

Apparatus for mixing or conveying concrete

This invention relates to apparatus for mixing or conveying concrete and to a method for reducing wear of certain working edges or parts thereof such as concrete
5 mixing blades.

The invention will herein be described with particular reference to a transit mixer but is not limited to that use.

It is conventional for concrete to be produced at
10 specialised production sites and to be transported to a work site by way of a transit mixer, that is to say a truck incorporating a rotating drum in which concrete is kept in a mixed condition during transport.

The rotating drum comprises a side wall which is
15 usually cylindrical, frustro-conical or a composite of those shapes. The drum of a transit mixer typically includes one or more helical blades disposed peripherally of the drum side wall interior. Each blade extends in length in a helical circumferential direction
20 and in width extends radially inwardly from the drum side wall. The blade is mounted at the radially outer edge of its width to the drum wall and may be supplied with an outer edge flange to facilitate attachment of the blade to the drum wall.

25 It is sometimes practiced to provide the radially innermost blade edge, which is the working edge, with an

inner flange or curved margin with the object of enabling the blade to lift more material.

In that event the radially inner margin of the blade extends at an angle to the radial direction. As
5 herein used, reference to the blade working edge includes the rim of an inner flange if provided.

In use, as the drum of the transit mixer rotates, the blade lifts concrete contained in the drum to a height at which it rolls over the blade working edge
10 and/or cascades from the blade thus maintaining a mixing action.

It is usual to keep the internal working edges and surfaces of apparatus for concrete mixing or conveying smooth and as free of protrusions in order to facilitate
15 complete removal of wet concrete after discharge by hosing to avoid setting of any concrete on the interior or exterior surfaces.

A particular problem of blades for use in mixing or conveying concrete is that the working edge of the blade
20 is in use prone to wear. The accepted methods to counteract or repair wear have been,

(1) to deposit at or adjacent the working edge a hard wearing welding alloy to accrete a protective layer there,

25 (2) to attach a hard metal liner at or adjacent the working edge.

Both methods are costly but the second being less

costly has been preferred. A particular disadvantage of that method is that the hard metal liner plate has to be rolled and twisted to conform to the blade flight and is difficult both to manufacture and attach to the blade.

5 According to one aspect the present invention consists in an apparatus for mixing or conveying concrete characterised in that a working edge or surface is provided with means for entrapping concrete whereby to accrete a layer of concrete at the edge or surface.

10 According to a second aspect the invention consists in a method for reducing the wear of a working edge or surface of a concrete mixer or conveyor comprising the steps of:

(i) entrapping a layer of wet concrete at the
15 working edge or surface by means including means for reinforcing the concrete.

(ii) allowing the layer to set to form a coating of set reinforced concrete.

(iii) permitting the layer of set concrete to wear
20 away during use of the working edge or surface, and

(iv) replacing worn away concrete from fresh concrete being mixed or conveyed.

Embodiments of the invention will now be more particularly described by way of example only with
25 reference to the accompanying drawings, wherein:

Fig. 1 shows the drum of a transit mixer.

Fig. 2 shows a portion of a blade according to the invention for use in a transit mixer drum.

Fig. 3 shows a second embodiment according to the invention of a blade similar to that of Fig. 2.

5 Fig. 4 shows a third embodiment according to the invention of a blade similar to that of Fig. 2.

The embodiment of Figs. 1 and 2 comprises a transit mixer provided with a drum shell 10 have at least one convoluted blade 11 extending in a helical direction about the drum side wall internal periphery 13. Blade 10 11 is manufactured by a press forming process and as shown in Fig. 2 is generally of a shallow gutter trough cross-section across its width, that is to say the blade width has a peripherally outer edge flange formation 14 whereby it is mounted to the drum wall 13, an inner edge 15 flange formation 16 extending in a direction at an angle to the radial direction a short distance to a rim 17, and a trough floor 15 extending radially inwardly of drum side wall 13 from outer edge flange 14 to the inner 20 edge flange 16.

In the example shown in Fig. 2, inner edge flange 16 is provided on each side with a mesh structure 20 comprising an expanded metal and which is face to face with inner edge flange 16 covering the surface thereof 25 from the rim 17 to the trough floor 15.

Mesh 20 may be provided for example by cutting

strips of a suitable flexible expanded metal, which are then clamped by hand onto the inner flange and spot welded to hold them in place. A suitable mesh is a steel mesh GM50080.

5 Surprisingly it has been found that the resulting structure prolongs blade useful life as well as reducing blade manufacture or maintenance cost. In use, concrete fills the apertures of the expanded metal mesh structure at the working edge at least up to the thickness of the
10 mesh and the mesh retains such concrete during normal drum washing procedures. The retained concrete when set forms a thin layer of reinforced concrete which protects the original blade and flight. Subsequently, it seems that an exposed part of the layer of concrete wears away
15 and is replaced by fresh concrete which is retained and sets.

Blades according to the invention and as described with reference to Fig. 2 were fitted to a transit mixer in regular use. No adverse effect on mixing or
20 discharge was noticed when other regular concrete or low slump curb mix concrete was carried. Concrete build up did not substantially exceed the thickness of the expanded mesh and it is thought that the layer of concrete wears away down to the mesh in use and that
25 fresh concrete accretes on the exposed layer surface. Over a 15 month period the wear on flight blades and edges in accordance with the invention was significantly less than with blades not having the mesh structure.

Although expanded metal mesh is preferred other forms of mesh or concrete reinforcement structures may be employed. With reference to Fig. 3 and Fig. 4 there are shown further embodiments of the invention.

5 Parts of the blades shown in Figs. 3 and 4 which correspond to parts of the blade of Fig. 2 are identified by corresponding numerals.

In the embodiment of Fig. 3 instead of an expanded metal mesh, the inner edge flange 16 is provided with reinforcing rods 22 extending longitudinally thereof.

10 With reference to Fig. 4 the inner edge flange 16 is provided with longitudinal fins 23 upstanding in the radial direction.

In other embodiments, not shown in the drawings, concrete reinforcements may be formed by punching or drilling apertures at a margin adjacent the working edge, or by provision of suitable shaped studs.

15 While it is preferred that a mesh like structure extend adjacent the working edge of the blade along the whole length of that edge, benefit is obtainable if only a portion of the working edge has a mesh like structure adjacent thereto.

20 Although the invention has been described with reference to accretion of a protective layer (for example a strip 10 mm x 100 mm) of reinforced concrete on a margin of a blade the invention is also applicable to protect other interior working surfaces of a concrete

mixer or transport vessel susceptible to wear, for example, to protect an area of the drum wall adjacent to the blade or near the discharge port.

5 In that case a mesh or similar reinforcing is disposed on the surface to be protected and attached for example by spot welding.

If desired the reinforcing and metal surfaces to be covered with an accretion of concrete may be treated with a corrosion resistant treatment or coating prior to
10 first use.

It will be understood that the invention is not limited to be used in transit mixers but may be applied to other apparatus for mixing or conveying cementitious materials or concrete, for example tilting or stationary
15 mixers, paddle mixers or turbine and fan mixers.



CLAIMS

1. Apparatus for mixing or conveying concrete characterised in that a working edge or surface is provided with means for entrapping concrete whereby to accrete a layer of concrete at the edge or surface.
- 5 2. Apparatus according to Claim 1 further comprising a layer of concrete entrapped by said means and set.
3. Apparatus according to Claim 2 wherein the set concrete entrapped is reinforced concrete.
4. Apparatus according to Claim 3 wherein the
10 reinforced concrete is reinforced by the entrapping means.
5. Apparatus according to any one of Claims 1 to 4 wherein the means for entrapping comprises a mesh structure at or adjacent the working edge or surface.
- 15 6. Apparatus according to Claim 5 wherein the mesh structure is an expanded metal mesh.
7. Apparatus according to any one of Claims 1 to 4 wherein the means for entrapping comprises spaced apart flanges extending from the working edge or surface.
- 20 8. Apparatus according to any one of Claims 1 to 4 wherein the means for entrapping are reinforcing rods extending adjacent the working surface.
9. A blade for a concrete mixer or conveyor, having a working edge which includes a lifting flange, the flange
25 having a mesh structure mounted on a flange surface whereby wet concrete may be entrapped and set to form a layer of mesh reinforced concrete.



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10. A blade according to Claim 9 wherein the mesh is an expanded metal mesh.

11. A method for reducing the wear of a working edge or surface of a concrete mixer or conveyor comprising the

5 steps of:

(i) entrapping a layer of wet concrete at the working edge or surface by means including means for reinforcing the concrete.

10 (ii) allowing the layer to set to form a coating of set reinforced concrete.

(iii) permitting the layer of set concrete to wear away during use of the working edge or surface, and

(iv) replacing worn away concrete from fresh concrete being mixed or conveyed.

15 12. A method according to Claim 11 wherein the set concrete is reinforced by reinforcing means in the form of a mesh.

20 13. Apparatus for mixing or conveying concrete substantially as hereinbefore described with reference to the accompanying drawings.

14. A blade for a concrete mixer or conveyor substantially as hereinbefore described with reference to Figure 2, 3 or 4 of the accompanying drawings.
