Sept. 3, 1974 H. J. W. EDWARDS 3,833,706

METHOD OF FORMING STRESSED CONCRETE

Original Filed Aug. 27, 1968 2 Sheets-Sheet 1

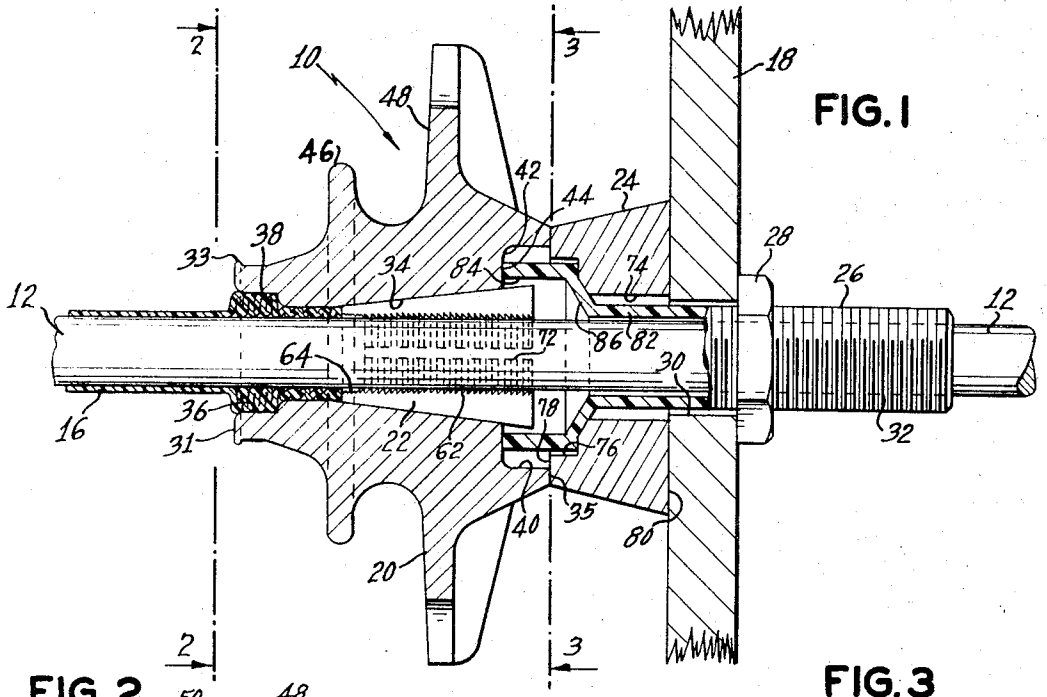


FIG. 1

FIG. 2

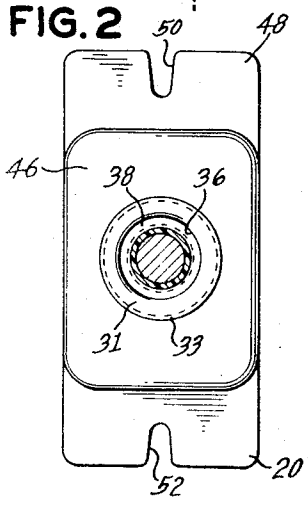


FIG. 4

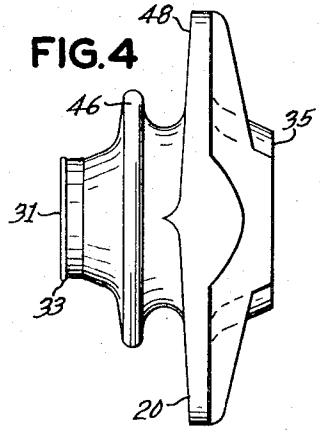


FIG. 3

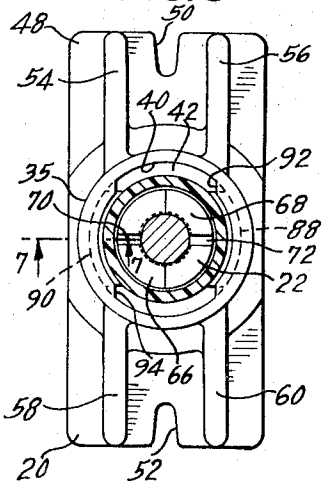


FIG. 6

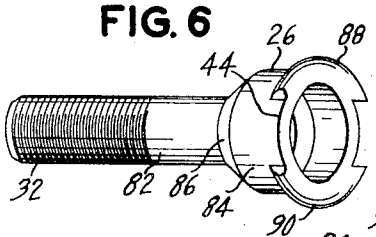


FIG. 5

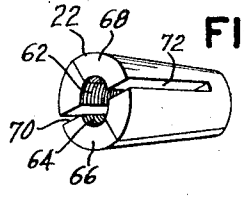
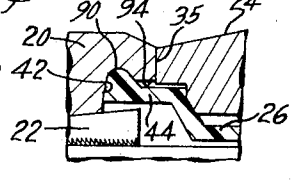


FIG. 7



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FIG. 8

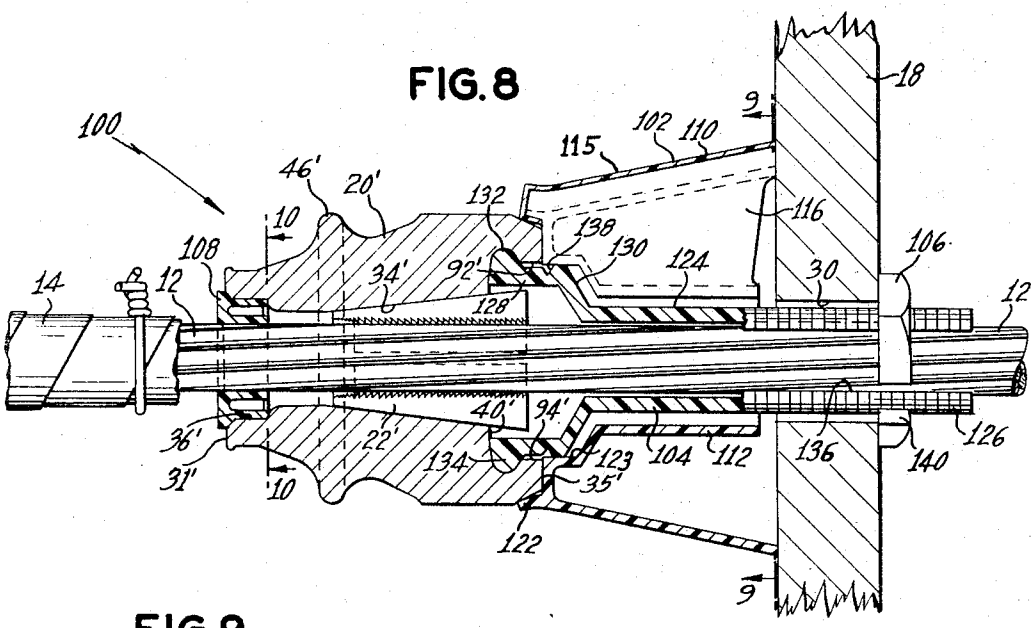


FIG. 9

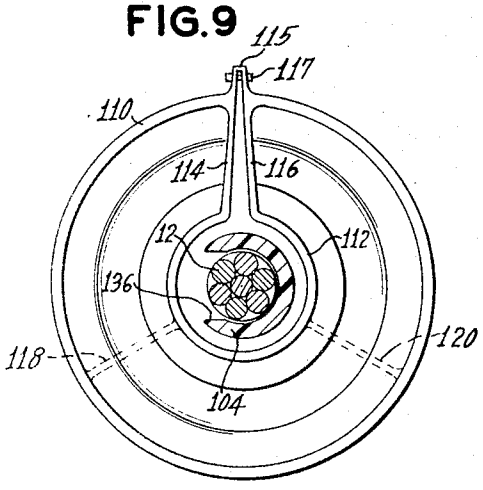


FIG. 10

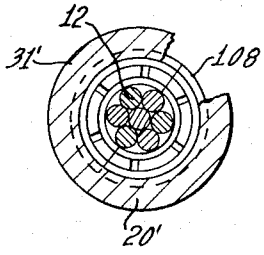
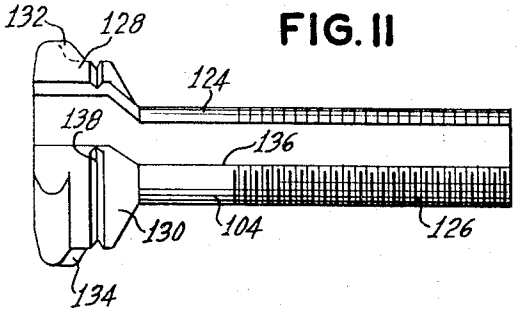


FIG. 11



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METHOD OF FORMING STRESSED CONCRETE

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Original application Aug. 27, 1968, Ser. No. 755,577, now abandoned. Divided and this application July 19, 1971, Ser. No. 163,777

Int. Cl. B28b 23/04

U.S. Cl. 264—228 10 Claims

ABSTRACT OF THE DISCLOSURE

A method of forming stressed concrete articles including post tensioning of a stressing tendon and utilizing an anchorage assembly including an anchor having a hollow housing and means therein for engaging a stressing tendon passing therethrough. The assembly includes a hollow member removably attached to the anchor housing and to the concrete formwork and fixing the relative position of the anchor housing to the formwork. The member surrounds the tendon between the anchor housing and the formwork and is adapted and arranged to be detached from the anchor housing after the concrete has set. A cavity forming spacer is provided which surrounds the member and is disposed between and seals against the anchor housing and the formwork to form a cavity in the concrete. The spacer is adapted and arranged to be removed from around the member after the concrete has set.

CROSS-REFERENCE TO RELATED APPLICATION

This application is a division of application Ser. No. 755,577, filed Aug. 27, 1968, now abandoned.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to the post-tensioning of concrete structures by means of wire or strand cables. In particular this invention concerns an anchorage device or assembly and parts thereof for use in anchoring a cable or cables in a concrete structure. In greater detail the invention pertains to anchorages for concrete stressing tendons, particularly to anchorage assemblies for use in the tensioning of such tendons positioned within concrete structures after the concrete has set or cured.

For many years mild, low strength steel reinforcing was simply imbedded in ordinary concrete and the result was an improvement in the strength of the concrete and some resistance to cracking and other failures was obtained. Later there was an attempt to place this reinforcement under tension so that it would have a compression effect upon the concrete. This slightly improved the construction although the success of this effort was not great because those who did it did not appreciate the fact that concrete would flow slightly under pressure thus that tension on the reinforcement would be reduced practically back to zero. Also under tension, the reinforcement itself would suffer from some permanent elongation that would add to this reduction of the tension. Accordingly, the tensioning of the reinforcement was not generally considered to be of great importance until recently when some of the factors influencing the effectiveness of reinforcement became better known and it was found that if steel wire having a very high tensile strength was used and placed under a very high tension, then although a part of the tension was lost by plastic flow and shrinkage in the concrete and permanent elongation or creep in the wire, nevertheless sufficient tension would remain in the wire and sufficient compression would result on the concrete to cause a major increase in the load-carrying capacity of the concrete and a major increase in the resistance of the concrete to cracking and the like. This represented such a complete departure from previously known facts to present completely new concept in reinforced concrete and hence this high tension wire reinforcing of concrete was probably considered to furnish a completely new and different approach to reinforced concrete construction. At the time that the possibility of using high-tension wire reinforcement came into being a general idea of tensioned reinforcement had long been known and considered of relatively little value. The discovery that high-tensioned wire reinforcement could produce far stronger and more durable structures than had ever before been known was a discovery that revolutionized the manufacture of reinforced concrete structures.

Description of the prior art

Anchors or anchorage assemblies for use in the post-tensioning of stressing tendons within concrete structures have been previously devised, such prior art devices are generally disclosed in U.S. Pat. No. 3,293,811. Applicant's invention of an improved anchorage assembly disclosed herein is an improvement over such prior art anchorage devices or assemblies, as shown for example in the above mentioned patent.

SUMMARY OF THE INVENTION

Therefore it is an object of the invention to provide an improved anchorage assembly for concrete stressing tendons of the type which are cast in place in such a manner that they may be tensioned after the concrete has set or been cured.

Another object of this invention is to provide an improved anchorage assembly for concrete stressing tendons in which there is utilized a single piece, wedge receiving and constraining plate anchor housing.

Still another object of the subject invention is to provide an anchorage assembly for concrete stressing tendons which includes a cavity forming spacer initially held in being engagement with the wedge receiving anchor housing and in being engagement with the concrete formwork when anchorage is secured to the formwork such as to provide a grout receiving cavity, the spacer forming an effective seal with the wedge receiving anchor housing to exclude concrete therefrom where the concrete is being poured and cured.

Yet another object of the instant invention is to provide means whereby a tendon anchoring housing is imbedded in the concrete at the time the concrete is poured and by which means the anchor housing is attached to the formwork, and after the concrete has set the means permitting the formwork to be released from the anchor housing.

A further object of this invention is to provide an improved anchorage assembly for concrete stressing tendons wherein portions of the anchorage assembly may be salvaged and later re-used.

Yet a further object of the invention is to provide an anchorage assembly which will permit the anchor housing thereof to be left in the concrete and which anchor housing when left in the concrete will not produce an unsightly appearance.

In general these and other objects are attained by providing an anchorage assembly including an anchor having a hollow housing and means therein for engaging a stressing tendon passing therethrough. The anchorage assembly includes a member removably attached to said housing and to the formwork, this member fixing the relative position of the anchor housing with respect to the formwork. The member is additionally adapted and arranged to be detached from the anchor housing after the concrete is set.

The concrete objects produced in accordance with the apparatus of this invention may be of any desired shape but are generally beams, columns, channels, slabs or other like structural members. In accordance with this invention, the concrete objects are comprised of three essential parts, namely, the concrete itself, reinforcing members or tendons and the end anchorages that transfer the load of the reinforcing tendons to the concrete.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features which are believed to be characteristic of this invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawings, in which:

FIG. 1 is a side elevational view, portions thereof being in cross-section, of the improved anchorage assembly of this invention;

FIG. 2 is a left-hand end view taken along line **2—2** of FIG. 1;

FIG. 3 is a cross-sectional view taken along line **3—3** of FIG. 1;

FIG. 4 is a side view of the anchor housing shown in FIGS. 2 and 3;

FIG. 5 is a prospective view of the wedges used in the assembly of FIG. 1;

FIG. 6 is a prospective view of the reusable bayonet fitting used in the assembly of FIG. 1;

FIG. 7 is a transverse-sectional view taken along line **7—7** of FIG. 3;

FIG. 8 is a cross-sectional view showing a second embodiment of the anchorage assembly of the invention;

FIG. 9 is a cross-sectional view taken along line **9—9** of FIG. 8;

FIG. 10 is a cross-sectional view taken along line **10—10** of FIG. 8; and

FIG. 11 is a top plan view of the reusable bayonet fitting used in the assembly of FIG. 8.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, and in particular FIG. 1 thereof, the anchor or anchorage assembly **10** of this invention is depicted therein retaining an appropriate strand or tendon **12** to be used in the construction of a concrete beam, column, slab or the like. Cable or tendon **12** when used with the anchorage assembly of this invention in its intended application is often of the non-bonded type. This type of cable (non-bonded) comprises the normal prestressing cable which before delivery to the site is pre-cut and coated with a special protection and lubricating compound which guards against corrosion and minimizes friction during the stressing operation. The thus coated cable is wrapped in a special heavy duty reinforcing paper **14**, as in FIG. 8, or a plastic sleeve or sheathing **16** is fitted over the entire length of the stand as in FIG. 1. In both cases the strand is free to move within the covering. When the cable arrives at the site it is simply laid out in position and appropriate anchorage assemblies, such as at **10**, are located on the ends thereof interiorly of the formwork or shuttering **18**. After this the concrete is placed within the form with the anchor assembly **10** being recessed therein. When the concrete has set the tendon is then stressed by jacks which bear against the back of the anchor housing.

Assembly **10** generally includes a tendon anchor or housing **20**, see in particular FIGS. 2 through 4; grips or teethed wedges **22**, see in particular FIG. 5; a recess or pocket former or spacer **24** for recessing anchor **20** into the concrete; and a releasable bayonet fitting or member **26**, see in particular FIG. 6, for maintaining the assembly **10** in assembled form and when employed in combination with a nut **28** maintaining the complete and assembled assembly firmly in position with respect to the shuttering or formwork **18** at any desired location thereon. The assembly is positioned on the formwork **18** at the desired location by means of a hole or opening **30** extending therethrough the bayonet fitting **26** of the assembly being positioned therethrough and secured by means of nut **28** being tightened on a threaded portion **32** of bayonet fitting **26**.

The anchor or anchor housing **20** of anchor assembly **10** includes a forward end portion **31** having an outwardly extending lip **33**, a rearward end portion **35**, and a conical-shaped bore or hollow passageway **34** extending therethrough and through which strand or tendon **12** passes. Bore or hollow **34** is provided with an enlarged forward portion or passageway **36** having a forwardly facing shoulder **38** against which sheathing **16** abuts whereby the same bunches up within enlarged portion **36** to prevent the concrete from entering internally into the anchor assembly from this its forward end portion **31**. Bore or hollow **34** is further enlarged by cavity **40** adjacent the rearward end portion **35** of anchor **20** to form a rearwardly facing shoulder **42**, against which the forward end portion **44** of releasable bayonet fitting abuts. Anchor **20** further includes a rib or flange member **46** of a generally rectangular shape having rounded corners and positioned generally perpendicular to the axis of conical bore **34**. Rib or flange **46** distributes the stressing forces into the concrete and thus reduces the stress intensities in the anchorage zone. Member **46** additionally provides a safety factor in the fact that any bad compaction of the concrete in the region of the face or forward end portion **31** of anchor **20** has less effect than would be the case if anchor housing **20** were not provided with this flange or rib **46**. Body portion **20** further includes a generally rectangular shaped flange **48** extending outward therefrom and positioned generally adjacent the rearward end portion **35** thereof. Flange member **48** distributes the stressing forces into the concrete which reduces the stress intensities in the anchorage zone. Flange member **48** is provided with a slotted opening **50** in its top portion extending downward from its upper edge and a slotted opening **52** in its bottom portion extending upward from its lower edge, see in particular FIGS. 2 and 3. Slots **50** and **52** are provided such that anchor **20** may be secured to the shuttering or framework **18** by means of nails (not shown) if so desired, extending through slots **50** and **52** and into the formwork **18**. Casing or anchor housing **20** is further provided with a pair of reinforcing ribs or members **54** and **56** extending from adjacent the rearward end portion **35** and adjacent opening or cavity **40** upward to the upper outer edge of flange or plate member **48**. In like manner, a second pair of reinforcing ribs or members **58** and **60** are provided and extend downward from a joint adjacent the rearward end portion **35** and cavity **40** to the lower outer edge of flange member **48**.

Wedges or jaws **22**, see in particular FIGS. 1 and 5, have a conical shaped outer surface to generally conform to the conical configuration of passageway or hollow **34** within anchor housing **20**. Wedges **22** are provided with teeth or serrations **62** extending laterally round their inner opening or passageway **64** to grip and bite strand **12** passing therethrough, as depicted in FIG. 1. Jaws or wedges **22** are split and include a left **66** and right **68** member or portion to fit around strand **12** and generally conform thereto as the jaws **22** are pulled forward within bore **34**. Further, each of the jaw or wedge sections or portions **66** and **68** are slit or provided with slotted openings, respectively at **70** and **72** adjacent their mid portions, whereby the upper and lower portions of each wedge section **66** and **68** may move toward each other to generally conform to and better grasp tendon **12** passing therethrough, see also FIG. 3.

Recess or pocket former **24** is of a conical shape having a central bore or passageway **74** extending therethrough, with an enlarged forward end portion **76** to per-

mit bayonet fitting **26** to extend therethrough and to generally accommodate the same. Forward end portion **78** of cavity forming spacer **24** abuts rearward end portion **35** of anchor **20** to generally seal therewith to exclude the cement or grout from entering the anchorage assembly **10** at this point. In addition, rearward end portion **80** of recess former or spacer **24** abuts and generally seals with the forward edge of formwork **18** to prevent the cement from gaining access to the interior of the anchorage assembly at this particular location.

Detachable and releasable bayonet fitting or hollow member **26** includes a circular elongated portion **82**, a threaded outer end portion **32** and an enlarged circular forward portion **84** connected to portion **82** by a transition portion **86**. Elongated portion **82** extends through opening **30** within formwork **18** and through passageway or opening **74** within pocket or recess former **24**. Enlarged forward portion **84** of the bayonet fitting is positionable within the enlarged rearward portion cavity **40** of the casing or anchor housing **20** outwardly of the wedges or jaws **22** such as to not interfere with the operation of the same. The forward end portion **44** of bayonet fitting **26** which abuts rearwardly facing shoulder **42** of anchor **20** is provided with a pair **88** and **90** of flange members or shoulders (see FIGS. 3 and 7) which respectively fits behind and engage a pair of lips or shoulders **92** and **94** provided on anchor housing **20** adjacent its rearward end portion **35** and extending inward of enlarged opening or cavity **40**.

Upon proper positioning of the forward end portion **44** of bayonet fitting **26** within cavity **40** of anchor **20** and rotation or pivoting of the fitting such that flange members **88** and **90** become engaged behind lips **92** and **94**, the fitting **26** becomes releasably affixed or secured to anchor **20**. The pocket or recess former **24** is then positioned over bayonet fitting **26** with enlarged forward portion **84** thereof fitting within the enlarged forward portion **76** of pocket former **24**. Next the threaded portion **32** of elongated portion **82** of fitting **26** is positioned through opening **30** within the formwork **18**, and the nut **28** is threaded on portion **32** of bayonet fitting **26**. Transition portion **86** of bayonet fitting **26** prevents jaws or wedges **22** from coming out of their proper position within bore or hollow **34** of the anchor housing **20**. Nut **28** is tightened on threaded portion **32** to pull bayonet fitting **26** through formwork **18** causing the attached anchor **20** to tighten against pocket former **24** thereby forming a seal between pocket former **24** and formwork **18**, and between pocket former **24** and anchor **20** to prevent cement from entering the anchorage assembly **10** at these points of adjoinment. Next the concrete is poured and placed within the formwork or shuttering. After the concrete has set, nut **28**, formwork **18**, pocket former **24** and bayonet fitting **26** are removed to afford access to the back of anchor body **20** and wedges or jaws **22** positioned therein, which are now recessed within the set concrete. The tendon may now be stressed by jacks which bear against the back of anchor housing **20**, and jaws **22** may be tapped home to firmly and snugly grip the stressed strand **12**. After stressing tendon **12**, the opening in the concrete which was formed by the recess or cavity forming spacer **24** can be grouted-in if so desired.

With detailed reference to FIGS. 8 through 11 now, a second embodiment of the anchorage assembly **100** is depicted therein retaining strand or tendon **12**, having been wrapped with heavy duty reinforcing paper **14**, to be used in the construction of a concrete beam, column, slab or the like. Assembly **100** generally includes an anchor housing or casing **20'**, identical to that seen in FIG. 1 grips or teethed wedges **22'**, identical to those shown in FIG. 5, a recess or pocket former **102** for recessing casing or anchor housing **20'** into the concrete, a releasable and detachable bayonet fitting **104**, see in particular FIG. 11, and a split nut **106** for maintaining the assembly firmly in position with respect to shuttering or formwork **18**.

Casing or anchor housing **20'** of anchorage assembly **100** includes a forward end portion **31'**, a rearward end portion **35'** and a conical shaped bore or hollow **34'** extending therebetween, through which tendon **12** passes. Bore **34'** includes an enlarged forward portion or passageway **36'** and an enlarged rearward portion or cavity **40'**. Anchor housing **20'** further includes a flange-like member **46'** which aids in distributing and stressing forces into the concrete to thereby reduce the stress intensities in the anchorage zone, and provides a safety factor in that any bad compaction of the concrete in the region of the forward end portion **31'** of anchor **20'** has less effect than would the same if the anchor housing were not provided with this flange member **46'**. Anchor housing **20'** further includes a pair **92'** and **94'** of lips or shoulders adjacent rearward end portion **35'** extending inward of enlarged rearward opening or cavity **40'**, behind which bayonet fitting **104** is engageable, as will be explained more fully hereinbelow.

In the embodiment of the strand anchor assembly shown in FIGS. 8 through 11, a grout or cement extruder or bushing **108** is provided which snugly and engagingly fits within enlarged forward portion or passageway **36'** of bore or hollow **34'** within anchor housing **20'**. Cement extruder **108** fits closely and snugly about tendon **12** passing therethrough such as to prevent grout or cement from entering anchor assembly **100** at this forward end portion thereof.

Recess or pocket former **102** is hollow and preferably formed from a frangible material of good release properties, such as a suitable plastic. Cavity forming spacer **102** includes an outer conical shaped shell portion **110** and an inner centrally disposed, hollow cylinder portion **112**, through which tendon **12** passes and which is connected to the outer conical shell portion **110** by suitable webs such as **114** and **116**. Webs **114** and **16** are joined or connected at **115** adjacent their outer ends to seal pocket former **102**. Additional webs, such as indicated by dotted lines at **119** and **120**, may join outer shell **110** and inner cylinder **112** to further strengthen and rigidify pocket or recess former **102**. The rearward end of inner cylinder portion **112** of recess former **102** stops short of the formwork or shuttering **118**, while the rearward edge of outer shell portion **110** of pocket former **102** extends completely to the formwork **18** to form a seal therewith when the parts of the assembly are tightened together. The inner end **122** of outer shell **110** extends outward beyond anchor **20'** and forward of rearward end portion **35'** thereof to form an effective seal with anchor housing **20'** to prevent cement from entering the anchorage assembly at this point. The forward end portion **123** of central hollow cylinder portion **112** of recess former **102** is enlarged to generally accommodate and conform to the shape of bayonet fitting or member **104**.

Bayonet fitting **104**, which is releasable and detachable includes a circular elongated hollow portion **124** having a threaded outer end portion **126** and an enlarged circular forward end portion **128** connected to elongated portion **124** by a transition portion **130**. Elongated portion **124** is positionable through the opening of hollow cylinder **112** of recess former **102** and through opening or passageway **30** within formwork **18**. Enlarged forward end portion **128** of bayonet fitting **104** is positionable within enlarged rearward portion or cavity **40'** of anchor housing **20'**, and a pair of flanges or shoulders **132** and **134** on forward end portion **128** of bayonet **104** are respectively engageable behind and with lips or shoulders **92'** and **94'** of anchor housing **20'**. Bayonet fitting or member **104** has a portion removed therefrom to form a slot or opening **136** extending over its entire length such that fitting **104** can be slipped transversely over or clipped on cable or strand **12**, thereby eliminating the need of threading fitting **104** over the entire length of

strand 12 up to the point where it is desired to be put to use. Additionally bayonet or hollow member 104 is provided with a V-notch 138 extending about its entire circumference and positioned on enlarged forward end portion 128 adjacent transition portion 130. V-notch 138 permits fitting 104 to be broken off at this point, such as when formwork 18 is stripped away from the hardened concrete, leaving only the enlarged forward end portion 128 with flanges or shoulders 132 and 134 of bayonet 104 in anchor housing 40'. Alternatively fitting 104 instead of being broken off by V-notch 138 can be removed from anchor 20' by simple rotation of and release of flanges 132 and 134 from behind lips or shoulders 92' and 94' and reused with another casing, similar to casing 20', at another point along tendon 12.

In like manner nut 106 has a portion or section removed or cut-out from its entire thickness to provide a slot or opening 140 therealong whereby the nut may be transversely slipped over or clipped on strand 12 to eliminate threading of the nut over the entire length of strand 12 up to the point where it is intended to be used.

The embodiment of strand anchor assembly 100 depicted in FIGS. 8 through 11 has particular applicability when employed along the mid-portions or sections of a particularly long strand which is to be used in the stressing of concrete. When thus employed, using the readily slottable recess former 102, slotted bayonet fitting 104 and slotted nut 106, the assembly can be readily arranged and assembled on the mid-portion of the strand or tendon without the necessity of threading these portions or parts of assembly 100 over the entire length of the strand from its end to its mid-portion. In this use pocket or recess former 102 is split at reference number 115 where webs 114 and 116 are joined together and then placed or clipped over strand 12. Next the slot so formed in recess former 102 is closed by joining webs 114 and 116 together with staples 117 or the like. Now slotted bayonet fitting 104 is clipped over strand 12 and located and secured in cavity 40' of anchor 20'. The pocket former 102 is then pushed over fitting 104 and the whole assembly 100 is lined up in slot or opening 30 in formwork 18, after which split nut 106 is clipped on strand 12 and tightened on threaded portion 126 of fitting 102 against the outer face of formwork 18 adjacent opening 30 therein. When anchorage assembly 100 is used in the mid-portions of an extended tendon, anchor 20' is usually placed on the strand in the factory at the approximate position at which it will be used before the strand is shipped to the location for use. Once the concrete has set and cured, formwork 18 is stripped by means of leverage between the formwork and the concrete, thus breaking off bayonet fitting 104 at notch 138. Pocket former 102 is then extracted to leave anchor housing 20' and enlarged forward end portion 128 of bayonet fitting 104 recessed within the concrete.

While only certain preferred embodiments of this invention have been shown and described by way of illustration, many modifications will occur to those skilled in the art and it is, therefore, desired that it be understood that it is intended in the appended claims to cover all such modifications as fall within the true spirit and scope of this invention.

What is claimed as new and what it is desired to secure by Letters Patent of the United States is:

1. A method for forming a stressed concrete structure including a post-stressing tendon extending between a pair of opposed and spaced formwork members and fixed with respect to one of the formwork members and a tendon anchorage positioned inwardly of the other formwork member with the tendon passing through the other formwork member and anchorage comprising the steps of securing a means including a temporary and positive locking means and a void forming means surrounding the locking means to the anchorage with the locking means extending from the anchorage and passing through a void in the concrete when it is set and through the other formwork member at a predetermined spaced position therefrom, urging the anchorage toward the other formwork member with the void forming means sandwiched between the anchorage and the other formwork member by adjustable means attached to the locking means outwardly of and bearingly against the other formwork member to fix the anchorage in proper position with respect to the other formwork member and the tendon and to tightly seal the void forming means to the anchorage and the other formwork member, pouring the concrete within the formwork members and about the tendon and the anchorage and about the void forming means, completely removing the void forming means and locking means after the concrete has set, stressing the tendon, and setting the anchorage to grip and retain the tendon under tension.

2. In the method as defined in claim 1 wherein said void forming means comprises a spacer member separate from said locking means, said step of securing a means including the step of inserting the spacer member tightly sandwiched between the anchorage and the other formwork member with the spacer member extending about the locking means to form the void in the set concrete.

3. In the method as defined in claim 1 further comprising the step of temporarily setting the anchorage to grip the tendon prior to said step of pouring the concrete.

4. The method as defined in claim 3 wherein said void forming means comprises a spacer member separate from said locking means, said step of securing a means including the step of inserting the spacer member between the anchorage and the other formwork member with the spacer member extending about the locking means to form the void in the set concrete.

5. A method for forming a stressed concrete structure including a post-stressing tendon extending between a pair of opposed and spaced formwork members and fixed with respect to one of the formwork members and a tendon anchorage positioned inwardly of the other formwork member with the tendon passing through the other formwork member and anchorage comprising the steps of securing a means including a temporary and positive locking means and a void forming means to the anchorage with the locking means passing through the other formwork member at a predetermined spaced position therefrom, removably fastening the locking means externally of and bearingly against the other formwork member with the anchorage urged toward the other formwork member and with the void forming means sandwiched therebetween in sealing relation to the anchorage and the other formwork member, pouring the concrete within the formwork members and about the tendon and the anchorage and the void forming means, removing the void forming means and locking means after the concrete has set, stressing the tendon, and setting the anchorage to grip and retain the tendon under tension.

6. In the method as defined in claim 5 wherein said locking means includes an elongated member and said void forming means comprises a spacer member, said step of securing a means including the step of inserting the spacer member tightly sandwiched between the anchorage and the other formwork member with the spacer member extending about the elongated member to form the void in the set concrete.

7. In the method as defined in claim 5 further comprising the step of temporarily setting the anchorage to grip the tendon prior to said step of pouring the concrete.

8. In the method as defined in claim 7 wherein said locking means includes an elongated member and said void forming means comprises a spacer member, said step of securing a means including the step of inserting the spacer member with the spacer member extending about the elongated member to form the void in the set concrete.

9. A method for forming a stressed concrete structure,

the steps prior to pouring the concrete of laying the post-stressing cable in place, placing an anchorage means having an aperture about the cable inwardly of the formwork, placing a means for locking and forming a void about the cable with a portion extending through an opening in the formwork, temporarily and positively connecting the portion to the anchorage means temporarily and positively securing the portion externally of the formwork, adjustably urging the portion externally of the formwork and the attached anchorage means toward the formwork thereby to hold in fixed position the anchorage means by the formwork through the portion, sealing the portion by another void forming portion surrounding same between the anchorage means and formwork for preventing the seepage of concrete therebetween and to form a void in the set concrete whereby the portion may be removed.

10. In the method as defined in claim **9** wherein the portion comprises a sleeve and the void forming portion comprises a spacer, placing the spacer around the sleeve and between the anchorage means and the formwork to prevent seepage of concrete onto the sleeve and to form a void in the concrete after setting thereof whereby the spacer and sleeve may be removed after setting of the concrete and removal of the formwork.

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