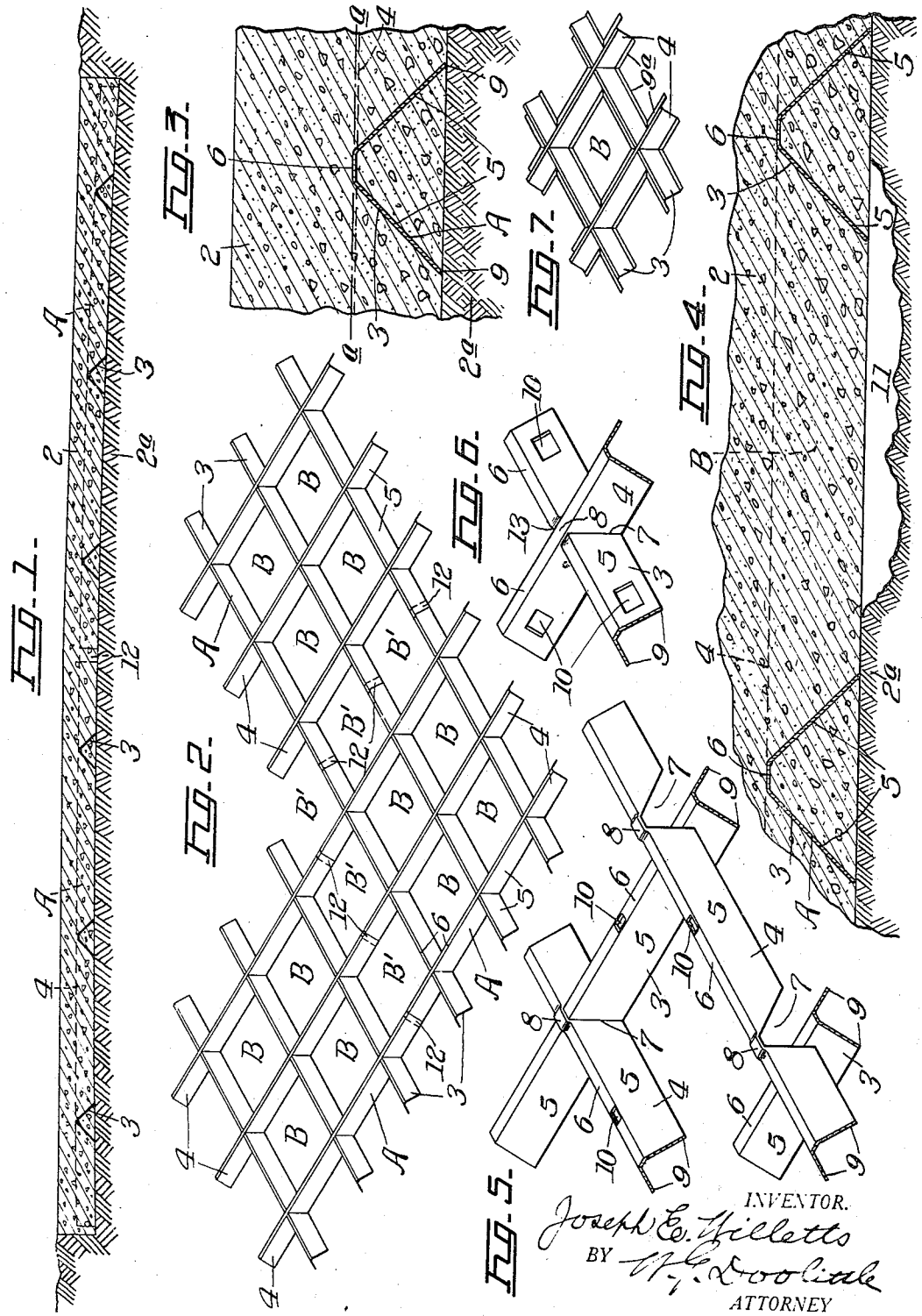


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

INVENTOR.
Joseph E. Willetts
BY W. L. Crooliffe
ATTORNEY

Patented Nov. 7, 1939

2,179,019

UNITED STATES PATENT OFFICE

2,179,019

CONSTRUCTION UNIT

Joseph E. Willetts, Pittsburgh, Pa.

Application May 6, 1936, Serial No. 78,147

5 Claims. (Cl. 94—8)

This invention relates to improvements in construction members or units particularly adapted for use in the reinforcement of concrete and the like, although their uses are not to be limited thereto.

Concrete slab construction, as for example, that employed in the formation of present day concrete roads or highways, generally employs reinforcement in the form of steel bars or mesh. Despite the use of such reinforcement, cracking and failures in the road surface are constantly recurring, which damage is probably caused by failure of the sub-grade with resultant loss of support to the overlying concrete.

The increasing traffic on the highways, particularly augmented by heavy trucks and trailers hauling freight loads, quickly deforms the weakened road surface, causing the formation of large and dangerous holes and breaks therein. This depreciation in the highways and roads has necessitated the yearly expenditure of large sums for repairs and replacements.

It is a prime object of my invention to provide for the reinforcement of such concrete roads and other concrete slabs, whereby the applied loading will be distributed in all directions to the slab, thus relieving unsupported areas and preventing their destruction under impact.

A further object is to provide a construction having extensive internal contact and bond with the concrete to continuously interlock or key the concrete against severance of the loaded areas from the main body of the slab.

Additional objects are to provide a simple and economical structure which may be readily fabricated and applied.

In the drawing which illustrates a preferred embodiment of my invention:

Fig. 1 is a transverse sectional view of a standard concrete highway slab showing my invention applied thereto;

Fig. 2, a perspective view of a plurality of the construction units of my invention;

Fig. 3, an enlarged detail sectional view of a portion of Fig. 1, showing the manner of applying the unit to the concrete;

Fig. 4, a similar enlarged sectional view, particularly illustrating the keying action of the unit;

Fig. 5, a detail perspective view showing one manner of assembling the unit;

Fig. 6, a view similar to Fig. 5, showing an alternative manner of assembly; and

Fig. 7, a detail perspective view of a modified form of the invention.

Referring to the drawing, 2 designates generally a concrete highway slab constructed in accordance with standard design upon a prepared and rolled sub-grade 2*a*. In forming the sub-grade, the earth is cut away to the proper width and rolled and shaped in slightly rounded form, generally approximating a parabolic curve in a transverse direction.

Suitable forming strips or curbs (not shown) are applied along the limiting edges of the highway section being formed, and concrete is poured therebetween to the proper depth, being finished off to form a molded top surface with a proper crown. It has been customary to employ reinforcing bars or mesh in the lower portion of the slab, but as stated, this form of reinforcement has not satisfactorily resisted the present day heavy traffic and loading.

To alleviate the difficulties encountered, I have provided a new construction unit comprising an open-work or mesh type flanged reinforcement generally designated A, preferably formed of sheet steel and pre-formed into said units. Each unit A includes plural series of crossed or intersecting members 3 and 4 formed of flat sheets bent into substantially V-shape with downwardly and outwardly diverging longitudinal flanges 5 of substantial depth, and having upper central terminal edges preferably slightly flattened as shown at 6.

The members 3 and 4 may be secured together in any suitable manner. For example, in Fig. 5, I have shown the flanges 5 of the members 4 cut away as at 7 at regular intervals to telescope over the members 3, said cut-away portions however not extending into the edges 6, thereby providing bridges or portions 8, which may be slightly upset as indicated, for straddling the flattened edges 6 of the members 3, thereby maintaining the bottom edges 9 of the members 3 and 4 in the same plane. When so positioned, the members 3 and 4 may be spot-welded together, forming a complete fabricated unit A.

Particular attention is called to the fact that I utilize the spaces or cavities between the members 3 and 4, together with the angularly disposed bounding or enclosing flanges 5 of the said members, providing forms or mold-like cavities B for the reception of concrete. Due to the angularity of the flanges 5, they become downwardly convergent limiting walls for the mold cavities B, forming the latter of substantially inverted truncated pyramidal form.

In forming the concrete slab 2, I prefer to first pour the concrete onto the sub-grade 2*a* to a depth indicated by the line *a*—*a*, or substantially

equal to the vertical depth of the reinforcing units A, which units are then applied to the pour by insertion flatwise, with the edges 9 of the respective members 3 and 4 thereof downward. The flanges 5 or edges 6 of the unit members may be perforated as at 10, to allow for the escape of air trapped within the members as the unit settles downwardly in the concrete to rest by its edges 9 on the sub-grade 3 as shown.

The finished pour is then applied to provide the prescribed total depth of the slab 2, being finished off with the proper finishing tool which will impart the desired crown to the finished product.

It will be noted that the members 3 and 4 and their flanges 5 are completely embedded and surrounded by the body of concrete, providing an extensive contact and bond therewith. For the purpose of increasing the bond, the surfaces of the flanges may be roughened if desired.

The masses of concrete disposed within the mold cavities B are effectively keyed or interlocked against downward displacement, and due to the flatwise angular interposition of the metal flanges 5, a transverse load applied to the slab will be partially transmitted laterally through the slab, thereby relieving the downward strain on the loaded area.

Likewise, the distribution of load will minimize any centralized deflection an in unsupported area. For example, assuming a failure of the sub-grade as indicated at 11 in Fig. 4, a load applied directly thereover will be laterally distributed to relieve the local portion of the slab, and together with the supporting action of the unit A per se, will prevent failure of the slab.

While the reinforcing means of my invention may be formed in one continuous mat or assembly, I have shown the same comprised of individual units of proper proportions. For example, in constructing a highway slab twenty feet in width, each unit A may be ten feet square, two of such units being employed per ten foot length of slab.

I also prefer to have the ends of the unit members 3 and 4 project on all sides of the unit whereby to join with like projecting portions of the next unit, as by overlapping contact 12, or any other suitable manner of connection. The lengths of the projecting end portions of members 3 and 4 are preferably such as to enclose a series of mold cavities B' substantially like the cavities B for continuity of the keying action throughout the slab.

While the units A will accommodate themselves to the slight curvature of the sub-grade 2*a*, they may be preformed with a proper curvature before being applied to the slab.

Fig. 6 illustrates another manner of fabricating the units, whereby the members 3 are slightly depressed at spaced intervals along their top edges 6 as at 13, whereby to saddle the bridge portion 8 of the member 4 without projection, and maintaining the lower edges 9 of the members in the same plane.

As a further modification, in Fig. 7 I have shown the lower edges of the members 3 and 4 formed with lateral marginal flanges 9*a* to afford added supporting effect.

While I have shown and described my new construction unit in connection with the reinforcing of concrete, it will be understood that the same may be advantageously employed as a building unit for spacing or supporting other layers of building or construction material.

I claim:

1. A concrete reinforcing unit for embedding in the concrete in spaced relation below the upper surface of the concrete including a plurality of spaced intersecting perforated members having downwardly inclined longitudinally extending flanges, the flanges of adjacent members forming a mold cavity having downwardly converging side walls for receiving and supporting concrete therebetween.

2. A concrete reinforcing unit for embedding in the concrete in spaced relation below the upper surface of the concrete including a plurality of spaced intersecting members having downwardly inclined longitudinally extending flanges, said members having perforations formed therein, the flanges of adjacent members being adapted to contact the concrete on opposite faces thereof and forming mold cavities of inverted and truncated pyramidal form for the reception and retention of concrete therein with the edges of the flanges terminating substantially in a common plane.

3. A construction unit of the character described for embedding in the concrete in spaced relation below the upper surface of the concrete including a series of metallic members each bent into V-shape with their apices flattened and widened to form concrete-supporting portions and having angularly related longitudinally extending flanges, a second series of metallic members of similar contour, said members having spaced perforations, the flanges of one series of members only being cut away for telescoping engagement with the members of the other series in intersecting relation, the edges of the flanges of the members when assembled being disposed substantially in a common plane.

4. A road slab including a lower portion of concrete, a metallic reinforcing unit embedded in said lower portion and including a plurality of intersecting members having downwardly inclined longitudinally extending diverging flanges terminating relatively far apart substantially in a common horizontal plane, the flanges of adjacent members forming mold cavities of pyramidal form for the retention of concrete therein, and a top portion of concrete above the reinforcing unit.

5. A road slab including a portion of concrete, a reinforcing unit embedded in said portion and terminating below the top thereof and including a plurality of intersecting metallic members having downwardly inclined longitudinally extending diverging flanges terminating relatively far apart substantially in a same horizontal plane as the base of said portion, the flanges of adjacent members forming mold cavities of pyramidal form for the retention of concrete therein, portions of the concrete filling said metallic members between the flanges said intersecting members being perforated.

JOSEPH E. WILLETTS.