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A SUPPORTING DEVICE

5 The present invention relates to a supporting
device for use in the construction of a building having a
concrete floor and concrete columns. In particular, the
present invention relates to a supporting device which is
used to support formwork walls which define a mould for
10 the column.

 In the construction of a building having concrete
columns, the concrete columns are formed by erecting
formwork walls defining a mould for the column and pouring
15 concrete into the formworks. It is necessary when
erecting the formworks to provide a reaction block which
is located on the inside of the mould defined by the
formworks, and which provides a reaction surface against
which the formwork walls can be erected. This reaction
20 block is known in the art as a "kicker". The kicker
prevents the lower ends of the formwork walls from moving
laterally inwardly off the mould. The formwork walls are
also held in position during the concrete pouring
operation by other features such as a band which extends
25 around the upper ends of the formwork walls.

 The standard kicker is formed by erecting
formworks and pouring concrete into the formworks until
the concrete rises to a level of 150 mm in height. This
30 reaction block is disadvantageous since it is time-
consuming to erect.

 In order to overcome the problems associated with
the known concrete kicker, there has been developed an
35 alternative device which is lightweight and which is
located inside the formworks to restrain the column
formworks from moving laterally inwardly during the



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pouring of concrete. Concrete columns in such buildings are commonly formed with reinforcing column bars extending vertically along the length of the column. The alternative kicker device is tied to these column bars with the reaction surfaces of the device located to provide reaction surfaces against which the formwork walls are erected. However, this alternative device, whilst being lightweight, is disadvantageous since it can move during the pouring of concrete into the formworks.

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Accordingly, it is an object of the present invention to provide a supporting device for use in the construction of a building to provide a supporting surface against which formwork walls can be placed and which can be located sufficiently securely to minimise the risk of movement of the supporting device during the pouring of the concrete columns.

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According to the present invention there is provided a supporting device for use in the construction of a building having a concrete floor and concrete columns, the concrete columns being formed by erecting formwork walls defining a mould for the column and pouring concrete into the formworks, the supporting device being used to provide a supporting surface inside the mould against which the formwork walls can be placed, the supporting device comprising:

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- a reaction surface against which a formwork wall can be erected, and

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- an anchoring support which enables the supporting device to be anchored in concrete poured to form the concrete floor so that, in use, the supporting device is anchored in the concrete floor with the reaction surface located so that it will form a secure reaction surface against which the formwork wall can be erected.

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By the provision of an anchoring support, which is embedded in the concrete floor when the concrete floor is poured, it becomes possible to provide a sufficiently
5 fixed reaction surface which will not be at risk of moving during the pouring of concrete into the formworks when the concrete column is being formed. The supporting device is also still sufficiently lightweight, simple and fast to install during the construction of the building.

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Preferably, the reaction surface can be removed after the concrete column has been cast.

Preferably, the reaction surface projects in one
15 direction from a body of the supporting device, and the distance that the reaction surface projects from the body of the supporting device can be adjusted. More preferably, the body of the supporting device includes an elongate portion, and the reaction surface is moveable
20 axially with respect to the elongate portion of the device.

Preferably, the reaction surface is threadably engaged with the elongate portion so that revolving of the
25 reaction surface results in the reaction surface being moved axially inwardly and outwardly of the elongate portion.

Preferably, the reaction surface is formed by a
30 conical projection, and an outer face at the wider end of the conical projection defines the reaction surface.

Preferably, the supporting device includes two
reaction surfaces, one to each end of the supporting
35 device, the reaction surfaces providing support surfaces against which opposite walls of the formworks can be erected.

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Preferably, the device includes preliminary positioning means which enable the preliminary location of the reaction surface adjacent the position where the formwork wall is to be erected. More preferably, the column includes column bars extending in an upright direction in the region where the column is to be constructed for reinforcing the column, and the preliminary positioning means is provided by surfaces of the supporting device which can be tied to the column bars for preliminary location of the reaction surfaces adjacent the position where the formwork wall is to be erected.

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Preferably, the anchoring support comprises one or more anchoring legs.

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Preferably, the supporting device comprises a body comprising a first elongate rod, having a reaction surface extending from one lateral end thereof, and the anchoring leg is formed by an anchoring rod which extends laterally of the first elongate rod.

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Preferably, the anchoring rod is bent into an "n" shape so as to define two anchoring legs which each extend laterally of the first elongate rod.

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According to the present invention there is also provided a method for constructing a concrete column of a building, the building including a concrete floor and one or more concrete columns reinforced by upright column reinforcing bars, the method comprising:

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(a) providing a supporting device comprising a reaction surface against which a formwork wall can be erected, the reaction surface thereby providing a support for the formwork wall, the supporting device further comprising an anchoring support;

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- (b) positioning the supporting device in the region where the column is to be located, with the reaction surface facing laterally outwardly of the upright column reinforcing bars so as to be located adjacent the position where the formwork wall is to be erected, and with the anchoring support extending into a floor cavity which is to be filled with concrete to form the floor,
- 10 (c) pouring concrete into the floor cavity and allowing the concrete floor to cure,
- (d) erecting formwork walls to define a mould for the concrete column, with one formwork wall abutting the reaction surface of the supporting device;
- 15 (e) pouring concrete into the mould defined by the formwork walls and allowing the concrete column to cure, and
- 20 (f) removing the formwork walls.

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Preferably, the supporting device comprises the supporting device described above.

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Preferably, step (b) comprises securing the supporting device to the column bars so that the supporting device is secured sufficiently firmly in position to prevent significant movement during the pouring of the concrete floor in step (c).

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Preferably, step (a) comprises providing a supporting device which has a reaction surface which projects in one direction from a body of the supporting device, the distance that the reaction surface projects from the body being adjustable; and the method comprises the further step following step (c) of adjusting the

distance that the reaction surface projects from the body of the supporting device so that the formwork wall is located in the desired position when it is erected with a lower end abutting the reaction surface.

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Preferably, the method comprises the further step of removing the component of the supporting device which forms the reaction surface after step (f), so that the component forming the reaction surface can be re-used.

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Preferably, a plurality of supporting devices are used to provide support for each of the formwork walls.

The present invention will now be described in further detail with reference to the following drawings of two preferred embodiments of the invention, in which:

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Figure 1 is a side perspective view of the supporting device of one preferred embodiment of the invention;

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Figure 2 is a side perspective view of a second preferred embodiment of the invention;

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Figure 3 is a side perspective view of the supporting devices of the preferred embodiments illustrated in Figure 1 and 2 positioned in the region where the column is to be located;

Figure 4 is a side perspective view corresponding to Figure 3 after the pouring of a concrete floor;

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Figure 5 a schematic side view of the supporting device of the preferred embodiment illustrated in Figure 1 which is positioned to support formwork walls; and

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Figure 6 is a schematic plan view of the supporting devices of the preferred embodiments

illustrated in Figures 1 and 2 positioned to support two pairs of opposite formwork walls.

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The supporting device 1 of one preferred
5 embodiment of the invention includes a body portion which is formed by a metal rod 2, two plastic cones 3, one to each end of the metal rod, and an anchoring support in the form of a pair of anchoring legs 4 which are formed by bending a metal rod into a "n" shape and securing to the
10 metal rod 2. The plastic cones 3 define at an outer face of the wider end of the cone a reaction surface 5 which is circular in shape. Each reaction surface provides a surface against which a formwork wall can be erected. In the case of the supporting device 1 illustrated in Figure
15 1, the reaction surfaces to each end of the supporting device provide support surfaces against which opposite walls of the formworks can be erected.

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The metal rod 2 of the supporting device 1
20 illustrated in Figure 1 includes a threaded portion 8 to either end, and the plastic cones 3 are threadably mounted onto the threaded ends 8 of the metal rod 2. The length of the rod 2 is 270 mm when the cones 3 are tightened. The threaded length of each end of the rod is 40 mm in
25 length. The distance that the reaction surface projects in one direction from the body of the supporting device (which is formed by the rod 2) can be adjusted (i.e. be lengthened or shortened) in an axial direction with respect to the elongate rod 2. This is effected by
30 twisting of the cones 3.

The distance between the two adjacent supporting legs 4 is 180 mm, and the length of each of these legs from the body of the device is 175 mm. The diameter of
35 the rod forming the legs is 10 mm. These dimensions are suitable for embedding of the legs a distance 75 mm into a concrete floor.

The supporting device of a second preferred embodiment of the invention 6 is illustrated in Figure 2. This supporting device 6 includes similar features to the supporting device 1 illustrated in Figure 1, however the supporting device 6 only includes one reaction surface against which a formwork wall can be erected. This reaction surface is provided by the outer face of the wider end of a conical projection, or more specifically a conical cone 3 corresponding to the cone of supporting device 1.

The body of supporting device 6 is formed by a first elongate rod 7, and the reaction surface extends from one lateral end of this rod 7. The length of this rod is 135 mm when the cone is tightened. An "n" shaped rod corresponding to that illustrated in the supporting device 1 of Figure 1 forms the anchoring support of the supporting device 6 of the second embodiment of the invention.

The supporting device is used in the construction of a building having a concrete floor 9 and concrete columns 10, the concrete columns being formed by erecting formwork walls 11, 12, 13, 14 defining a mould for the column and pouring concrete into the formworks. The supporting device 1, 6 is used to provide a supporting surface inside the mould against which the formwork walls can be placed.

In buildings of this type, the columns 10 are reinforced by upright column reinforcing bars. In addition, prior to casting of the concrete floor 9, a floor cavity 12 into which the concrete is to be cast is overlaid by a network of metal bars and beams 13.

One or more supporting devices 1, 6 according to

either of the preferred embodiments illustrated in Figures 1 and 2 are positioned in the region where the column is to be located. With reference to Figure 3, there is illustrated two of the supporting devices 1 of the first preferred embodiment of the invention, and two of the supporting devices 6 of the second preferred embodiment of the invention. Together these devices provide six reaction surfaces 5 against which formwork walls can be erected.

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The supporting devices 1, 6 are positioned by securing the supporting devices to the column bars 11 so that the supporting device 1, 6 is secured sufficiently firmly in position to prevent significant movement during a following step in which the concrete floor is cast. This positioning step can be thought of as a preliminary positioning step since the step enables the preliminary location of the reaction surface adjacent the position where the formwork wall is to be erected, prior to permanent positioning of the supporting device when the concrete floor is cast. In the preferred embodiment illustrated, the supporting devices are located in position by securing to the upright column reinforcing bars 11 by tying with wire. Alternative positioning means could be provided in the supporting devices to facilitate preliminary positioning, such as for example by the provision of apertures in the rods 2, 4 through which the wire can be threaded.

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The supporting devices are positioned or located so that the anchoring support in the form of the anchoring legs 4 extend into a floor cavity 12 which is to be filled with concrete to form the floor 9. As explained above, it is preferred that the anchoring legs 4 extend a distance of approximately 75 mm into the floor cavity 12.

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Next, concrete is poured into the floor cavity 12

and the concrete floor 9 is allowed to cure. The cured floor with the upright column reinforcing bars 11 and supporting devices projecting therefrom is illustrated in Figure 4.

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With reference to Figure 5, formwork wall 11, 12 are erected to define a mould for the concrete column, with one formwork wall 11 abutting a reaction surface 5 of the supporting device 1. For the supporting devices 1 of the first preferred embodiment of the invention, opposite walls 11, 12 of the formworks are located against the two reaction surfaces 5, 5' of that device.

In addition, as is illustrated in Figure 6, two of the opposite formwork walls 11, 12 have two reaction surfaces 5, 5' abutting the formwork wall 11, 12 to support the lower region of that formwork wall 11, 12 in two laterally spaced locations.

If, when the formwork walls are erected, it is found that the reaction surfaces are not located in a suitable position so as to abut the formwork wall in the correct position for forming a column of the desired dimensions, the reaction surface can be moved laterally inwardly or outwardly of the first elongate rod by twisting the cone 3. Accordingly, it is possible after the anchoring of the supporting device 1, 6 in the concrete floor of the building to alter in a controlled way the positioning of the or each reaction surface 5, 5' of the supporting device 1, 6.

Next, concrete is poured into the mould defined by the formwork walls 11, 12, 13, 14 and the concrete is allowed to cure. Following this, the formwork walls 11, 12, 13, 14 are removed. Once the formwork walls are removed, the reaction surfaces 5, 5' will be visible from the side of the column. As described above, the cones 3

are preferably formed from plastic, and the plastic surface of the cone in contact with the concrete is not usually affixed securely to the cured concrete.

Accordingly, it is thereafter possible to remove the
5 plastic cones by twisting along the threaded portion 8 of
the rod 2. Once the cones 3 are removed, they can be
reused on a new supporting device.

Many modifications may be made to the preferred
10 embodiment of the invention without departing from the
spirit and scope of the invention. For one example only,
() the dimensions of the components of the supporting device
may be altered. In addition, the materials from which the
components of the supporting device are manufactured may
15 also be changed.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A supporting device for use in the construction of a building having a concrete floor and concrete columns, the concrete columns being formed by erecting formwork walls defining a mould for the column and pouring concrete into the formworks, the supporting device being used to provide a supporting surface inside the mould against which the formwork walls can be placed, the supporting device comprising:

- a reaction surface against which a formwork wall can be erected, and

- an anchoring support which enables the supporting device to be anchored in concrete poured to form the concrete floor so that, in use, the supporting device is anchored in the concrete floor with the reaction surface located so that it will form a secure reaction surface against which the formwork wall can be erected;

wherein the reaction surface can be removed after the concrete column has been cast.

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2. The supporting device as claimed in claim 1 wherein the reaction surface projects in one direction from a body of the supporting device, and the distance that the reaction surface projects from the body of the supporting device can be adjusted.

3. The supporting device as claimed in claim 2, wherein the body of the supporting device includes an elongate portion, and the reaction surface is moveable axially with respect to the elongate portion of the device.

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4. The supporting device as claimed in claim 3,
wherein the reaction surface is threadably engaged with the
elongate portion so that revolving of the reaction surface
results in the reaction surface being moved axially
5 inwardly and outwardly of the elongate portion.

5. The supporting device as claimed in any one of
claims 1 to 4, wherein the reaction surface is formed by a
conical projection, and an outer face at the wider end of
10 the conical projection defines the reaction surface.

6. The supporting device as claimed in any one of
claims 1 to 5, wherein the supporting device includes two
reaction surfaces, one to each end of the supporting
15 device, the reaction surfaces providing support surfaces
against which opposite walls of the formworks can be
erected.

7. The supporting device as claimed in any one of
20 claims 1 to 5, wherein the device includes preliminary
positioning means which enable the preliminary location of
the reaction surface adjacent the position where the
formwork wall is to be erected.

8. The supporting device as claimed in claim 8,
wherein the column includes column bars extending in an
upright direction in the region where the column is to be
constructed for reinforcing the column, and the preliminary
positioning means is provided by surfaces of the supporting
25 device which can be tied to the column bars for preliminary
location of the reaction surfaces adjacent the position
where the formwork wall is to be erected.

9. The supporting device as claimed in any one of
35 claims 1 to 8, wherein the anchoring support comprises one
or more anchoring legs.

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10. The supporting device as claimed in any one of claims 1 to 9, wherein the supporting device comprises a body comprising a first elongate rod, having a reaction surface extending from one lateral end thereof, and the
5 anchoring leg is formed by an anchoring rod which extends laterally of the first elongate rod.

11. The supporting device as claimed in claim 10, wherein the anchoring rod is bent into an "n" shape so as
10 to define two anchoring legs which each extend laterally of the first elongate rod.

12. A method for constructing a concrete column of a building, the building including a concrete floor and one
15 or more concrete columns reinforced by upright column reinforcing bars, the method comprising:

(a) providing a supporting device comprising a reaction surface against which a formwork wall can be
20 erected, and an anchoring support, the reaction surface being shaped so as to be removable after the concrete column has been cast;

(b) positioning the supporting device in the region
25 where the column is to be located, with the reaction surface facing laterally outwardly of the upright column reinforcing bars so as to be located adjacent the position where the formwork wall is to be erected, and with the anchoring support extending into a floor cavity which is to
30 be filled with concrete to form the floor,

(c) pouring concrete into the floor cavity and allowing the concrete floor to cure,

35 (d) erecting formwork walls to define a mould for the concrete column, with one formwork wall abutting the reaction surface of the supporting device;

(e) pouring concrete into the mould defined by formwork walls and allowing the concrete column to cure, and

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(f) removing the formwork walls.

13. The method as claimed in claim 12, wherein step (b) comprises securing the supporting device to the column bars so that the supporting device is secured sufficiently firmly in position to prevent significant movement during the pouring of the concrete floor in step (c).

14. The method as claimed in claim 12 or claim 13, wherein, following step (c), the distance that the reaction surface of the supporting device projects from the body of the supporting device is adjusted so that the formwork wall is located in the desired position when it is erected with a lower end abutting the reaction surface.

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15. The method as claimed in any one of claims 12 to 14, wherein the method comprises the step of removing the component of the supporting device which forms the reaction surface after step (f), so that the component forming the reaction surface can be re-used.

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16. The method as claimed in any one of claims 12 to 15, wherein a plurality of supporting devices are used to provide support for each of the formwork walls.

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17. A supporting device substantially as herein described with reference to the accompanying drawings.

18. A method for constructing a concrete column of a building substantially as herein described with reference to the accompanying drawings.

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