

A HOISTING AND LIFTING ANCHOR, IN PARTICULAR FOR A
CONCRETE PANEL

The present invention relates to an anchor for
settable materials, and in particular for concrete, the
5 anchor being inserted in a mold before the material is
cast, and being particularly, but not exclusively,
intended for use in handling thin panels of reinforced
concrete such as those which are used in making
prefabricated buildings.

10 Such anchors are well known, with one of the two
ends of a rod serving to provide a mechanical connection
with the hook of hoisting gear while the remainder of the
anchor comprising a longitudinal portion called the "rod"
and an opposite end portion called the "foot" is embedded
15 in the settable material when cast.

A first known type of anchor comprises one end which
is generally cylindrical in shape with a generally
cylindrical rod extending therefrom, the rod being
terminated by a foot of greater diameter than the rod.

20 When a traction force is exerted on this insert, the foot
of the anchor applies a compression force to the concrete
located thereabove. In other words the traction force is
applied to the foot and the shape of the foot determines
a breakage or pull-out cone.

25 It is also known to provide an eye in the vicinity
of the foot to allow a reinforcing iron or bar to pass
through the anchor. This disposition connects the anchor
to a reinforcing iron or bar that passes through the eye
at the foot of the anchor. In this case, a traction
30 force is applied to the mass of the panel by virtue of
the adherence of the reinforcement inside the panel.

Other anchors are also known and used, and in
particular so called "fishtail" anchors where the flat
rod is terminated by two diverging portions for retaining
35 the anchor in the concrete. The plate-shaped rod is
terminated at its top end by a hole for receiving a hook
of hoisting apparatus, or else by a threaded rod or by a

tapped hole.

Known anchors make it possible to hoist panels under acceptable conditions so long as the lifting forces are exerted in the longitudinal direction of the anchor.

5 However, when the force applied to the panel is no longer in this direction, it may happen that the anchor bends, thereby damaging the not yet completely set concrete if the thickness of the concrete above the anchor is insufficient. In such cases it is therefore necessary
10 firstly to reinforce the bending strength of the anchor and secondly to reinforce the concrete part around the anchor so as to enable it to withstand lateral forces, which forces occur, for example, when the panel as cast in a horizontal position needs raising to the vertical
15 position for drying purposes.

Anchors having projecting elements on their rods are already known.

DD-A-96 095 relates to a part enabling a quick connection to be made to the inside of a sleeve embedded
20 in concrete, and having a foot and a projection situated half way up the rod, the connection being achieved by turning the part through half a turn.

EP-A-0 211 256 proposes attaching a foot to a flat anchor, the foot being fixed perpendicularly to the
25 direction of the rod.

Those documents seek only to improve the quality of anchoring in the hoisting direction.

AT-B-183 553 concerns a sleeve, which is attached to a reinforcing iron, for integrating in a thin panel.
30 However, the solution proposed in that document consists in greatly enlarging the sleeve in a plane perpendicular to the hoisting direction.

That solution leads to increasing the dimensions of the anchoring part excessively and hence excessively
35 increasing its cost. In addition, the volume of concrete around the anchor is reduced.

The object of the present invention is to provide an

anchor enabling lateral forces to be applied to the panel. The present invention may be applied to all known types of anchor: having a solid or a hollow cylindrical rod, or a flat rod, and having any type of head and any
5 type of foot. In general, the invention serves to increase the traction strength of anchors by obtaining a better distribution of forces in a larger mass of concrete, thereby eliminating local overloading.

According to the present invention, the hoisting and
10 lifting anchor, in particular for a reinforced concrete panel permanently fixed in the panel by casting concrete, the anchor comprising an end suitable for co-operating with hoisting equipment and a rod extending in a longitudinal direction from the end to any type of anchor
15 foot, is characterized in that at least one lateral anchoring element projects from the rod into the area surrounding the end, defining a pull-out cone 7 having an axis oriented in the direction of the lateral surface of the panel.

Whereas in known anchor pieces, the anchor is
20 designed to withstand the application of a unidirectional force exerted in the longitudinal direction of the anchor, the anchor of the invention presents higher strength in a transverse direction perpendicular to the longitudinal direction of the anchor. The lateral
25 anchoring elements increase the rigidity of the rod in a transverse direction.

In general, the lateral anchoring element constitutes a projection from the rod making it possible,
30 optionally, to offset the contact points of reinforcing irons away from the midplane of the panel, i.e. away from the longitudinal direction of the anchor, should it be desirable to make a connection with the irons.

Other characteristics and advantages of the
35 invention appear from the following description of particular embodiments, given purely by way of non-limiting example and described with reference to the

accompanying figures, in which:

Figures 1 and 1a are diagrams for explaining the problem which is solved by the invention;

5 Figures 2 and 2a are diagrams for explaining a first embodiment, with Figure 2 being a vertical section and Figure 2a being a plan view showing the limits of the anchoring cone;

 Figures 3 and 3a are similar diagrams applicable to a variant embodiment;

10 Figures 4 and 4a are respectively a vertical section and a horizontal section on line IV-IV of Figure 4;

 Figures 5 and 5a are a vertical section and a section on line V-V of Figure 5;

15 Figures 6 and 6a are a vertical section and a cross-section through an anchor;

 Figures 7 and 8 show variants of the embodiment of the anchor shown in Figure 6;

 Figures 9 and 9a show a flat rod anchor with a hole in accordance with the invention;

20 Figures 10, 10a, and 10b show an embodiment of an anchor having a sleeve;

 Figures 11 and 11a show an embodiment of a flat anchor having an elongate lateral anchoring foot;

25 Figures 12 and 12a show a cylindrical rod anchor having a symmetrical lateral anchoring element, Figure 12a being a section on line XII-XII of Figure 12;

 Figures 13 to 13b are a front view, a cross section and a rear view respectively of a lateral anchoring piece for an anchor having a sleeve or a cylindrical rod; and

30 Figures 14 and 14a are two views of an anchoring element for fixing to a flat anchor.

 The anchor feet are not shown in most of the figures since, as shown above, they can be of any type.

35 As mentioned above, there are numerous cases where anchors are required to withstand forces that are not longitudinal. A first example is shown in Figure 1 which shows a thick panel for which the user requires that

there be no anchor points in the top face. In such a case, hoisting must be performed from lateral anchor points. The forces F_1 applied to the anchors are therefore perpendicular to the direction in which the anchors extend (not shown). If the thickness l is insufficient, then the anchors may deform and damage the concrete. Another example where the invention is applicable is shown in Figure 1a. In this case, a thin panel is to be lifted, i.e. it is to be raised from the horizontal position as shown to the vertical position by being pivoted through 90° by applying a force F_2 to its anchors. Here again, if the thickness l of the concrete above the anchor is insufficient, then the anchor will deform and damage the concrete. Panels are also subject to lateral forces when they are subjected to wind effects while they are suspended from hoisting apparatus. The present invention serves to reinforce anchors and to handle of panels, even when the thickness l is insufficient for conventional anchors. To do this, the strength of each anchor in the plane P of Figure 1 containing the forces F_1 or F_2 is increased regardless of the angle that may exist between the longitudinal direction of the anchor and the direction of the external force.

A first embodiment of the invention is shown in Figures 2 and 2a. In this example, the anchor has a cylindrical head 3 and a cylindrical rod 2, with any type of anchor foot (not shown) being suitable. In accordance with the invention, a lateral foot 5 is disposed parallel to the rod 2 of the anchor. The lateral foot defines a pull-out cone 7 whose limits are shown in dashed lines. The periphery of the cone 7 can be seen more clearly in Figure 2a. It is circular in shape. The lateral foot or insert 5 is preferably disposed as close as possible to the head 3.

Given that the lateral insert 5 is close to the head 3, the breakage cone is intersected by the line 8 (as

shown in Figure 2a) constituting the edge of the panel, such that the strength of the concrete cone (which is proportional to the volume of the cone) is correspondingly reduced. Thus, according to a characteristic of the invention, the anchoring element 5 may have an axis of symmetry which slopes relative to the lateral surface of the panel. As shown in Figure 3a, the periphery of the cone 7 takes up an elliptical shape. Its volume is much larger, and consequently the strength it provides is much larger.

In the examples shown above, the lateral anchoring element is constituted by a cylindro-conical part. It is also possible, for the purpose of increasing the stiffness of a cylindrical rod, to provide a projection 5a thereon such as that shown in Figure 4 which is a vertical section through the top end of an anchor having a head 3 and a rod 2, both of which are generally cylindrical in shape. As can be seen in Figure 4a, the thickness of the rod 2 is increased in the direction in which a lateral force is applied in the recess 6, while remaining constant in a direction perpendicular thereto. The stiffness of the rod 2 is increased in this way and it is possible to tilt panels up from the horizontal position to the vertical position in which the anchor operates normally. The stiffness of the anchor rod is thus increased transversely without there being a significant increase in the thickness of the concrete.

Figures 5 and 5a show an anchor having a cylindrical rod 2 and a cylindrical head 3 with a projection 5a, and a lateral anchoring element 5 on the opposite side of the rod therefrom. A reinforcing iron 4 bears against the projection 5a as described below and the lateral insert 5 defines a pull-out cone 7. An anchor as shown in Figures 5 and 5a may operate simultaneously in compression via the piece 5 and in adherence via an iron 4 passing over the projection or swelling 5a.

Figures 6, 6a, 7, and 8 show another embodiment with

an anchor having a flat or a cylindrical rod 2, a cylindrical head 3, and a longitudinal projection 5a. This projection may receive reinforcing irons 4, either passing through one or more holes 11 provided in the projection 5a (Figure 7), or else in notches 12 formed in said projection 5a (Figure 8).

Figures 9 and 9a show an anchor having a flat rod 2 in front view and in top view, with the anchor head 3 having an orifice for receiving a hoisting ring. Laterally to the longitudinal direction of the plate 2 there extends a disk-shaped cylindrical anchoring piece 5 which is either fixed to the rod or is integrally formed therewith. As before, this piece operates in compression and the end of the rod 2 (not shown) may be of any appropriate shape, e.g. a fishtail shape.

Figures 10, 10a, and 10b show an anchor having a tapped sleeve 13 with lateral anchoring elements 5. Handling means (not shown) may be engaged inside the anchor by being screwed thereto. As can be seen in Figure 10a, lateral elements 5 project on either side of the sleeve 13. They may be situated at any point along the length of the sleeve.

Figures 11 and 11a show a flat anchor whose lateral anchoring element 5 extends over substantially the entire length of the anchor. This makes it possible to handle panels in which the anchor is included in a direction perpendicular to the longitudinal direction of the anchor.

In the examples given above, the lateral anchoring elements are integrated with the anchor when the anchor is manufactured. That is to say the anchor is operates effectively in the longitudinal direction like a conventional anchor, and also in directions perpendicular thereto, in the plane in which the lifting force is applied.

However, the anchors and their lateral anchoring elements must necessarily be properly positioned inside

the mold in order to be capable of withstanding lateral forces. In order to avoid positioning errors in the mold, it is also possible to provide lateral anchoring elements which are symmetrical in structure, such as those shown in Figure 12.

In Figures 12 and 12a, the rod 2 has lateral projections 14 with two pieces 15 being formed thereon, each piece 15 having grooves 12 for passing reinforcing irons. Such a piece can be obtained directly by forging. In the example shown, the head 3 is cylindrical, but it could be flat or constituted by a tapped sleeve.

Such an anchor has the advantage of enabling panels to be handled in two opposite directions relative to the longitudinal direction of the anchor, and in particular they enable the panel to be turned over completely.

In the examples given above, the anchors are constituted by single blocks. It is also possible to implement the invention by add-on pieces which may be fixed to conventional anchors by friction, by welding, by brazing, etc.

The piece 16 shown in Figures 13, 13a, and 13b is more particularly designed to be threaded over a sleeve anchor. It has a central orifice 17 for sliding over the rod of an anchor, and grooves 12 for retaining reinforcing irons. Feet 5 constitute lateral anchoring elements, thereby enabling such an anchor to be used in compression, i.e. without being connected to reinforcing bars.

Figures 14 and 14a show a piece 20 suitable for applying to a flat rod anchor and capable of being fixed thereto by any appropriate means. It is in the form of a U-shape or staple whose opening 18 is applied against the sides of the rod. Feet 19 on the piece 20 are preferably inclined relative to the horizontal as in the embodiment of Figure 3 in order to increase the volume of the pull-out cone. At the top of the piece 20 there is a groove 12 for receiving a reinforcing bar (not shown).

CLAIMS

- 1/ A hoisting and lifting anchor, in particular for a reinforced concrete panel, permanently fixed in the panel by casting concrete, the anchor comprising an end (3) suitable for co-operating with hoisting equipment and a rod (2) extending in a longitudinal direction from the end (3) to any type of anchor foot, the anchor being characterized in that at least one lateral anchoring element (5) projects from the rod (2) into the area surrounding the end, defining a pull-out cone (7) having an axis oriented in the direction of the lateral surface of the panel.
- 2/ An anchor according to claim 1, characterized in that the anchoring element is constituted by a projection (5a) formed along the rod (2).
- 3/ An anchor according to claim 2, characterized in that the lateral anchoring element (5a) includes abutment means (11, 12) for reinforcing irons (4).
- 4/ An anchor according to claim 3, characterized in that the lateral anchoring element (5) is truncated in form, the axis of the cone being inclined relative to the perpendicular to the longitudinal direction of the rod (2).
- 5/ An anchor according to any preceding claim, characterized in that the lateral anchoring element (5) is constituted by an add-on piece (16, 20).
- 6/ An anchor according to any preceding claim, characterized in that the lateral anchoring element is constituted by two parts (5) disposed symmetrically about the axis of the rod (2).
- 7/ An anchor according to claim 3, characterized in that



the lateral anchoring element (5) is constituted by a disk whose axis is perpendicular to the longitudinal direction of the rod (2).

- 5 8/ An anchor according to claim 3, characterized in that the lateral anchoring element is constituted by a disk whose axis is inclined relative to the longitudinal direction of the rod (2).
- 10 9/ An anchor according to claim 2, characterized in that the rod (2) being flat includes, in addition to a projection (5a), a lateral anchoring element (5) perpendicular to the rod (2).
- 15 10/ An anchor according to any preceding claim, characterized in that the anchoring element (5) extends over substantially the entire length of the rod (2).
- 20 11/ An anchor according to any preceding claim, characterized in that it includes two lateral anchoring elements extending transversely on either side of the rod (2).
- 25 12/ An anchor according to claim 5, characterized in that the rod is a sleeve (13) and in that the add-on part includes an orifice (17) whose inside diameter is close to the outside diameter of the sleeve (13) and two symmetrically disposed feet (5) said feet (5) having grooves (12) for reinforcing irons.
- 30 13/ An anchor according to claim 5, characterized in that the rod (2) is flat and in that the add-on part is U-shaped with its branches being extended by outwardly directed "serifs" (19), with the size of its opening (18) being substantially equal to the thickness of the flat rod.
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