Oct. 15, 1968 R. R. LA MARR 3,405,490

ANCHOR STRUCTURE FOR POST-TENSIONED TENDONS

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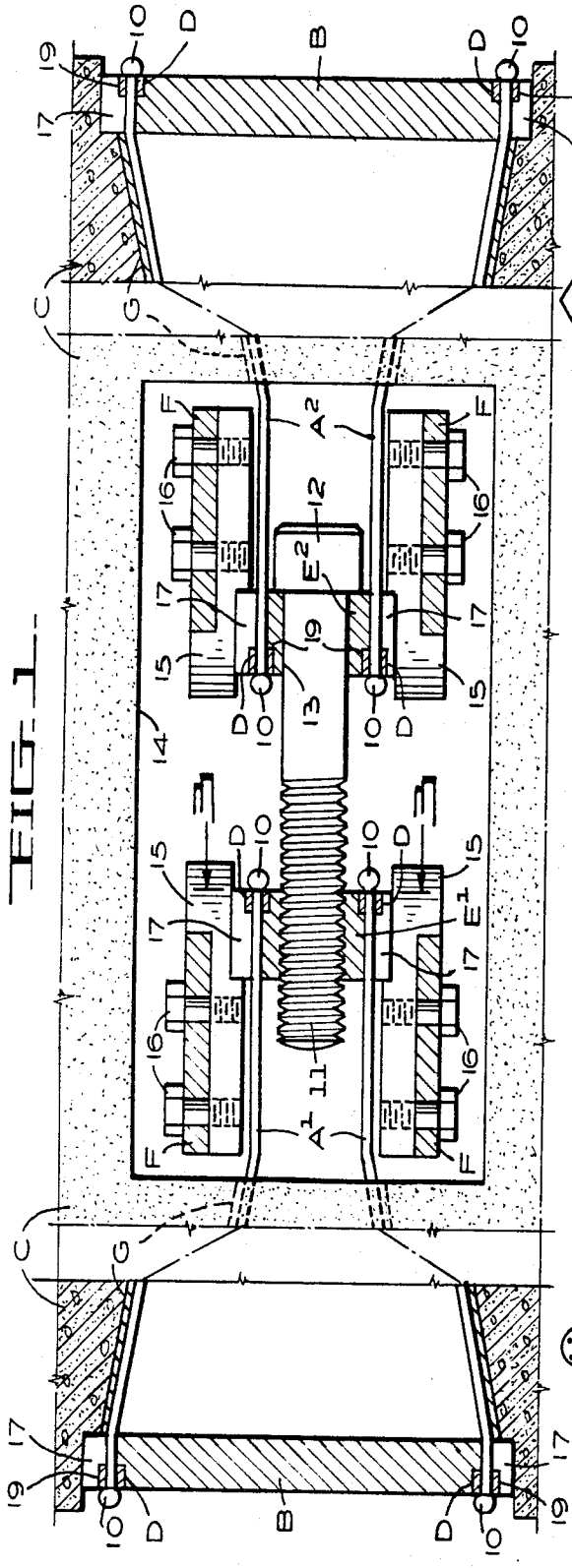


FIG. 1

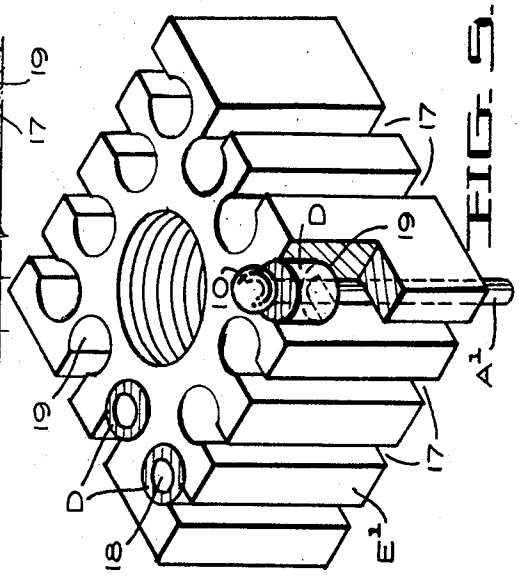


FIG. 5

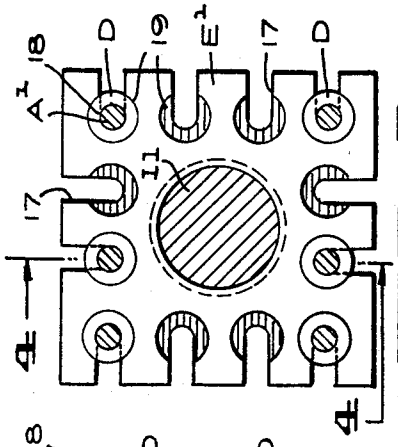


FIG. 3

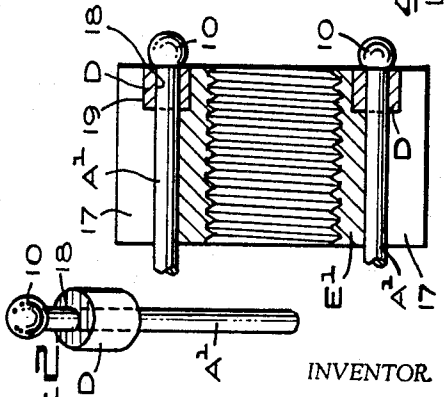


FIG. 4

FIG. 2

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ANCHOR STRUCTURE FOR POST-TENSIONED TENDONS

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ABSTRACT OF THE DISCLOSURE

An anchor structure for post-tensioned button headed tendons having an anchor member fashioned with at least one slot in its periphery dimensioned to receive a tendon that extends through a concrete member to reinforce the latter, the anchor member having a socket to accommodate a bushing that is slidable on the tendon, the bushing preventing accidental dislodgment of the tendon from the anchor member.

Background of the invention

(1) *Field of the invention.*—The present invention relates to the construction of the anchor member with its socket and the bushing arranged on the button headed tendon.

(2) *Description of the prior art.*—United States Patent No. 2,728,978, granted to Birkenmaier et al., shows a method for pre-tensioning and anchoring reinforcements of concrete. As disclosed therein, a plurality of wires are inserted through openings provided in a pair of anchor members and then the outer ends of the wires are button headed in a factory to provide an assembled unit. The wires must be coiled due to their lengths in order to be delivered to the building site, and uncoiling of the unit is required before the wires may be placed in the concrete forms. The unit is clumsy to handle and workmen may be clobbered when tying strands are cut, or the wires are otherwise uncoiled.

United States Patent No. 3,225,499, granted to Kourkene, shows post tensioning concrete wires that are button headed, these wires having bushings slidable disposed thereon and the wires are insertable in apertures or slots formed in anchor plates. The bushings merely abut the outer faces of the anchor plates, and there is nothing provided for preventing the wires from dropping out of the slots. Moreover, the bushings are substantially harder than the wire heads.

Summary

It is proposed in this invention to provide an anchor member having slots in its periphery that are dimensioned to have button headed tendons inserted sidewise thereinto, and each tendon has at least one bushing slidable thereon so as to abut an adjacent button head. Each slot has a socket associated therewith, and the socket is located in the anchor member so that the bushing may be inserted into the socket to form a key surrounding the tendon to prevent the latter from being accidentally dislodged from the anchor member.

Thus the individual tendons may be assembled on the anchor members at the job site, making it easier to transport the tendons from the button heading shop to the place where they are placed in the forms for the concrete member, making the placing of the tendons an easier task, and assuring the fact that the tendons will not drop out of the anchor members before or during the tensioning operation.

Moreover, it is proposed to make the bushings softer than the tendons and their button heads so that each button head may be compressed in a bore of a bushing, when the tendon is tensioned, expanding the bushing into locking relation with the socket.

Brief description of the drawing

For a better understanding of the invention, reference should be had to the accompanying drawing, forming part of this specification, in which:

FIG. 1 is a top plan view of a concrete member disclosing my anchor structure for post-tensioned tendons;

FIG. 2 is a perspective view of a portion of a button headed tendon with a bushing slidably disposed thereon;

FIG. 3 is a face view of an anchor member with a series of tendons secured thereto, this view being taken along the transverse plane 3—3 of FIG. 1;

FIG. 4 is a longitudinal sectional view taken along the plane 4—4 of FIG. 3; and

FIG. 5 is an isometric view of the anchor member shown in FIG. 3.

Description of the preferred embodiment

Referring now to the drawing in detail, two sets of tendons A^1 and A^2 have their outboard ends secured to anchor members (dead-end plates) B disposed at opposite portions of a concrete member C, with these two sets of tendons extending toward one another. The opposite end section of each tendon has a bushing D surrounding the tendon and being slidable therealong so as to abut button heads **10** formed on opposite ends of the tendon. The button heading is accomplished after the bushings D have been slipped over the tendons, and may be done in a shop. The inboard ends of the tendons A^1 are secured to an anchor member E^1 (see FIGS. 1, 3, 4 and 5), while the inboard ends of the tendons A^2 are secured to a second anchor member E^2 (see FIG. 1).

For the purpose of post-tensioning the tendons and thereafter holding the tendons under the tension to which they have been subjected, FIG. 1 shows a portion of the apparatus covered in my copending patent application entitled, "Post-Tensioning Tendon Anchoring Means," Ser. No. 548,719, filed in the United States Patent Office on May 9, 1966. However, I do not wish to be limited in this respect.

As illustrated in FIG. 1, the anchor members E^1 and E^2 take the form of a nut and a collar, respectively. An elongated bolt **11** has its shank threaded through the nut-like anchor member E^1, while a head **12** on this bolt bears against the collar-like anchor member E^2. The latter has a bore **13** that slidably receives the bolt shank.

At the start of the post-tensioning operation, the anchor members E^1 and E^2 are separated from one another. Two pairs of jaws F of a post-tensioning apparatus depend into a recess **14** formed in the concrete member C. Each of these jaws has a jaw plate **15** secured thereto, for example, by studs **16** or other suitable fastening means.

Thus the anchor members E^1 and E^2 may be moved toward one another under force to apply post-tensioning forces to the two sets of tendons A^1 and A^2 simultaneously, with the shank of the bolt **11** sliding in the bore **13** of the anchor member E^2 and the bolt head **12** backing away from this anchor member. When the bolt **11** is tightened in the nut-like anchor member E^1, the two sets of tendons A^1 and A^2 will be held in fixed positions and under the tension to which they are subjected, since the anchor members E^1 and E^2 are held against movement relative to one another at this time.

Each anchor member B, E^1 and E^2 is fashioned with a plurality of slots **17** in its periphery that extend between the opposite faces thereof, each slot being dimensioned to have a tendon inserted sidewise thereinto so as to extend longitudinally through the anchor member, and one of these faces being positionable adjacent a button head **10** of the inserted tendon.

Each bushing D has a bore **18** surrounding the tendon on which the particular bushing is slipped, and the bush-

ing is slidable therealong in either direction toward and away from the button head and the bushing may abut the adjacent button head **10**, the bushing having a greater diameter than the width of the slot **17**. Moreover, each anchor member (B, E^1 and E^2) has a socket **19** extending thereinto from the face thereof that is disposed adjacent to the button head **10**, the socket extending into the walls of the slot **17** and dimensioned to receive the bushing, whereby during assembly the bushing may be initially moved away from the adjacent button head and advanced into the socket to form a key surrounding the tendon to prevent the latter from being accidentally dislodged from the anchor member prior to and during tensioning of the tendon, and the tendon will slide through the bore of the bushing so that the button head will abut the bushing during tensioning of the tendon.

As an important structural feature, each bushing D is softer than the tendon and its button head, and the latter is movable into a position to abut the bushing so that the button head **10** will be compressed into the bore **18** of the bushing, when the tendon is tensioned, thereby expanding the bushing and locking it in the socket **19**.

Each bushing D initially has a sliding fit with the socket **19** into which it is inserted, and this will tend to hold the bushing in place, and each bushing substantially corresponds in length with the depth of the socket (see FIG. 4).

As clearly shown in the drawing, a plurality of slots **17** and sockets **19** are provided in each anchor member (B, E^1 and E^2), and each slot and its socket is dimensioned to receive at least one of the tendons.

When the sets of jaw plates **15** at the left and right, respectively, in FIG. 1 are moved toward one another by corresponding movements of the jaws F, all of the tendons A^1 and A^2 will be tensioned simultaneously, thus reinforcing the concrete member C.

In the post-tensioning of a concrete member it is common practice at the present time to enclose the tendons in a sheath G (see FIG. 1) so that the tendons may be tensioned after the concrete has reached sufficient strength, with the force being transmitted to the concrete member so as to support greater weight. Hence, the expression "post-tensioning." The sheath G prevents bonding of the concrete to the tendons, permitting the latter to slip through the poured concrete and friction is reduced.

As shown in United States Patent No. 3,285,569, of which I am a co-patentee, the inboard ends of the tendons A^1 and A^2 may overlap one another. In this event, the slotted anchor members E^1 and E^2 would be moved away from one another during the post-tensioning operation. However, the features of my bushings D and sockets **19** still could be employed.

I claim:

1. In an anchor structure for post-tensioned tendons wherein a tendon extends through a space for a concrete member to be poured to reinforce the latter, the tendon being provided on at least one end thereof with an enlarged button head, wherein the improvement comprises:

(a) an anchor member fashioned with at least one slot in its periphery that extends between opposite faces of the anchor member, the slot being dimensioned to have the tendon inserted sidewise thereinto so as to extend longitudinally through the anchor member, and one of these faces being positioned adjacent to the button head of the inserted tendon;

(b) a bushing formed with a bore surrounding the tendon and being slidable therealong in either direction toward and away from the button head, the bushing being greater in diameter than the width of the slot;

(c) the anchor member having a socket extending thereinto from the face thereof that is disposed adjacent to the button head, the socket extending into walls of the slot and dimensioned to receive the bushing, whereby during assembly the bushing may be initially moved away from the adjacent button head and advanced into the socket to form a key surrounding the tendon to prevent the latter from being accidentally dislodged from the anchor member prior to and during tensioning of the tendon, and the tendon will slide through the bore of the bushing so that the button head will abut the bushing during tensioning of the tendon.

2. The anchor structure for post-tensioned tendons, as set forth in claim **1**:

(d) and in which the bushing is softer than the tendon and its button head, and the latter is movable into a position to abut the bushing with sufficient force so that the button head will be compressed into the bore of the bushing, when the tendon is tensioned, thereby expanding the bushing and locking it in the socket.

3. In an anchor structure for post-tensioned tendons wherein at least one tendon extends through a space for a concrete member to be poured to reinforce the latter, the tendon having inboard and outboard ends, and each end of the tendon being provided with an enlarged button head, wherein the improvement comprises:

(a) a pair of spaced anchor members located at the inboard and outboard sections of the tendon, one at each end;

(b) each anchor member being fashioned with at least one slot in its periphery that extends between opposite inner and outer faces of the anchor member, each slot being dimensioned to have the adjacent end section of the tendon inserted sidewise thereinto, with the tendon extending longitudinally through the anchor members and bridging the space between the anchor members, and the outer faces of each anchor member being positionable adjacent to a button head of the inserted tendon;

(c) a pair of bushings having bores surrounding the tendon and being slidable therealong in either direction toward and away from the adjacent button head, the bushings being greater in diameter than the widths of the slots;

(d) each anchor member having a socket extending thereinto from its outer faces, with each socket straddling a slot and being dimensioned to receive an adjacent bushing, whereby during assembly the bushings may be initially moved away from the adjacent button head and advanced into their respective sockets to form keys surrounding the tendon to prevent the latter from being accidentally dislodged from the anchor members prior to and during tensioning of the tendon, and the tendon will slide through the bores of the bushings so that the button heads will abut the bushings during tensioning of the tendon.

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