July 29, 1969 A. L. JACOBUS 3,457,687

MEANS OF DEPRESSING AND/OR HOLDING-DOWN PRE-TENSIONING TENDONS IN PRE-TENSIONED CONCRETE MEMBERS EMPLOYING DRAPED, HARPED OR DEPRESSED TENDONS

Filed April 3, 1968 3 Sheets-Sheet 1

FIG. 1

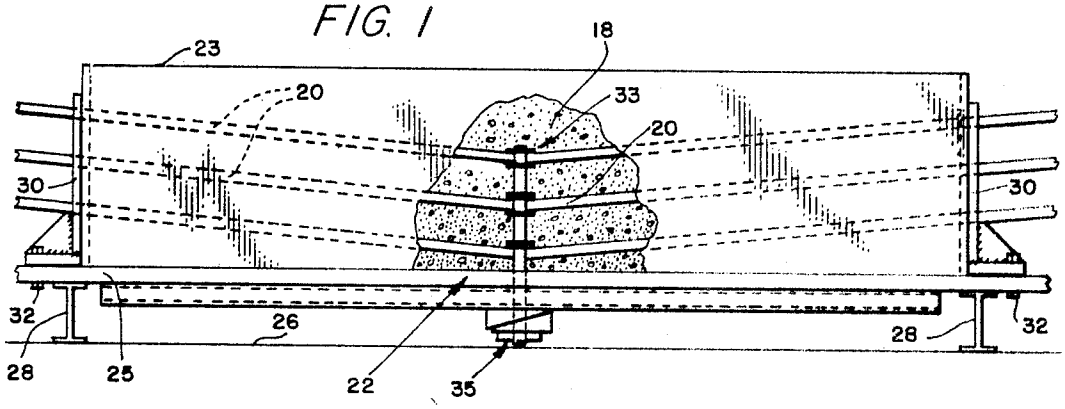


FIG. 2

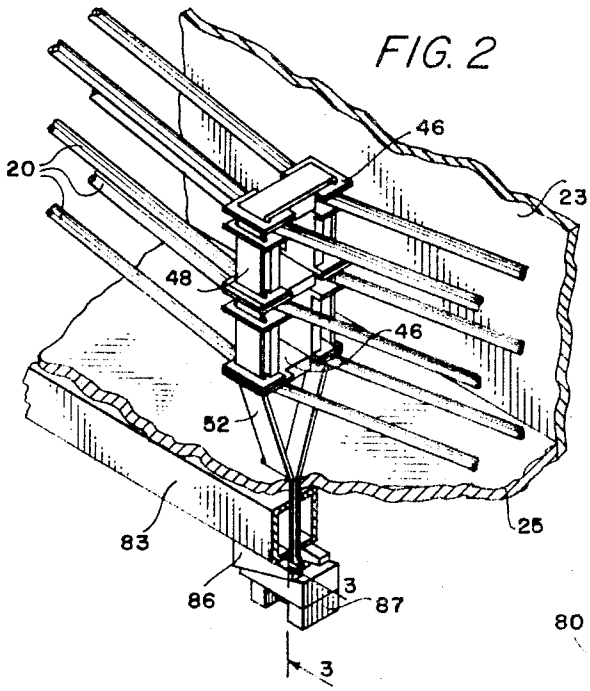


FIG. 3

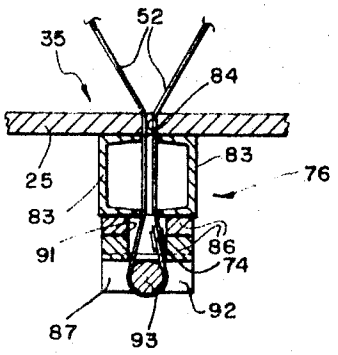


FIG. 4

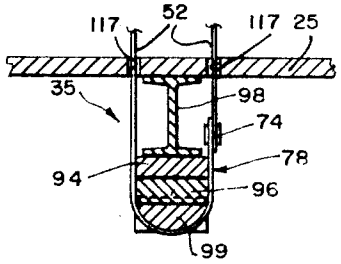
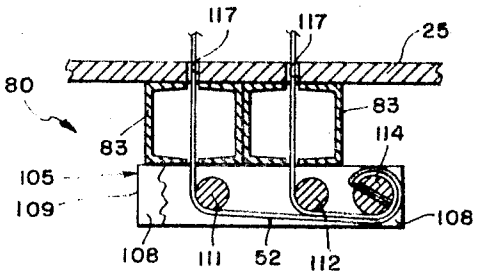


FIG. 5



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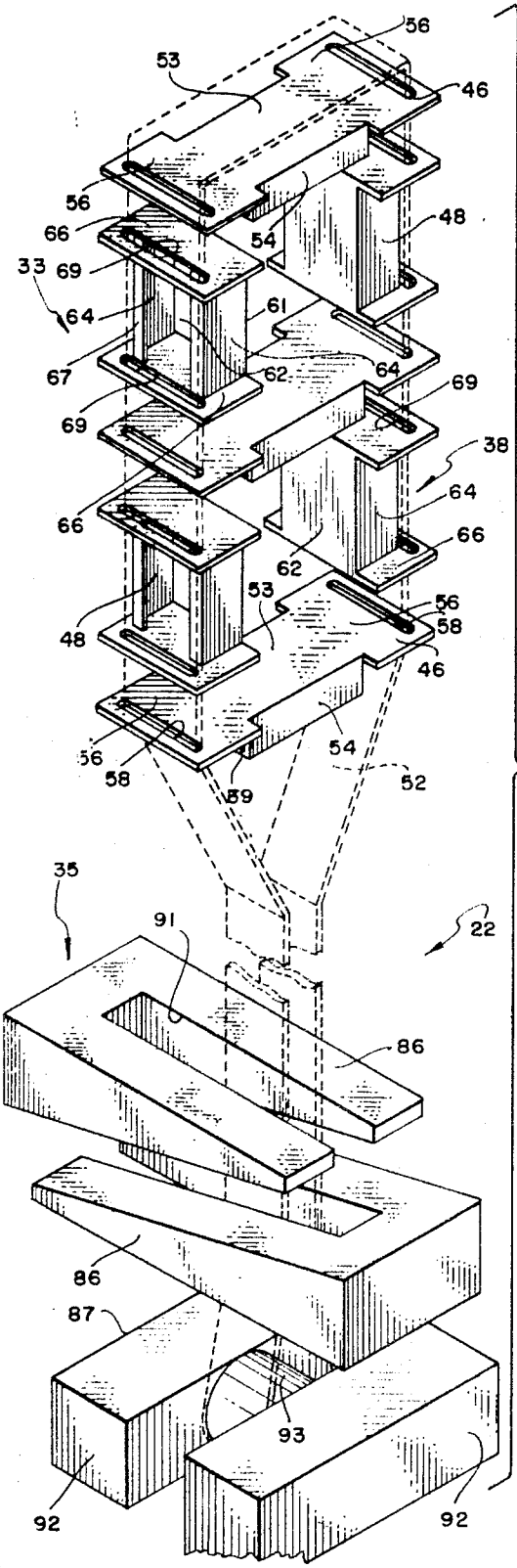


FIG. 6

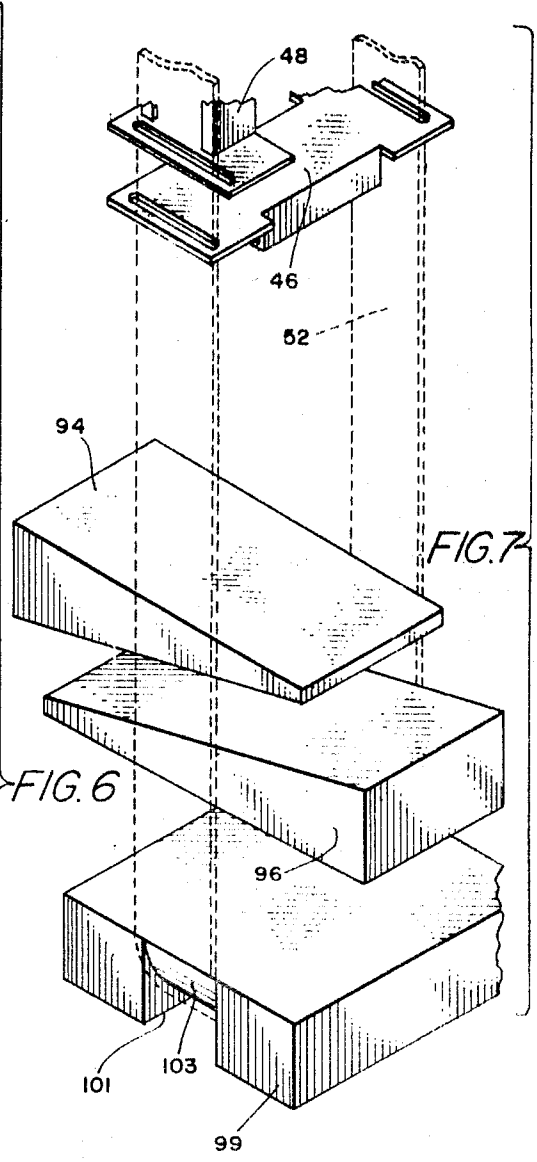


FIG. 7

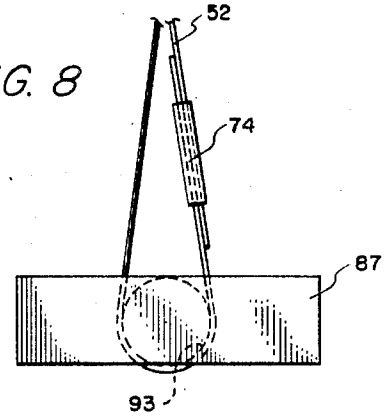
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FIG. 8



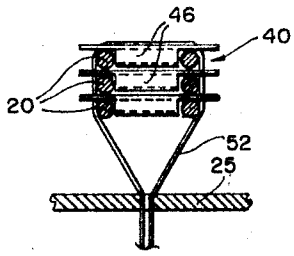
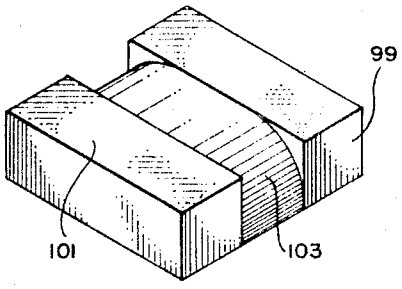


FIG. 9

FIG. 10



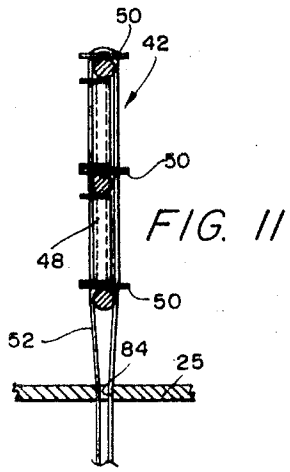


FIG. 11

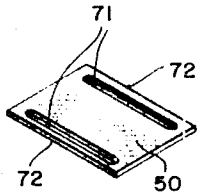


FIG. 14

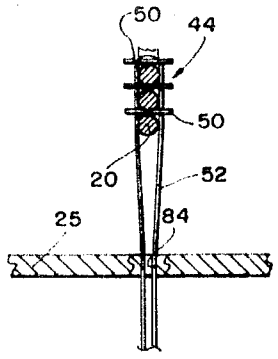


FIG. 13

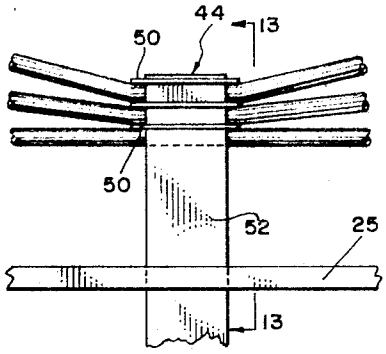


FIG. 12

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MEANS OF DEPRESSING AND/OR HOLDING-DOWN PRE-TENSIONING TENDONS IN PRE-TENSIONED CONCRETE MEMBERS EMPLOYING DRAPED, HARPED OR DEPRESSED TENDONS

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ABSTRACT OF THE DISCLOSURE

This invention relates to a means of manufacturing reinforced concrete support structures and, more particularly, to means for construction of concrete girders provided with pre-tensioned reinforcing members therein. Still, more specifically, this invention relates to means for depressing or holding-down elongated tendons or cable members within a form means to produce elongated concrete I-beams, girders, and the like; the means including structure for grasping the cable members and pre-tensioning the same in a spaced, pre-determined manner requiring a minimum amount of space within the concrete members with a minimum cost of the elements left therein.

The construction industry has long recognized the advantages of forming concrete girders, beams, and the like in the pre-stressed condition. The desirability of pre-stressing by depressing elongated tensioned reinforcement has been recognized particularly as applied to relatively long concrete support structures. The use of long beams having pre-tensioned cables or strands therein has been long recognized and such structures have been produced but the cost making the same has been excessive and the equipment employed has been elaborate and expensive to install and operate. The use of pre-tensioned reinforced strands or cables has been used normally in top push-down or bottom hold-down methods. However, in the prior art, it has been found that elaborate equipment has been necessary and substantial equipment is normally left within the concrete structure being produced or if not, a large opening in which the equipment for depressing the cable member has been placed, must be filled which is undesirable as producing a weakened portion of the structure plus being an additional manufacturing step adding to overall costs.

In preferred specific embodiments of this invention, a pre-tensioning means is provided including cable connector means adapted to be connected to a plurality of elongated cable members or tendons in a pre-tensioned concrete member and having anchoring means connected thereto to hold the inter-connected cable members in a tensioned or depressing condition. The cable connector means is provided with a number of different embodiments including a multiple strand, horizontal and vertically spaced attachment assembly; a multiple strand vertically adjacent, horizontally spaced attachment assembly; a multiple strand vertically aligned and spaced attachment assembly; a multiple strand vertically aligned and adjacent attachment assembly; and each of these various assemblies constructed of a plurality of elements arranged in a predetermined order to change from one assembly to the other. More specifically, the elements include elongated banding straps operably connected to horizontal spacing clips, vertical spacing struts, and strap spacing clips in a pre-determined manner. The banding strap is preferably of a high-strength steel construction adapted to be bent about the tendons or cable members and inter-connected to the vertical spacing struts and horizontal spacing clips

for connection to the anchor means. The horizontal spacing clips are provided with main bodies having downwardly depending abutment sections and outer end sections each formed with elongated slots adapted to receive the banding strap therethrough. The vertical spacing strips are provided with parallel end sections having elongated slots interconnected by a vertical box-like main body. The strap spacing clips are of a flat plate construction having two parallel elongated slots therein adapted to receive the banding strap therethrough. The aforementioned various elements are readily used in a pre-determined manner in order to provide various horizontal and vertical spacing of the cable members so as to positively maintain the spacing in order to provide a more desirable structure. On assembly of the selected connector means, the banding strap is extended through a lower support bed or soffit and connected to the anchor means. The anchor means used may be one of three different embodiments, namely, a single slot, wedge-type anchoring assembly; a double slot, wedge-type anchoring assembly; or a winch-type anchoring assembly. In the single slot anchoring assembly, the banding strap is interconnected by a banding clamp about a single strip anchor pad having a pair of channel members and split wedges mounted between the same and the lower surface of the working bed. The split wedges are operable to move the single strip anchor pad and the inter-connected banding strap downwardly to pre-tension the cable members through the connector means. The double slotted, wedge-type anchoring assembly is provided with a pair of plain tapered wedges and an I-beam spacing member mounted under the lower surface of the soffit and connected to a double strip anchor pad. In this embodiment, the banding strap is extended through spaced parallel slots in the soffit and trained about the lower surface of the double strip anchoring pad and inter-connected as by banding clamp. The tapered wedges are additionally movable relative to each other to regulate the amount of down-pull on the banding strap and inter-connected cable members. In the third embodiment of the anchor means, a special depressor or hold-down frame is provided mountable against a plurality of elongated beam members which, in turn, are adjacent the soffit. The depressor frame is provided with one or more roller sheaves adapted to receive the banding strap thereabout for connection to a slotted shaft which, in turn, is rotatable by a tool to pull the interconnected banding strap and cable members downwardly.

Accordingly, one object of this invention is to provide a new and novel means for holding-down pre-tensioning cables or tendons overcoming the above-mentioned disadvantages of the prior devices.

A further object of this invention is to provide a depressing means operable against the lower surface of a supporting working bed or soffit of a concrete form box to depress a plurality of longitudinally extended tendons or cables mounted within the form box.

One further object of this invention is to provide a pre-tensioning means connectable to a plurality of elongated cable members to be embodied within a concrete structure; the pre-tensioning means including connector means having horizontal and vertical spacer members engageable with the cable members for holding in a pre-determined pattern by a banding strap which is anchored to a support bed as by various anchor means to provide tensioning to the cable members.

One other object of this invention is to provide a pre-tensioning means readily attachale to a plurality of substantially parallel cable members so as to deform the same as desired in adjacent, or vertical and horizontally spaced positions in construction of a concrete structure and having means for connecting to the cable members which are inexpensive to manufacture and readily ex-

pendable on solidification of the concrete material thereabout.

A still further object of this invention is to provide a pre-tensioning means engageable with a plurality of cable members to apply a desired downward or depressed force that is economical to manufacture, easy to assemble in a pre-determined desired pattern, using a minimum amount of deformity in the concrete structure to be produced, and economical in having a minimum amount of cost in material retained in the finished product.

Various other objects, advantages and features of the invention will become apparent to those skilled in the art in light of the following discussion, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a side elevational view of a pre-tensioned concrete member within a form for the same having a portion broken away for clarity to reveal the pre-tensioning means of this invention;

FIG. 2 is an enlarged fragmentary perspective view of one pre-tensioning means of this invention mounted within a form and secured to cable members;

FIG. 3 is a fragmentary sectional view taken along line 3—3 in FIG. 2;

FIG. 4 is a view similar to FIG. 3 illustrating a second embodiment of an anchor means of this invention;

FIG. 5 is a view similar to FIG. 3 showing a third embodiment of the anchor means of this invention;

FIG. 6 is an exploded perspective view of one embodiment of the pre-tensioning means of this invention having a banding strap shown in dotted lines for clarity;

FIG. 7 is an exploded fragmentary perspective view similar to FIG. 6 except having another embodiment of the anchor means of this invention connected thereto;

FIG. 8 is a fragmentary elevational view of an anchor pad of one embodiment of the anchor means of this invention;

FIG. 9 is a fragmentary elevational view of another embodiment of the connector means of the pre-tensioning means of this invention;

FIG. 10 is a perspective view of an anchor pad used in another embodiment of the anchor means of this invention;

FIG. 11 is a fragmetnary elevational view of another embodiment of the connector means of the pre-tensioning means of this invention;

FIG. 12 is a fragmentary elevational view of still another embodiment of the connector means of the pre-tensioning means of this invention;

FIG. 13 is a fragmentary sectional view taken along line 13—13 in FIG. 12; and

FIG. 14 is a perspective view of a strap spacing clip of the connector means of this invention.

The following is a discussion and description of preferred specific embodiments of the new means of depressing and/or holding down pre-tensioning tendons or cables of pre-tensioned concrete members of this invention, such being made with reference to the drawings, whereupon the same reference numerals are used to indicate the same or similar parts and/or structure.

Referring to the drawings in detail and in particular to FIG. 1, a concrete beam or girder **18** is illustrated having a plurality of longitudinally extended tendons or cable members **20** held in a downward or depressed position as by the pre-tensioning means **22** of this invention. In construction of the girder **18**, a form box **23** is provided of the desired width and height which is placed on an elongated working bed or soffit **25** elevated above a support surface **26** as by I-beams **28**.

The form box **23** is of a generally rectangular shape having end bulkheads **30** adapted to receive the cable members **20** therethrough to position the same at the right height and separation. The end bulkheads **30** are releasably secured to the soffit **25** as by bolt members **32** and various types thereof may be used depending on the desired number and positioning of the cable members **20** in the form box **23** as will be explained. It is obvious that a plurality of the form boxes **23** can be positioned on the soffit **25** with common cable members **20** extended transversely through adjacent ones whereby numerous pre-tensioned girders **18** could be formed at the same time.

The pre-tensioning means **22** includes connector means **33** attachable to the cable members **20** in combination with anchor means **35** engageable with the soffit **25** to apply the desired pressure to cable members **20**. The connector means **33** includes various structures using similar elements arranged differently depending on pattern of the cable members **20** within the girder **18** to be formed. Therefore, the connector means **33** includes the embodiments of (1) a muliple strand, horizontally and vertically spaced attachment assembly **38** (FIGS. 2 and 6); (2) a multiple strand vertically adjacent, horizontally spaced, attachment assembly **40** (FIG. 9); (3) a multiple strand vertically aligned and spaced attachment assembly **42** (FIG. 11); and (4) a vertically aligned and adjacent attachment assembly **44** (FIGS. 12 and 13). Each of these embodiments are constructed from assembly of various ones of the elements of the connector means **33**, being horizontal spacing clips **46**, vertical spacing struts **48**, strap spacing clips **50**, and an elongated flexible banding strap **52** used with each given embodiment for anchoring purposes to be explained.

More specifically, the horizontal spacing clips **46** are preferably of a bent-sheet construction having a main body **53** provided with facing leg sections **54** reversely bent so as to extend the same direction laterally of the main body **53** to function as spacers as will be explained. The main body **53** is formed with end sections **56** on opposite sides of the leg sections **54** formed with parallel elongated slots **58** of a sufficient width and length so as to receive the banding strap **52** as will be explained. Additionally, the outer end portion of the leg sections **54** are formed with inwardly extended flange portions **59** positioned in a common plane to provide positive spacing and support as will be explained.

The vertical spacing struts **48** are of a box-like structure having a main spacer body **61** provided with a base wall **62** integral with two sidewalls **64** and having two enlarged end walls **66** extended laterally of the sidewalls **64**. The inner edges of the sidewalls **64** are turned inwardly to form flanges **67**. The endwalls **66** are of the generally rectangular shape each having an elongated slot **69** aligned with the slot **69** in the other endwall **66** extended adjacent and outwardly from the flange **67** on the sidewalls **64** for reasons to become obvious.

The strap spacing clips **50** are merely of a rectangular plate structure having a pair of spaced, parallel, elongated slots **71** extended along parallel sides **72** and having a distance between the adjacent sides of the elongated slots **71** equal to or slightly greater than the diameter of the cable members **20** for reasons to become obvious. The slots **71** are of a sufficient size to receive the banding strap **52** therein for reasons to be explained.

The banding strap **52** is preferably constructed of a high strength, flexible, steel material similar to a conventional narrow belt structure and, in the assembled condition, the banding strap **52** is held together by a clamp **74**. It is obvious that the banding strap **52** has to be of a sufficient high strength to withstand the tension and stresses to be placed on the cable members **20** in the assembled condition as will be explained.

As shown in FIGS. 3, 4, and 5, the anchor means **35** also includes various structures using somewhat similar elements depending on the pattern of the cable members **20** to be formed within the girder **18**. The anchor means **35** includes the embodiments of (1) a single slot, wedge-type anchor assembly **76** (FIG. 3); (2) a double slot, wedge-type anchor assembly **78** (FIG. 4); and a winch-type anchor assembly **80** (FIG. 5). All of the aforemen-

tioned anchor assemblies **35** are operable in a similar manner, namely, to grasp onto the banding strap **52** for providing a downward pull on the cable members **20** secured to respective ones of the embodiments of the connector means **33**.

The single slot anchor assembly **76**, as shown in FIGS. 2 and 3, includes a pair of elongated channel members **83** placed on opposite sides of a slot **84** in the soffit **25** adapted to receive the banding strap **52** therethrough; a pair of split wedges **86**; and a single strap anchor pad **87**. The split wedges **86** are of a generally U-shape having parallel sloping legs **89** defining an open slot **91** therebetween. The anchor pad **87** is constructed of a pair of parallel bar members **92** inter-connected by a cylindrical shaft section **93**. The use and function of these various elements will be fully explained in the respective completed assembly.

The double slot anchor assembly **78**, as shown in FIGS. 4 and 7, includes a pair of tapered wedges **94** and **96** mounted between an elongated I-beam **98** and a double strip anchor pad **99** as will be explained. The anchor pad **99** is of a substantially rectangular block shape having the undersurface **101** formed with an arcuate surface **103** adapted to receive the banding strap **52** thereabout as will be explained.

The winch-type anchor assembly **80** includes a plurality of the elongated channel members **83** and a winch device **105**. More specifically, the winch device **105** is provided with a U-shaped depressor frame **107** having parallel legs **108** joined by a base section **109**. The legs **108** are adapted to receive roller sheaves **111** and **112** rotatably mounted therein and the banding strap **52** thereabout as will be explained. Additionally, a slotted shaft **114** is mounted parallel to the roller sheaves **111** and **112** spaced therefrom and being rotatably mounted in the leg members **108**. One end of the shaft **114** is extended laterally of the legs **108** so as to be rotatable by a pull-down wrench (not shown) or the like point it is obvious that the laterally extended end of the slotted shaft **114** may be provided with a ratchet assembly (not shown) rotatable in one direction only for reasons to become obvious.

In the use and operation of the pre-tensioning means **22** of this invention, the cable members **20**, as shown in FIG. 1, are extended through the form box **23** at the desired height and the multiple strand horizontally and vertically spaced attachment assembly **38** is used with six of the cable members **20**. The horizontal spacing clips **46** are first placed upon pairs of the cable members **20** extended in common horizontal planes with the leg sections **54** extended downwardly as clearly shown in FIG. 6. Next, the vertical spacing struts **48** are placed between adjacent pairs of the cable members **20** having their endwalls **66** extended in horizontal planes in contact with the cable members **20**. The banding strap **52** is thereupon placed through the vertically aligned slots **69** and **58** in the vertical spacing struts **48** and the horizontal spacing clips **46** in order to group the cable members **20** in a compact package. It is noted that in this assembled condition of the attachment assembly **38**, the banding strap **52** prevents outward lateral movement of the cable members **20** while the leg sections **54** of the horizontal spacing clips **46** prevent inward movement of the cable members **20**. Additionally, the cable members **20** are clamped between adjacent ones of the vertical spacing struts **48** and the horizontal spacing clips **46** in order to restrict vertical movement therefrom. It is seen, therefore, that the cable members **20** are positively held in a given horizontal and vertical spaced relationship by the attachment assembly **38** of this embodiment. The banding strap **52** can thereupon be pulled together as shown in FIG. 6 and trained through the slot **84** in the soffit **25** to be attached to the single slot anchor assembly **76**.

More specifically, as shown in FIG. 3, the strap **52** is trained about the shaft section **93** of the anchor pad **87** with free ends of the banding strap **52** inter-connected by the banding clamp **74**. The pair of the channels **83** are mounted in a facing relationship on opposite sides of the banding strap **52** whereupon the split wedges **86** are placed about the strap **52** and between the anchor pad **87** and lowermost wedge **86**. Movement of the wedges **86** toward each other acts to move the anchor pad **87** downwardly to increase a downward pull upon the banding strap **52** and inter-connected attachment assembly **38**. It is obvious that relative sizes of the split wedges **86** can be varied and the length of the banding strap **52** controlled in order to achieve a desired downward pull on the cable members **20** in the assembled condition.

The same horizontal and vertical attachment assembly **38** may be used with the double slot anchor assembly **78** as shown in FIG. 7. The main difference is that two parallel slots **117** are formed in the soffit **25** in order to receive the banding strap **52** whereupon the strap **52** is placed on opposite sides of the tapered wedges **94** and **96** and trained about the double strip anchor pad **99** on the arcuate surface **103**. The I-beam **98** is placed between the soffit **25** and the uppermost tapered wedge **94** whereupon the wedges **94**, **96** can be moved relative to each other to regulate the downward movement of the anchor pad **99** to achieve a desired downward pull on the cable members **20**.

Additionally, the winch anchor assembly **80** can be used with either an adjacent single, or a spaced double position of the banding strap **52**. In the instance of an adjacent banding strap **52**, the same is trained about the lower section of the first roller sheave **111** and the elongated channels **83** are placed on opposite sides between the lower surface of the soffit **25** and the depressor frame **105**. The free ends of the banding strap **52** are placed within the slot on the shaft **114** and the shaft **114** is rotated in a conventional manner to cause a downward movement of the banding strap **52** and connector means **33**. It is obvious, that in this embodiment of the anchor means **35**, the downward movement of the connector means **33** and inter-connected banding strap **52** is unlimited as it is not controlled by the various thicknesses of any wedges. It is seen that the second roller sheave **112** may be used when the banding strap **52** is extended through the parallel slots **117** in the soffit **25** similar to usage of the double slot anchor assembly **78**.

In the multiple strand, vertically adjacent and horizontally spaced attachment assembly **40** as shown in FIG. 9, it is seen that three of the horizontal spacing clips **46** are used in an assembly of six of the cable members **20** inter-connected by the banding strap **52** through the aligned slots **58** therein. As shown in FIG. 9, the banding strap **52** is trained through a single slot in the soffit **25** but may be extended downwardly in parallel relationship through the soffit **25** depending on whether using the anchor assembly **76**, **78**, or **80**.

The third embodiment of the connector means **33** is shown with the vertically aligned, spaced attachment assembly **42** of FIG. 11 whereupon the strap spacing clips **50** are placed on top of each of the cable members **52** and maintained in a spaced relationship by vertical spacing struts **48** placed therebetween. The vertically aligned slots **69** and **71** are adapted to receive the banding strap **52** therethrough. In this embodiment, it is obvious due to the narrow relationship of the banding strap **52** they are preferably trained through a single slot **84** in the soffit **25** and may be anchored to the winch-type anchor assembly **80** or the single slot anchor assembly **76** as desired to provide a downward pull thereon.

The fourth embodiment of the connector means **33** is illustrated in FIGS. 12 and 13 being the vertically aligned and adjacent attachment assembly **44**. More particularly, the attachment assembly **44** is provided with the strap spacing clips **50** placed on the upper surface of the three adjacent ones of the cable members **20** and interconnected as by the banding strap **52** which is extended through the common slot **84** in the soffit **25** for attach-

ment to the anchor assembly **76** or **80** as desired. It is noted that the various dimensional relationships of the vertical spacing struts **48**, the horizontal spacing clips **46**, and the clips **50** are regulated so that the cable members **20** are always maintained in a compact restrictive relationship preventing horizontal and vertical movement. The banding strap **52** operates to provide a lateral restriction of the cable members and, because there is always an upward force thereupon, even the lowermost cable members **20** are restricted in all directions against movement.

Although the numerous embodiments have been discussed have wedge members to apply a downward force on the banding strap **52**, the various connector means **33** could be first attached to the cable members **20** when they are in a slacked condition. The banding strap **52** used in the connector means **33** would be constructed to a predetermined length in an attached loop with the lower end extended through a slot on the soffit **25**. Next, a bolt or connector shaft would be extended through the lowermost looped end of the banding strap **52** and anchored to adjoining channel member **83** or the like. Such a structure would resemble FIG. 3 without the wedges **86** and having the shaft section **93** removable so as to be placed in the banding strap **52**. Conventional cable tightening mechanisms could then be used to raise the cable members **20** to achieve the desired pre-tensioning thereto. This is very desirable as the banding strap **52** could be constructed to uniform length to eliminate the necessity for skilled labor as may be needed on use of the wedges.

This invention has been primarily concerned with depressing or holding-down cable members; however, it is obvious that the same could be used to pull up the cable members by attachment to the upper surface of the form box. In fact, the cable members could be alternately depressed and raised in a wave type form with the final product being sawed into predetermined lengths to achieve a plurality of concrete beams from one pouring in an elongated form box.

It is seen that the pre-tensioning means of this invention provides a new and novel means for depressing or pulling upwardly elongated cable members to be formed in concrete beams, girders and the like whereupon various patterns of the cable members can be readily achieved. Additionally, the connector means of this invention are readily constructed with the numerous elements that are substantially inexpensive to manufacture whereby on completion of the concrete girder or the like the banding strap may be severed whereupon a minimum amount of material and expense is left with the completed product. Additionally, in using the pre-tensioning means of this invention a minimum opening is left within the completed concrete product which is extremely desirable in that filling with concrete or repair material is not necessary to achieve a uniform attractive end product.

As will be apparent from the foregoing description of the applicant's new and novel pre-tensioning means, relatively inexpensive means have been provided which are readily assembled to a plurality of longitudinally extended cable members to provide a pre-determined downward pull or tension thereto. This is extremely desirable in the formation of concrete support members because concrete by itself is known to have a great compression but low tension strength. Because of the varying bending or flexural forces exerted on a concrete support member, the positioning of the cable members therein may be regulated as desired depending on whether the member is to be supported in the middle, at opposite ends, etc. The location of the pre-tensioning cables within a prestressed concrete member is commonly referred to as draping, depressing or harping the cable members to achieve the desired end product.

I claim:

1. A pre-tensioning means operable for holding-down or depressing cable members to be formed in concrete structural members produced in form boxes placed upon a support soffit, comprising:

(a) connector means mounted within the form box connected to the cable means, said connector means having a band member extended about the cable members and extended laterally of the respective form box; and

(b) anchor means connected to said band member positioned below and against the form box, said anchor means having extension means to move said band member relative the form box to regulate pull on the cable members.

2. A pre-tensioning means as described in claim **1**, wherein:

(a) said connector means including a vertical and horizontally spaced attachment assembly having a plurality of vertical spacing struts and horizontal spacing clips connected to said band member and the cable members;

(b) said vertical spacing struts engaged with upper and lower surfaces of the cable members to maintain the same in a given vertical position and having slot sections adapted to receive the band member therethrough;

(c) said horizontal spacing clips mounted between adjacent ones of said vertical spacing struts and having downwardly depending leg sections engageable with inner vertical sides of the cable members to maintain the same in a given spaced relationship; and

(d) said horizontal spacing clips having outward slot portions aligned with said slot sections of said vertical spacing struts and having said band member extended through said slot portions to hold the cable members against outward lateral movement.

3. A pre-tensioning means as described in claim **2**, wherein:

(a) said vertical spacing struts provided with a main body having outward end sections provided with slots being in alignment; and

(b) said horizontal spacing clips having outwardly extending end sections from said leg sections with said slot portions spaced a distance for maintaining the cable members in horizontally spaced positions.

4. A pre-tensioning means as described in claim **1**, wherein:

(a) said anchor means including a single slot, wedge-type anchor assembly having a plurality of split wedge members, an anchor pad, and elongated channel members;

(b) said split wedges of generally U-shape adapted to receive said banding strap therebetween engageable with said anchor pad and said channel members;

(c) said channel members engageable with one of said wedges and the lower surface of the soffit; and

(d) said band member mounted about said anchor pad whereby said wedge members are movable relative to each other to cause a desired increase and decrease in the overall effective length of said band member to cause a downward pull on said connector means and inter-connected cable members for pre-tensioning the same.

5. A pre-tensioning means as described in claim **1**, wherein:

(a) said anchor means including a double slot wedge-type assembly having a beam member engaged with the lower surface of the soffit, a plurality of tapered wedges having one thereof engaged with said beam member, and an anchor pad mounted against the other one of said tapered wedges;

(b) said band member extended through a pair of spaced openings in the soffit and trained about opposite sides of said tapered wedges and the lower

surface of said anchor pad and inter-connected to form a continuous endless band structure; and

(c) said tapered wedges movable relative each other to move said anchor pad to adjust the overall effective length of said band member to cause a desired downward pull on said cable members for pre-tensioning the same.

6. A pre-tensioning means as described in claim 1, wherein:

(a) said anchor means including a winch-type anchor assembly having a depressor frame separated from the lower surface of the soffit by elongated channel members;

(b) said depressor frame having spaced, parallel roller sheave members and a third parallel slotted, pull-down shaft;

(c) said band member extended transversely of the soffit and mounted about said roller sheaves and attached to said slotted shaft; and

(d) said depressor frame having winch means connected to said slotted shaft whereby the same may be rotated as desired to wrap said band member about said shaft to regulate the effective length of said band strap causing a downward force on the cable members for the pre-tensioning thereof.

7. A pre-tensioning means as described in claim 6, wherein:

(a) said band member extended through parallel openings in the soffit with each portion mounted about a respective one of said roller sheaves and connected to said slotted shaft; and

(b) said slotted shaft rotatable to decrease the effective length of the said band member to cause a pull-down and pre-tensioning of the cable members.

8. A pre-tensioning means as described in claim 1, wherein:

(a) said connector means including a vertically aligned and spaced attachment assembly including a plurality of horizontal spacing clip members engageable with the upper and inner facing surfaces of the cable members;

(b) said horizontal spacing clips each having a main body with an integral laterally extending leg section and outward end sections having elongated parallel slots therein; and

(c) said band members extended through said slots about the cable members to prevent outward, lateral movement whereby the cable members are positively held in the given spaced horizontal relationship.

9. A pre-tensioning means as described in claim 1, wherein:

(a) said connector means including an aligned and spaced attachment assembly having a plurality of vertical spacing struts and clip members;

(b) said vertical spacing struts having laterally extended end portions with aligned slots therein to receive said band members therethrough; and

(c) said spacing clips of a plate shape having spaced, parallel slot openings placed adjacent the upper surface of the cable members with said banding strap extended through said slot openings and said slots of said spacing clips and said vertical spacing struts, respectively, to positively hold the cable members in a given vertical spacing and aligned position.

10. A pre-tensioning means as described in claim 1, wherein:

(a) said connector means including a vertically aligned and adjacent attachment assembly having a plurality of spacing clips placed on opposite surfaces of the cable members and having parallel spaced slots therein to receive said band member therethrough to hold the cable members.

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