

AN ANCHOR FOR USE IN JOINING CONCRETE SLABS

FIELD OF THE INVENTION

THIS INVENTION relates to an anchor when used in concrete building construction and in particular but not limited to a "U" shaped looped anchor
5 utilised in relation to a concrete floor employing concrete connectors connecting the loop anchor to reinforcing structures in the adjacent floor where the loop is utilised in a rebate in a wall or the like.

BACKGROUND OF THE INVENTION

It is common to construct walls with rebates and for tie reinforcing to
10 project from the rebate which is tied into a floor with the edge of the floor poured into the rebate. The most common arrangement utilises a rebate box having a cover and fitted into wall form work in horizontal position. The wall is poured and the cover is removed from the rebate box to reveal the reinforcing tie bars held in the rebate box. These bars are usually pre-bent into the box at the factory and
15 then bent out to project from the rebate. These bars are tied into the reinforcing of the floor as the floor is being prepared for pouring and the concrete floor is poured, thus tying the reinforcing of the floor into the wall.

Recent alternatives to this arrangement include rebate forming arrangements which do not use the bend out bar arrangement but, rather, when
20 the cover is removed from the rebate box, loops project from the rebate and bars from the floor are simply connected to the loops using connectors.

The loops are anchored in the reinforcing of the wall using various arrangements of bends to the bars forming the loops. In one configuration known as "paper clip" the loop sections are part of a paper clip type formation.

These are formed from deformed reinforcing bar by manipulating the bar to one and a half loops. The overlap bar at one end of the loop forms the anchorage device into the wall while the other end is a single "U" shaped configuration which ultimately projects into the rebate for connection to the floor reinforcement via the connector. This type of anchor is difficult to manufacture, and because it is a closed loop, it is also difficult to install between the reinforcing cage bars in the wall prior to pouring the concrete for the wall.

Connecting and tying reinforcement in concrete to join panels is a crowded art where many and varied techniques and apparatus are used including loop arrangements. US patent 4,324,508 to Hilfiker et al discloses use of spaced U-shaped looped bars having turned legs and a connecting web portion, the web portions project from a wall or floor with a gap between the web portion and the wall or floor. The gap is used to tie the loops to the steel in the adjacent sections. In order to retain the looped bars in position the turned legs are pre-welded to a bar or bars running at 90° to the loops and interconnecting adjacent loops in parallel spaced relation.

U-shaped arrangements are used for other purposes including provision of lifting anchors. US patent 6,082,700 to Lancelot, III et al describes a U-shaped anchor having legs and retaining members at the ends of the legs, the retaining members being of larger cross-section than the respective legs for facilitating engagement and retention of the anchor within the concrete structure. The anchor has its apex within a recess made using a removable void former. The anchor is used in conjunction with a hoist or crane so that the concrete may be lifted into position.

While the basic U-shaped device is well known and has been well known for many years, including the simple U-bolt, the present invention relates to a novel and simple application to the process of tying steel into adjacent slabs.

It is an object of the present invention to provide an alternative anchor
5 which at least provides the public with a useful alternative but overcomes the problems associated with the paper clip type arrangement referred to above.

OUTLINE OF THE INVENTION

In one broad aspect the invention resides in the use of a headed loop anchor to aid the tying together of adjacent concrete slabs. Preferably the
10 headed loop anchor is U-shaped.

In one preferred aspect therefore the present invention resides in a headed loop anchor comprising a "U" shaped anchor having parallel spaced anchorage sections each having respective free ends and a loop section bridging between the parallel spaced legs, each free end of the legs having a
15 head, the headed loop anchor being locatable in a concrete slab with the loop section projecting from the slab and being adapted for connection to reinforcing bars in an adjacent slab to be poured afterwards.

Typically, the dimensions and arrangements, length of the legs, size and configuration of the heads being such that the headed loop anchor may be
20 simply inserted through cage reinforcing prepared in a concrete slab and placed in position according to normal procedures.

Preferably, the headed loop anchor is formed as an integral unit having heads formed from the loop anchor material in a hot forging process.

Preferably, the loop anchor material is at least 600 grade wire. More preferably, the loop anchor is formed from a hard drawn wire of at least 600 grade wire with 670 grade high tensile wire being preferred.

5 In another aspect the invention resides in a partially completed concrete construction employing spaced apart headed loop anchors as described above with the looped section of the headed loop anchor projecting from the partially completed concrete construction.

Preferably, the headed loop anchors have their heads set at 120mm to 170mm deep. This will naturally depend on the strength of the concrete. The
10 typical arrangement is to configure the headed loop anchors in terms of the dimensions thereof and the strength of the concrete such that in a test rig the concrete fails before the headed loop anchor.

In a further aspect the invention provides a rebate form work comprising a box holding headed loop anchors as described above in spaced apart relation,
15 the box having a back wall through which loops project into the box and legs project out of the box and a there being a removable cover which closes the box and may be removed to expose the loops inside the box.

It will be appreciated that in the preferred form of the invention the headed loop anchors have their respective heads free and not welded to steel in the
20 concrete, although some limited tying may be used.

In a still further aspect there is provided in combination a headed loop anchor as described above and a connector used to connect the headed loop anchor to reinforcing in an adjacent concrete slab, the connector comprising a

unit having a loop attachment means at one side and a reinforcement attachment means at the other side.

In one further aspect there is provided a method of connecting two adjacent concrete slabs together using headed loop connectors comprising the steps of first setting the reinforcement in a first one of the two slabs and then placing the legs of plural headed loop anchors amongst the reinforcing with the loop section positioned to project from the first slab when poured, pouring the first slab, allowing it to cure sufficiently to begin preparation to pour the second slab, tie the headed loop anchors to reinforcing steel in the second slab and subsequently pour the second slab. Preferably, the method employs headed loop anchors as described above.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the present invention may be more readily understood and be put into practical effect, reference will now be made to the accompanying drawings which illustrate preferred embodiments of the invention and wherein:-

Figures 1 and 2 are respective plan and perspective views of a typical headed loop anchor;

Figure 3 is a plan view showing four headed loop anchors in alignment as they would appear in operative position relative to a slab join (other reinforcement and slab not shown);

Figure 4 is a schematic drawing showing a partially completed concrete construction utilising headed loop anchors according to the present invention in a wall rebate; and

Figure 5 is a schematic drawing showing a partially completed concrete construction utilising headed loop anchors according to the present invention in a wall rebate with connectors used to tie the loops to steel in the adjacent floor.

DETAILED DESCRIPTION OF THE DRAWINGS

5 Referring to the drawings and initially to Figure 1 and Figure 2, there is illustrated a headed loop anchor 10 comprising a "U" shaped section having parallel spaced legs 11 and 12 and a looped adjoining section 13, the free ends 14 and 15 having heads 16 and 17. The headed loop anchor is formed by bending and then forging the head from the legs so the anchor is an integral unit.

10 In the illustrated embodiment the bar diameter is 13.6mm and the loop section has an internal diameter of 48mm. The leg spacing is also 48mm. The head thickness is 7.3mm at its thickest and each head is 35mm in diameter. The area of each head is typically 4 - 5 times the area of the bar cross-section.

In use, the headed loop anchors are positioned as illustrated in Figure 3
15 in parallel spaced relation so that the looped sections 13 project from a slab so that a suitable connector (not shown) may be used to hook over the loop sections 13 in order to connect adjacent concrete sections together.

The legs 11 project into and are retained in a previously poured slab and are suitably tied in to the reinforcement of that slab for alignment purposes.

20 Figure 4 illustrates a partially completed concrete construction 18 comprising, in this case, a wall 19 having a rebate 20 formed in the wall by a previously removed rebate form work involving headed loop anchors according to the present invention. The removal of the cover exposes projecting loop

sections 13 of headed loop anchors 10, the headed sections and leg sections being secured in the concrete wall section 19.

It will thus be appreciated that a floor illustrated by the dotted lines 21 may be secured and poured into the rebate 20 and the reinforcing of the floor connected to the loops 13.

Figure 5 shows an examples of various connectors that may be used including a simple hook 21 with a rebar 22 secured into a threaded opening in the hook 21. Another arrangement may be a two part connector 24 having a bottom 25 and a top (not shown), the bottom having D-spaded lands 26 and 27 matched to loops so that a loop 28 may be connected to the loops anchors 10.

Whilst the above has been given by way of illustrative example of the present invention many variations and modifications thereto will be apparent to those skilled in the art without departing from the broad ambit and scope of the invention as set out in the appended claims.

CLAIMS

1. A headed loop anchor comprising a "U" shaped anchor having parallel spaced anchorage sections each having respective free ends and a loop section bridging between the parallel spaced legs, each free end of the legs having a head, the headed loop anchor being locatable in a concrete slab with the loop section projecting from the slab and being adapted for connection to reinforcing bars in an adjacent slab to be poured afterwards.
2. A headed loop anchor according to claim 1 wherein the dimensions and arrangements, length of the legs, size and configuration of the heads is such that the headed loop anchor may be simply inserted through cage reinforcing prepared in a concrete slab and placed in position.
3. A headed loop anchor according to claim 1 wherein the headed loop anchor is formed as an integral unit having heads formed from the loop anchor material in a hot forging process.
4. A headed loop anchor according to claim 1 wherein the loop anchor material is at least 600 grade wire.
5. A headed loop anchor according to claim 1 wherein the loop anchor is formed from a hard drawn wire of at least 600 grade high tensile wire.
6. A partially completed concrete construction comprising a concrete slab employing spaced apart headed loop anchors according to any one of claims 1-5 with the looped section of the headed loop anchor projecting from the concrete slab.
7. A partially completed concrete construction according to claim 6 wherein the headed loop anchors have their heads set at 120mm to 170mm deep.

8. A partially completed concrete construction according to claim 6 wherein the headed loop anchors in terms of the dimensions thereof and the strength of the concrete are such that in a test rig the concrete fails before any headed loop anchor fails.

5 9. A rebate form work comprising a box holding headed loop anchors according to any one of claims 1-5 in spaced apart relation, the box having a back wall through which loop sections of the respective loop anchors project into the box and legs corresponding legs project out of the box and there being a removable cover which closes the box and may be removed to expose the loops
10 inside the box.

10. A partially completed concrete construction according to any one of claim 6 to 8 employing a rebate form box according to claim 9.

11. In combination a headed loop anchor according to any one of claims 1-5 and a connector used to connect the headed loop anchor to reinforcing in an
15 adjacent concrete slab, the connector comprising a unit having a loop attachment means at one side to attach the connector to a loop section of the headed loop anchor and a reinforcement attachment means at the other side to attach the connector to the reinforcing in the adjacent concrete slab.

12. A method of connecting two adjacent concrete slabs together using
20 headed loop connectors comprising the steps of first setting the reinforcement in a first one of the two slabs and then placing the legs of plural headed loop anchors amongst the reinforcing with the loop section positioned to project from the first slab when poured, pouring the first slab, allowing it to cure sufficiently

to begin preparation to pour the second slab, tie the headed loop anchors to reinforcing steel in the second slab and subsequently pour the second slab.

13. The method according to claim 12 wherein the headed loop anchors comprise headed loops anchors according to any one of claims 1-5.

5 14. The method according to claim 12 the headed loop anchors comprise headed loops anchors according to any one of claims 1-5 where the anchors are housed in a box form.

15. The method according to claim 12 wherein the headed loop anchors comprise headed loops anchors according to any one of claims 1-5 and are
10 located in a box form according to claim 9 before being inserted into the reinforcing of the first slab.

16. A headed loop anchor according to any one of claims 1-5 when used in tying together concrete slabs.

17. A headed loop anchor to aid the tying together of adjacent concrete slabs,
15 the headed loop anchor comprising spaced apart legs and a loop section bridging between the legs, each leg having an enlarged head .

18. A headed loop anchor according to claim 17 wherein the headed loop anchor is U-shaped.