Sept. 18, 1962 F. P. DICKOW 3,054,320

EXPANSION SHELL ASSEMBLY FOR JOINING CONCRETE SLABS

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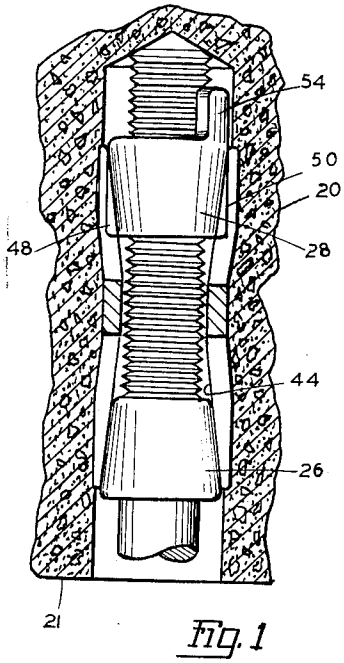


Fig. 1

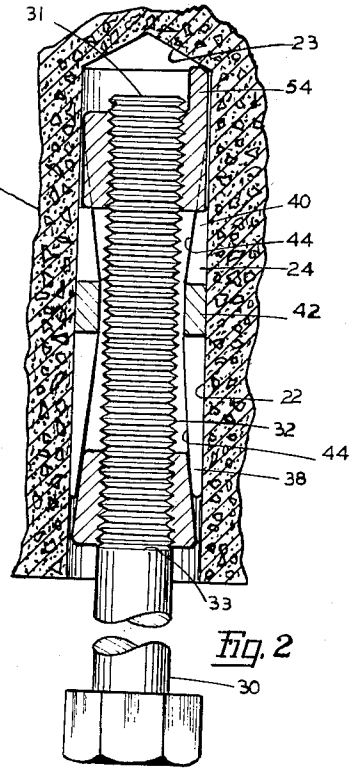


Fig. 2

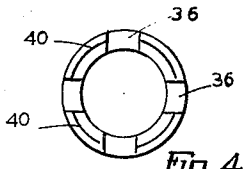


Fig. 4

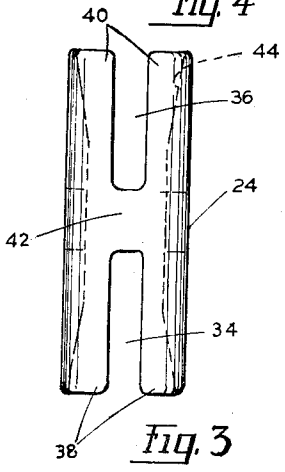


Fig. 3

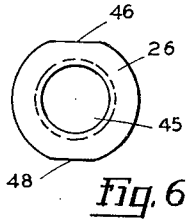


Fig. 6

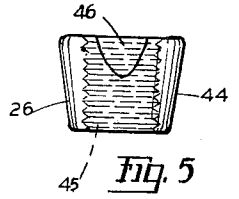


Fig. 5

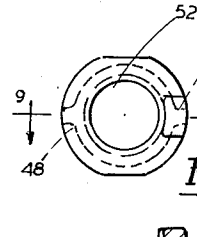


Fig. 8

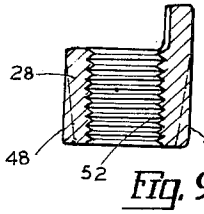


Fig. 9

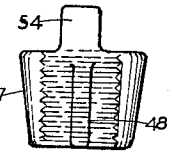


Fig. 7

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EXPANSION SHELL ASSEMBLY FOR JOINING CONCRETE SLABS

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1 Claim. (Cl. 85—2.8)

This invention relates to an expansion shell assembly particularly adapted for tie bolt use in joining concrete slabs.

More particularly the invention is directed to an expander adapted for simultaneous double end expansion adapted for use with tie bolts having standard threads, and free of shoulders, left and right hand threads and structure uncommon to an ordinary threaded bolt.

In tying concrete slabs together, as in road work, tie irons may be employed when the concrete is poured. However, to join a slab already cast, having no projecting tie irons, to a slab to be cast, it is the practice to drill a series of holes in the side edge of the slab, and insert expansion devices having tie bolts of sufficient length and suitable form to project from the slab, and be cast or imbedded in an adjoining slab, when poured. It is desirable that such a device requires a minimum diameter hole, allow the use of as large a diameter tie bolt as possible, while affording a maximum gripping power within the hole. At the same time, it is desirable to prevent over expansion, such as would be liable to damage the slab.

It is an object of the present invention to provide an expander, the shell of which is expanded at both ends by wedge cones which may be drawn together by a standard tie bolt having a common threaded end. The invention is further directed to an expander capable of being properly located within a bore of predetermined depth, and which operates in a manner to indicate when a proper degree of expansion has been effected.

The above and other novel features of the invention will appear more fully hereinafter from the following detailed description when taken in conjunction with the accompanying drawings. It is expressly understood that the drawings are employed for purposes of illustration only and are not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claim.

In the drawings, wherein like reference characters indicate like parts:

FIGURE 1 is a plan view, partly in section of an expander, expanded in position;

FIGURE 2 is a plan view partly in section of an expander, prior to expanding;

FIGURE 3 is a plan view of the expanding sleeve;

FIGURE 4 is an end view of the expanding sleeve;

FIGURES 5 and 6 are side and end views of one of the expanding cones;

FIGURES 7 and 8 are side and end views of the other expanding cone; and

FIGURE 9 is a sectional view taken substantially on the line 9—9 of FIGURE 8.

Referring to the drawings and more particularly FIGURES 1 and 2, there is shown a concrete slab or the like 20 in which a hole 22 has been formed in the side edge 21, as by boring, the hole having a depth indicated at 23. Within the bore is positioned the expander assembly comprising an expanding sleeve 24, expanding cones 26 and 28, the latter being threaded on the end of a bolt or stud 30, having a thread 32 of predetermined length.

The sleeve 24 is generally cylindrical and slotted from opposite ends as at 34 and 36 to provide expanding tongues 38 and 40, extending from the central annular portion 42. Each of the tongues have inside conical surfaces 44, and the sleeve is generally symmetrical about a transverse center plane, both ends being preferably the same.

The expanding cone 26, shown in FIGURES 5 and 6, has a threaded bore 45 and a smooth conical exterior surface 46 adapted to engage the conical surfaces 44 of the tongues 38 on one end of the expander. The cone may have slight flats 46 and 48 to receive a wrench, so that any slight resistance to threading on the bolt 30 may be overcome, without the use of tools having jaw teeth which would tend to roughen the surface 44.

The expanding cone 28, in FIGURES 7, 8 and 9, which is adapted to be positioned in the other end of the sleeve 24, is provided with a conical surface 47, interrupted on opposite sides by integral straight wings or spline-like keys 48 and 50, of a width to slide between adjacent tongues 40 and within opposite slots 36 of the sleeve 24. The cone has a threaded bore 52, and an integral end lug 54 adapted to gage the depth to which the expander assembly may be inserted into a bore such as 20.

The threads of both cones 26 and 28 are of the same diameter and pitch, and are preferably both standard right hand threads, although if desired such threads might be both left hand, in which case the stud or bolt would have a corresponding left hand male thread.

The expander, assembled as shown in FIGURE 2, is placed within a bore of proper diameter, and the desired depth, with the cones drawn lightly into the sleeve tongues, approximately as shown. The length of the thread, on the bolt is selected, so that the end of the bolt just emerges from the inner cone 28 when the cone 26 is threaded to the thread end 33. The bolt and assembly are located at a proper depth within the bore by engagement of the lug 54, with the bore end 23. The bolt is then rotated, while the lug 54 bears against the bore end 23 to afford resistance to turning. The cone 26, having a smooth exterior, rotates within the tongues 38, by reason of being located against the end 33 of the threaded portion 32 of the bolt. As the bolt threads into the cone 28, which is splined to the tongues 40, the cones are drawn toward each other, cone 26, rotating, and cone 28 being held against rotation but both expanding their respective sleeve ends. The combined action expands the tongues 38 and 40 against the wall of the bore. When sufficient expansion of the sleeve tongues 38 and 40 to afford a good grip has taken place the bolt end 31 reaches the depth 23, of the bore, and the resistance to further turning, resulting from the bolt end abutting the bore end, can be felt, and further expansion discontinued.

It will be seen that the expander, with one cone rotating and the other splined, renders it possible to obtain dual expansion at opposite ends of the sleeve without the use of other than a standard threaded bolt or tie. The exterior of the tongues may be knurled if desired (not shown), and the cones and sleeve may be made of any malleable cast iron, or other suitable material, it being understood that the sleeve material must have sufficient ductility to permit the deformation required, as indicated for example in FIGURE 1.

It will be understood, however, that resort to knurling increases the over-all diameter of the shell, necessitating a larger hole. The double and expansion feature provides for expansion at both ends of the sleeve, making it possible to employ a sleeve having a smooth exterior, since the expansion at both ends forms a shouldered recess in the concrete, which securely holds the sleeve within the bore when once expansion has taken place.

Although a single embodiment of the invention has been illustrated and described, it is to be understood that the invention is not limited thereto. As various changes in the construction and arrangement may be made with-

out departing from the spirit of the invention, as will be apparent to those skilled in the art, reference will be had to the appended claim for a definition of the limits of the invention.

What is claimed is:

An expander for threaded tie bolts comprising a one piece shell having a substantially cylindrical exterior, said shell having slots extending inwardly from both ends to a point short of the center thereof to provide at each end a plurality of segmental tongues, said tongues having inside surfaces flared conically outward toward the respective sleeve ends to receive expander cones, an expander cone disposed in one end of said shell having a conical exterior complemental to the inside conical surfaces of the tongues adjacent said end and adapted to rotate relative to and within the shell, and a second expander cone disposed in the other end of said shell having a conical exterior complemental to the inside conical surfaces of the tongues adjacent said other end, said second cone having raised keying means extending lengthwise and along opposite sides thereof and disposed in and adapted to slide within corresponding opposed slots, each of said cones having an axial threaded bore of like diameter and thread pitch, and a tie bolt having a continuous and uniformly threaded end portion of limited length engaging the threads of said cones followed by an unthreaded shank portion, said threaded end portion extending through said cones and sleeve with said first named cone disposed immediately adjacent the unthreaded shank portion, said second cone having an axially extending bore end engaging depth gaging lug projecting from one side of the large diameter end thereof of a length approximately one-half of the axial length of the cone, to assure clearance for the bolt end on expansion of the sleeve, said tie bolt threaded end portion being of limited length sufficient merely to extend through the threaded portions of the apertures of both cones when said cones are disposed within the shell ends in engagement with the tongues, with the shell unexpanded whereby when said expander is inserted unexpanded to the full depth of a closed end bore as limited by said lug, subsequent expansion of the sleeve will be limited, by the engagement of the bolt end with the bore end.

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