

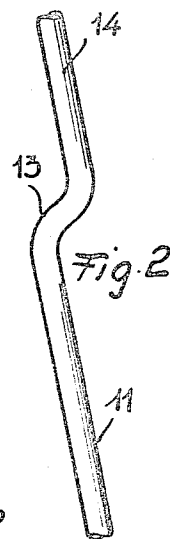
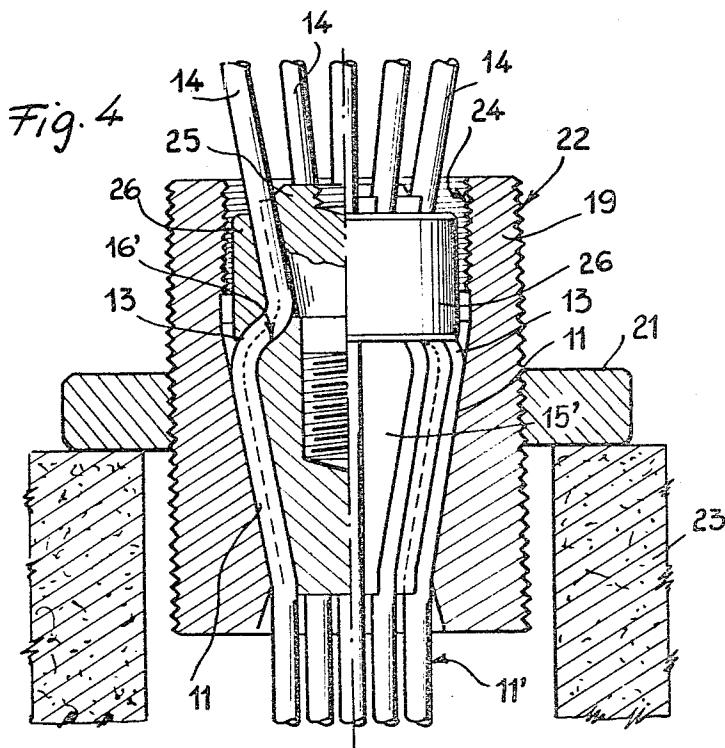
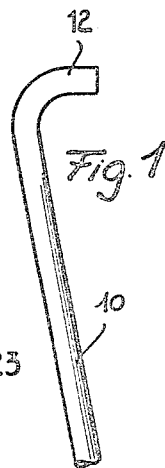
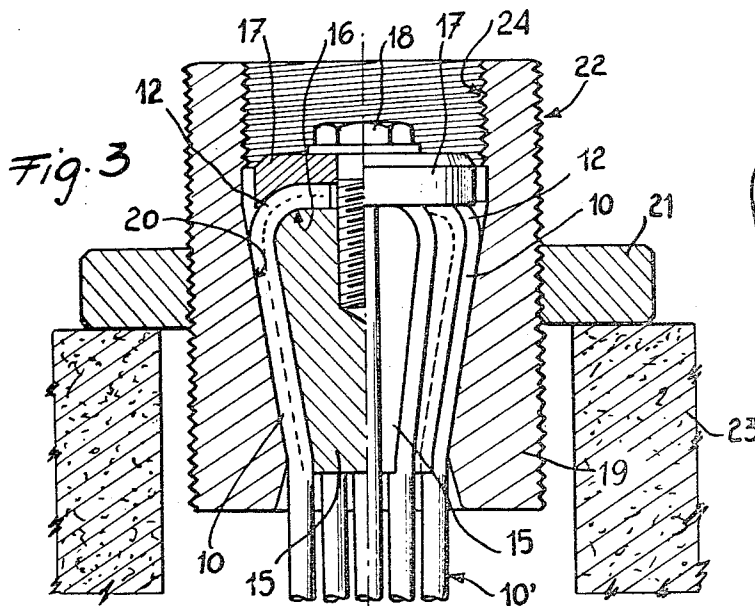
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DEVICE FOR ANCHORING RODS

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DEVICE FOR ANCHORING RODS

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This invention relates to a method and a device for anchoring wires, rods and cables, which have to be subsequently tensioned and are used in casings or concrete pre-stressed structures.

It is well-known that for tensioning steel cables used in the precompressed reinforced concrete art, the elementary wires of said cables are provided at their ends with suitable heads, usually obtained by cold-pressing, in order to provide engagement means for the anchoring device; these ends, thus shaped, are mounted in suitable metal blocks, forming the final headers of the cable.

The wires must be inserted in the anchoring blocks before effecting shaping of the ends of the wire, and, therefore, this operation has to be carried out after all wires forming the cable have been inserted in a protective sheath. The necessity of complying with these conditions and following the above succession of operations makes it extremely hard to provide all elementary wires of the cable with the same length between their heads. This condition is absolutely essential, however, in order to produce, during tensioning, stresses that are applied and distributed in a uniform manner among the different wires.

The known anchoring procedures have the further serious drawback that, in case of accidental breaking of one or more wires, the wires cannot be replaced and therefore the resistant section of the cable is reduced. Besides, by using the known devices, the accidental breaking of one or more wires causes the broken parts of the wire to be violently projected with great danger for the workers who are close to the headers of the cable for carrying out the various operations involved.

It is to be further considered that the known methods do not allow for an eventual disassembling of the cable after the tensioning has been effected, since the elementary wires forming the cable, due to the high tensions applied, are so damaged as to be of no further use.

The known devices, finally, allow for an anchoring at the ends of the wires only. Consequently, it is impossible to apply one or more anchoring devices at any intermediate point of the cable, which would be advantageous, for example, in the production of continuous beams from prefabricated elements, with previous tensioning of each mounted element and final tensioning of the group of prefabricated elements mutually and axially aligned so as to form the continuous beam.

The main object of this invention is to provide a method and a device, for anchoring tensioning wires or bars for pre-stressing concrete, which obviate the above mentioned inconveniences and difficulties.

According to the invention, there is provided a method which includes in bending each wire of the cable, at its end or at one or more of its intermediate points, so as to obtain a permanent bend or kink enabling the respective wire to be subsequently located on a seat of an at least

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partially conical inner body on which can be surrounded by the group of wires of the cable; plugging in said body surrounded by the thus shaped wires in sleeve means having a corresponding conical inner portion in which said body and the wires can wedge, after clamping said wires to said inner body by using a clamping means acting on the bent portions of said wires, the tension being applied by acting on said sleeve means to complete the wedging and, therefore, tightening action of the plurality of wires between the engaged parts.

More particularly, the device according to the invention for carrying said method into practice, comprises an inner at least partially conical body formed along the outer surface of which are a plurality of grooves distributed about the axis of the partially conical body and situated in planes which include the axis of the conical body, these grooves having a depth smaller than the diameter of wires, and said grooves serving for accommodating said wires, which are preformed so as to have permanently bent portions conforming to the configurations of the grooves, and clamping means for clamping a portion of said wires at their bent portions to the body, and an outer sleeve means having an at least partly conical inner bore for accommodating said inner body.

The preferred embodiments of this invention are illustrated in the drawing, wherein:

FIGURES 1 and 2 show a side elevational view of the end portion and the intermediate portion of an elementary wire, respectively;

FIGURE 3 shows in longitudinal section, with some parts shown in side elevation, the device for anchoring cable the wires whose ends have been shaped as shown in FIG. 1;

FIGURE 4 shows in a view similar to that of FIG. 3 an anchoring device adapted to be used at an intermediate part of a cable and cooperating with wires previously shaped as shown in FIG. 2.

With reference to the figures of the drawing:

When it is desired to anchor the ends 10 of wires or rods (FIG. 1), or one or more intermediate sections 11 (FIG. 2) of similar wires and rods, said ends 10 and sections 11 are bent as shown at 12 and 13, respectively. Such bends are obtained by conventional devices working at room temperature. The bending radii of the wires and angles formed by the bends are kept within proper limits.

For anchoring the end of a cable formed by a plurality of wires 10' (FIG. 3), the bent end portions 10 of the latter (FIG. 1) are located against the surface of an inner frusto-conical member 15 provided with a plurality of grooves 16 uniformly spaced about the axis of member 15 and respectively situated in planes which include the axis of member 15. In each groove there is inserted an end section 10. The bent hook-shaped terminal end 12 engages the top end of said member 15, as viewed in FIG. 3. The hook-shaped ends 12 of all wires forming the cable are then clamped between the member 15 and a disk-shaped part 17 having a central bore through which passes a bolt 18 which is threaded into a tapped bore extending only partly into member 15. The grooves have a depth smaller than the diameter of the accommodated wires so that a portion of each section 10 projects from the outer surface of member 15.

Thus, the threaded connection of the shank of the

bolt 18 to the member 15 in the tapped bore thereof forms a connecting means for connecting the clamping means 17 directly to the member 15.

A head is thus obtained which has a frusto-conical configuration and which has its smaller end directed toward the part to be tensioned, and this configuration is formed by the bent portions 10 of the wires. Said conical head is then located in a sleeve 19 having an internal frusto-conical surface 20. The wedging of the head in the sleeve causes the locking of single sections of wire between parts 15 and 19. The sleeve has an outer threaded surface 22 and an inner threaded surface 24. The inner threaded surface 24 is adapted to be threadedly connected with a jack assembly which acts on the structure to provide in the tension elements formed by the wires or rods a tension which will compress the concrete beam or the like. A lock nut 21 engages with the threaded outer surface 22 of sleeve 19 and is pressed against the concrete structure 23 to be precompressed.

In the embodiment of FIGS. 2 and 4 there is provided an inner member 15' having a partially frusto-conical surface in which there are formed grooves 16' for accommodating the intermediate double-bent sections 11 (FIG. 2) of wires 11' which form the cable. The inner member 15' differs from the member 15 of the embodiment of FIG. 3 in that it has a different shape of outer surface conforming to the double curved portions 13 of each wire in order to afford a positive support for these portions 13. Otherwise the member 15' is identical with the member 15.

The anchoring of the wires to the inner body 15' is obtained by placing an auxiliary conical member 25, having a threaded shank threaded into the tapped bore of body 15', within and surrounded by the sections 14 of wires 11'. The engagement of the auxiliary member 25 with the inner member 15' occurs against the reaction exerted by an auxiliary ring 26 internally tapered so to conform to the conicity of plug 25.

In this case also, the threaded connection of the threaded shank of the auxiliary member 25 directly to the inner member 15' in the tapped bore thereof forms a connecting means for connecting the clamping means 25, 26 of this embodiment directly to the member 15'.

The further operations for the installation of the device correspond with those already described in connection with FIGS. 1 and 3.

Obviously, owing to the ease of the bending operations required for preparing the parts 12 and 13 of the elementary wires, and mainly considering that these wires need not be individually inserted through any hole before their parts which are to be anchored are formed and shaped, the bending operation can be preliminarily made by using conventional bending machines well-known in the art, thus assuring a strict uniformity of the shaped parts as well as the exactness of the distances and relative positions of said parts.

Furthermore, the cables thus formed and tensioned can be sheathed at will before or after concrete is cast since the invention allows the head or anchoring heads to be applied at any time.

Many other variants can be adopted: for example, the difference between the depth of grooves of the internal members 15 or 15' and the diameter of the sections 10 and 11, respectively, of the wires resting in the grooves, beside preventing the direct contact between the internal members 15 or 15' and the sleeves 19, can be increased so that, in the spacing among the various wires, sufficient room is created for the cement mortar to pass, said mortar being injected around the tensioned cable in order to provide for the sealing of same in the precompressed structure.

Moreover, the members 17, 25 and/or 26 for initially locking the wires to the central member could be grooved or suitably shaped to prevent the wires from rotating.

It will thus be seen that in accordance with the inven-

tion the elongated tension elements formed by the wires or rods are preformed so as to have the permanently bent portions shown in FIGS. 1 and 2. As a result of this feature it is possible to assemble with the preliminarily shaped tension elements 10 or 11 the inner frustoconical body 15 or 15', as well as the remainder of the structure shown in FIGS. 3 and 4. Because the bent portions indicated in FIGS. 1 and 2 are preformed so as to be a permanent part of the tension elements 10' or 11', these bent portions can be very precisely situated along the lengths of the tensioning elements enabling the assembly of tensioning elements all to be uniformly tensioned so that the drawbacks which necessarily result from lack of tension in some elements and excessive tensioning in other elements can be avoided.

What is claimed is:

1. In an assembly for prestressing concrete beams or the like, an inner body of substantially frustoconical configuration, a plurality of elongated tension elements respectively having bent portions conforming to the configuration of the exterior surface of said body and distributed about and engaging said exterior surface of said body, clamping means clamping said elements at their bent portions to said inner body, connecting means releasably connecting said clamping means directly to said inner body, and an outer sleeve surrounding said elements and said inner body and having an inner surface of frustoconical configuration engaging said bent portions of said elements so that when tension is applied to the latter they will be wedged between said inner body and said sleeve.

2. In an assembly as recited in claim 1, said inner body being formed at its outer surface with grooves which respectively receive said bent portions of said tension elements, said bent portions respectively extending outwardly beyond said grooves into engagement with said inner surface of said sleeve.

3. In an assembly as recited in claim 1, said bent portions of said tension elements being respectively situated at ends thereof.

4. In an assembly as recited in claim 3, said clamping means including a disc engaging said ends of said elements and formed with a bore passing therethrough, said inner body having a tapped bore and a screw fastener extending through said bore of said disc and threaded into said bore of said inner body for pressing said disc against said ends of said elements, said screw fastener having a threaded shank engaging said inner body in said bore thereof and forming said connecting means.

5. In an assembly as recited in claim 1, said permanently bent portions being situated intermediate the ends of said tension elements, respectively.

6. In an assembly as recited in claim 5, said clamping means including an inner member threaded into said inner body and surrounded by said tension elements and an outer ring surrounding said inner member and cooperating therewith to clampingly engage said elements, said inner member having a threaded portion connected with said inner body and forming said connecting means for connecting said clamping means directly to said inner body.

7. In an assembly for prestressing concrete beams or the like, an inner body of substantially frustoconical configuration, a plurality of elongated tension elements respectively having permanently bent portions conforming to the configuration of the exterior surface of said body and distributed about and engaging said exterior surface of said body, clamping means clamping said elements at their permanently bent portions to said inner body, and an outer sleeve surrounding said elements and said inner body and having an inner surface of frustoconical configuration engaging said permanently bent portions of said elements so that when tension is applied to the latter they will be wedged between said inner body and said sleeve, said permanently bent portions being situated interme-

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diate the ends of said tension elements, respectively, and said clamping means including an inner member threaded into said inner body and surrounded by said tension elements and an outer ring surrounding said inner member and cooperating therewith to clampingly engage said elements. 5

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