

AN ANCHORING PIECE, IN PARTICULAR FOR CONCRETE

The present invention relates to an anchoring piece for a hardener material, and in particular for concrete, the piece being intended to be included in part inside a concrete element with the other part of the piece remaining outside the element to enable it to be handled. The invention relates particularly, but not exclusively, to an anchoring piece intended to be inserted in thin panels such as those which are to be found in prefabricated buildings.

The problem which is solved by the present invention is that of obtaining a point enabling traction forces (e.g. lifting forces) to be exerted on an element obtained by casting a material that is capable of hardening (concrete, plaster, etc. ...). Several solutions have already been proposed for concentrating traction forces on the anchoring point by making use of an elongate element or shank having grasping means at its top end and anchoring means at its bottom end. A known type of anchor is shown in Figure 1. It comprises a head A, a shank B, and a base C which is larger in diameter than the shank. This insert applies compression forces to the element, i.e. the traction force is applied to the base of the anchor, thereby defining an extraction cone. Another known solution comprises an eye anchor such as that shown in front view in Figure 2, likewise having a head A, a shank B, and a base D, with the base this time having an opening E through which a reinforcing bar is passed. Such an anchor fixes the head A to a reinforcing iron or bar which passes through the eye E. The traction force is conveyed to the mass of the panel, in this case because of the adherence between the bars and the inside of the panel.

Other anchors are also used, in particular so-called "fishtail" anchors where the shank is terminated at its base end by a "fishtail" with the top end of the anchor having a hole, for example, for receiving the hook of a

hoist, or else a threaded shank or a tapped tube. The fishtail constitutes a tab which is sealed within the material. However, all known anchor means suffer from drawbacks or limits on their use, in particular in
5 association with thin panels.

When used in compression, as shown in Figure 3, the extraction cone cannot be formed appropriately and flaking F is sometimes observed if the element is thin, or at least cracks are observed near the connection.

10 When using an eye anchor, as shown in Figure 4, the reinforcing iron G is deformed and crushed while a lifting force is being applied, thereby changing its curvature, thus straining it and possibly breaking it.

EP-A-0 259 295 describes an anchor in which an eye
15 is provided in the anchor head. In order to facilitate passing a curved bar therethrough, the bottom inside surface of the hole is slightly curved. However the armature does not bear against the bottom of said orifice.

20 FR-A-2 072 873 relates to a cylinder of plastic material, for example, intended to receive a metal pin and reinforcing irons penetrating inside hollows formed in the body of the cylinder. However there is no direct connection between the pin and the reinforcing irons.
25 Further, the sleeve occupies a larger concrete-free volume, and this presents problems with thin panels. It can only be used with reinforcing bars.

US-A-4 014 151 describes a one-piece forged anchor in which a bar or reinforcing iron passes through a hole
30 pierced in the base. However, while that anchor provides support for the iron, it does not provide guidance therefor. This is despite the fact that a good mechanical connection is needed to avoid the iron being deformed and the concrete bursting.

35 The object of the present invention is to mitigate the above-mentioned drawbacks and to provide an anchor which is universal in nature making it possible to work

either by compression alone, or else by compression and by adherence, and which may be shorter in length than conventional anchors.

According to the present invention, an anchoring
5 piece for hardenable material, the piece including at least one curved reinforcing iron and a one-piece implant comprising: a portion remaining outside the material and intended to be grasped; a shank having an axis of
10 symmetry; and a base having larger dimensions than the shank; is characterized in that the base includes at least one cylindrical support and guide strip for a reinforcing iron, the strip being hollowed out in its top face in order to receive the reinforcing iron, the angle of curvature of the strip being equal to the angle of
15 curvature of the reinforcing iron.

The bar is thus held in position by the edges of the strip and cannot slide during molding. The section of the strip is circular and the diameter of the grooves is substantially equal to the diameter of the reinforcing
20 irons so that the irons bear against the inside of the strip in optimum manner.

According to another characteristic of the invention, the base of the shank is pierced by at least one eye extending in a direction substantially
25 perpendicular to the axis of the shank, the top surface of the base forming a curved support strip extending the eye opening.

In another embodiment, the, or each, strip is off-center relative to the axis of the shank. A single
30 anchor base can thus engage two or more reinforcing irons.

An anchor of the invention may be used either without a reinforcing iron, with the material of the element working in compression, or else with a
35 reinforcing iron supported by the inside of the strip, thereby providing appropriate mechanical transmission for the forces applied to the anchoring piece, e.g. during

handling.

The reinforcing iron is not deformed or damaged and the implant does not move relative to the reinforcing iron, thereby avoiding cracks appearing at the connection.

Other characteristics and advantages of the invention appear from the following description of particular embodiments, given purely by way of non-limiting example and with reference to the accompanying drawings, in which:

Figures 1 to 4 are diagrams showing prior art anchors and their drawbacks;

Figure 5 is a section view through the bottom portion of an anchor of the invention;

Figure 6 is a vertical section through a second embodiment connected to two reinforcing bars for implanting purposes;

Figure 7 is a plan view corresponding to the embodiment of Figure 5;

Figures 8 and 9 are respectively a front view and a side view of another embodiment;

Figures 10 and 11 are a front view and a side view of an anchor engaged with two reinforcing bars having different angles of curvature; and

Figures 12 to 14 are a front view, a vertical section, and a plan view of a two-strip anchor base in accordance with a variant of the invention.

Figure 5 shows the bottom end of an implant 1 which is constituted in the example shown by a cylindrical shank pierced by an eye 2 and terminated immediately beneath the eye 2 by a base 3. A reinforcing iron 4 passes through the eye, which iron is inserted during assembly in a support strip or groove 5 within which the iron is securely guided and held. The base 3 may be partially hollowed out as shown at 6. The anchor head (not shown) may be of any type and enables the anchor to be grasped by an appropriate hoisting machine. It can

thus be observed that an anchor of the present invention, when a reinforcing bar is passed through the eye 2, operates simultaneously both by compression and by adherence to the concrete, or more generally to the substance from which the element is made. This gives rise to a uniform assembly, thereby increasing the load that can be carried by a given volume of insert. The resulting strength is greater than the sum of either strength (compression or adherence) considered in isolation. The structure of the piece eliminates the rocking play that previously existed in eye anchors, thereby eliminating any danger of cracking. Force is applied to the reinforcing iron 4 over a certain length thereof so it no longer operates in bending or shear, as is the case in prior eye anchors. In a thin panel, this embodiment avoids the panel being damaged in the way shown in Figure 3.

Figure 7 is a plan view of the device shown in Figure 5, and it can be seen that the iron 4 is securely guided by the strip 5.

As shown in Figure 6, in order to improve the connection, two or more reinforcing irons 4 may be passed through the base 3 of the anchor. The eyes 2 are then formed in the base 3. Thus, for the same total force, the diameter of the reinforcing bars may be reduced, thereby considerably reducing their radius of curvature and facilitating the provision of the support strips. In Figure 6, the head 7 of the anchor extends downwards in the form of a short shank 1 which is terminated by a base 3 provided with two openings 2, and the support strips may be sloping in this case.

The implant of the invention may be solid, obtained by molding, forging, or machining, or else it may be hollow and essentially constituted by a tube as shown in Figures 8 and 9. In this case, the top end of the shank 1 may have a tapped hole 8, for example, with the base of the anchor 3 being constituted by a flare 9 of the tube

which, as before, supports the reinforcing bar 4 over an adequate portion of its length, said bar 4 passing, as before, through the eye 2. The curvature of the flare 9 is such as to correspond exactly with the curvature of the iron 4 so as to hold it securely when traction is applied to the sleeve 1.

Figures 10 and 11 are respectively a front view and a side view of an anchor in a thin panel. Figure 10 shows an anchor such as that shown in Figure 6 enabling two different bars 4a and 4b to pass therethrough, the bars occupying two parallel vertical planes. As can be seen in Figure 10, the head 7 projects into a recess 10 provided in the panel 11. However, according to a characteristic of the invention, the reinforcing bars 4a and 4b may extend at different angles in the two parallel planes, with the curvature of the two strips 5 then being identical or different. The reinforcing bars can thus be better distributed within the panel, thereby increasing safety.

Figures 12, 13, and 14 show another embodiment of an anchor base 3, in which the strips 5 are offset from the shank 1 and may be straight or sloping according to requirements. I.e. the planes containing the axes X of the strips may either be parallel to the axis of the anchor or else they may be inclined relative to said axis.

For an implant having two reinforcing irons, the irons may be fixed within the implant by crimping, for example, thereby obtaining an assembly which is rigid, and easy to put into place prior to casting the panel-constituting material. An implant with a plurality of support strips serves to spread forces within the element, and this is advantageous, particular if its strength is very low, e.g. concrete which has not yet reached its final compression strength. A very short implant with a plurality of reinforcing irons designed for handling very thin slabs may also be used on the

edges of the elements for the purpose of lifting them and handling them vertically. The support strips 5 may be made of one or two pieces that are added to the implant by crimping or welding, or else they may be made by

5 deforming the implant.

Anchoring pieces of the invention may be obtained by conventional manufacturing methods and they may either be unitary, or else they may include items which are added on by welding or brazing, and in particular the base

10 provided with its strips may be added to a forged shank.

The conical shape of the base, particularly when hollowed out since material can then penetrate into the hollow, serves to counterbalance lateral forces which may be applied by a hoist while lifting a panel. In order to

15 lift thin elements, with the implant disposed in the edge thereof, a connection (e.g. by welding) between the implant and the reinforcing iron can prevent any hinge action occurring, thereby limiting cracking during hoisting.

20 Naturally numerous variants may be envisaged, in particular by substituting technically equivalent means, without thereby going beyond the scope of the invention, as defined in the accompanying claims.

CLAIMS

- 1/ An anchoring piece for hardenable material (11), the piece including at least one curved reinforcing iron (4) and a one-piece implant comprising: a portion (7) remaining outside the material (11) and intended to be grasped; a shank (1) having an axis of symmetry; and a base (3) having larger dimensions than the shank (1); is characterized in that the base (3) includes at least one cylindrical support and guide strip (5) for a reinforcing iron, the strip being hollowed out in its top face in order to receive the reinforcing iron (4), the angle of curvature of the strip (5) being equal to the angle of curvature of the reinforcing iron (4).
- 2/ An anchoring piece according to claim 1, characterized in that the bottom of the shank (1) is pierced by at least one eye (2) extending in a direction substantially perpendicular to the axis of symmetry, the top of the base (3) being hollowed out to constitute the support strip (5).
- 3/ An anchoring piece according to claim 1, characterized in that the strip (5) is offset from the axis of symmetry of the shank (1).
- 4/ An anchoring piece according to claim 3, characterized in that the base (3) includes at least two support strips disposed symmetrically about the axis of the shank (1).
- 5/ An anchoring piece according to claim 4, characterized in that the base (3) of the anchor is pierced by two eyes (2), each being disposed in line with a strip (5).
- 6/ An anchoring piece according to claim 2, characterized in that it is tubular, its base (3) being formed by a flare (9) at the bottom end of the tube (1) with the curvature of the flare being substantially equal to the



curvature of the reinforcing bar (4).

7/ An anchoring piece according to claim 3 or 5,
characterized in that the base (3) has at least two
5 support strips (5) of different curvatures.

8/ An anchoring piece according to claim 1, characterized
in that the base (3) is circularly symmetrical, with the
bottom of the base (3) including a hollow (6).
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9/ An anchoring piece according to any preceding claim,
characterized in that the planes of the axes (X) of the
support strip (5) are parallel to the axis of the
anchoring piece.
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