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PATENT SPECIFICATION 947,206

DRAWINGS ATTACHED.

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947,206

Date of filing Complete Specification (Under Section 3 (3) of the Patents Act, 1949) : May 11, 1960.

Application Date : May 11, 1959. No. 16046/59.
Application Date : July 24, 1959. No. 25479/59.

Complete Specification Published : Jan. 22, 1964.

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Index at Acceptance :—E1 V(31, 51, 52, 59).
International Classification :—E 04 b, c.

SPECIFICATION AMENDED - SEE ATTACHED SLIP
SEE ERRATA SLIP ATTACHED
and slip number 2

COMPLETE SPECIFICATION.

Improvements in Flooring and Roofing for Buildings.

We, SPANFORM LIMITED, a British Company, of Abbey House, Victoria Street, London, S.W.1, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to flooring and roofing for buildings, and more particularly to flooring and roofing composed of reinforced concrete and to a method of forming such flooring and roofing.

In these structures, it is well known to use hollow tiles or blocks made of concrete or clay arranged end to end in rows, the latter being spaced apart to permit ribs of reinforced concrete to be formed between them and the tiles or blocks being laid upon a substantially continuous supporting surface or shuttering prior to the pouring of the concrete which is to fill the spaces between them and around reinforcing bars therein, and also to cover the tiles or blocks. These clay tiles or blocks are usually of short length, for example about 12 inches, being made hollow in order to reduce the weight.

The present invention has for its main object to replace such tiles or blocks by means that do not require continuous supporting shuttering. It has also been proposed to form a hollow building element from two slabs of moulded wood wool or wood sawdust one or both of which have side flanges at right angles to the slab and securing the slabs together to form a hollow element.

The present invention comprises a monolithic structural beam made of wood wool bonded with Portland cement or of similar lightweight material having a main body of generally rectangular or trapezoidal cross-section for use in the formation of reinforced concrete flooring or roofing for buildings, and having a flange projecting substantially co-planar with the base of the beam on at least one longitudinal side of the beam, said flange being designed to form a channel between the beam and an abutting member, for example against an adjacent corresponding beam which channel is capable of housing at least one reinforcing member and of receiving a concrete mixture whilst in a bridged condition between two supports and retaining the concrete in the channel without the aid of any shuttering beneath the beam.

The invention also comprises the method of forming in situ a laminated floor or roof from concrete or like material and wood wool bound with cement or similar light weight material comprising forming a continuous shuttering from the elongated load bearing beams of the present invention supported by bearers at each end of the beams, pouring the concrete or like setable material onto the beams so as to cover them to the desired depth and to fill the channels between the beams, and then allowing the concrete or like material to set. Where any of the bearers for the beams are temporary these are then removed. If desired the beams may be hollow, that is to say moulded with a cavity or cavities which may extend throughout the length of the beam.

The invention also includes a shuttering for carrying out the method of the present invention and comprises the beams in accordance with the invention arranged so that the flanges on the beams abut against an adjacent and parallel arranged beam to leave channels between the beams and bearers supporting the beams at their ends, the said assembly of beams forming a load support-

[*Price* 4*s.* 6*d.*]

ing mould without any underneath all-over support, said beams having a substantially continuous undersurface which serves as a soffit when the concrete or like setable material poured onto the top of the beams has set and any temporary bearers removed.

The invention will be hereinafter more particularly described with reference to the accompanying drawing, in which:—

Figure 1 is a perspective view of part of a flooring, prior to the concrete mixture being poured thereon, the beams being supported on girders of the stuctural framework and also on intermediate supports which are removed after the concrete has set.

Figure 2 is a section of the finished flooring, with the reinforcing bars embedded in the concrete to form reinforced ribs between the beams, and the concrete extending over the assembled beams to form the floor surface;

Figures 3, 4 and 5 are details showing suitable cross-sections of the improved beams; and

Figure 6 is a cross-section of a pre-cast reinforced composite beam, made from a plurality of the beams of the present invention connected end to end, with reinforcing bars embedded in concrete moulded along the assembled beams.

Referring to Figure 1, the flooring comprises a plurality of rows of beams 10, each row consisting of three beams placed end to end, the outer ends 11 of the beams bearing upon two girders 12 and 13, forming part of the framework of the building. The abutting ends 14 of the beams bear upon intermediate temporary bearers consisting for example of two wooden joists 15 and 16, arranged between the girders and parallel thereto. In some cases, a single temporary support may suffice, this depending upon the distance between the adjacent girders and upon the length of the beams, which may be 4 feet or 8 feet or more in length. Reinforcing members 17 extend between the beams, being secured at their ends to the girders in the usual manner.

It will be observed from Figure 2 that when two or more beams 10 are arranged so that flanges 22 projecting co-planar with the bases of each beam contact with one another a channel 18 is formed between adjacent beams which is capable of housing at least one reinforcing member 17 and receiving a concrete mixture whilst in a bridged condition between two supports 12 and 15 (Figure 1) and retaining concrete in the channel 18 without the aid of any shuttering beneath the beams.

When the concrete mixture is poured upon the assembled beams, it will flow into the channels 18 formed between them and around the reinforcing members 17, so as to produce reinforced concrete ribs, and will cover the beams to form a flat surface 19, over which a desired floor finish 20 may be laid. The lower surface of the flooring may be finished with plaster, as at 21, to form the ceiling for the next lower storey of the building. The bases of the beams formed from wood wool and tangled loosely together and coated with a grouting of Portland cement forms an excellent surface for plaster.

The beams 10 may be of rectangular cross-section, preferably with flanges 22 projecting substantially co-planar with the base of the beam as illustrated in Figure 3, the longitudinal edge of one flange is designed to abut against the adjacent corresponding flange of the next adjacent beam as is clearly illustrated in Figure 2. Alternatively, the flange may be provided on one side only of the beam, and the opposite side may be formed with a rebate 23, as shown in Figure 4, into which the flange 22 of the adjacent slab may engage so as to form the necessary channel between two adjacent beams. The beams may be trapezoidal in cross-section, as shown in Figure 5. Instead of being solid, as shown, the beams may be hollow, with a cavity running through the length of the beam, and formed during the moulding.

The material employed for the beams consists of wood wool (see British Standard Specification No. 1105, Building Slabs), tangled loosely together and then coated with a grouting of Portland cement, the setting of which will result in a very light bonded material having a large proportion of voids but sufficiently rigid to act as a mould for the concrete mixture poured to form the flooring.

It will be understood that similar beams may be used and assembled in a similar manner to make roofings for buildings.

The monolithic beams of the present invention are stronger than similar elements made from two or more pieces joined together since there is homogenity of the wood wool or other material throughout the structure thereby avoiding lines of weakness at joints. Furthermore the monolithic beam of the present invention is easier to handle, for example when sawing, does not lend itself to breakage, and is generally easier and quicker in assembly on site.

The beams may also be used for making up pre-cast reinforced concrete beams, such as shown in Figure 6, where reinforcing members 26 are placed longitudinally of the beams 10, directly above the side flanges 22, being held in place by means of ties 27 connected to upper longitudinal rods 28, the whole being embedded in concrete by moulding in the usual manner. The beams can be prepared in situ or beforehand, being hoisted into position and secured in place as required.

A beam constructed in accordance with the present invention is substantially fireproof and heat insulating.

In the Specification and claims the term "monolithic" means formed in one piece as distinct from a beam fabricated from two or more pieces.

WHAT WE CLAIM IS:—

1. A building element for use in the construction of reinforced concrete flooring or roofing comprising a monolithic structural beam made of wood wool bonded with Portland cement or of similar lightweight material having a main body of generally rectangular or trapezoidal cross section and having a flange projecting substantially coplanar with the base of the beam on at least one longitudinal side of the beam said flange being designed to form a channel between the beam and an abutting member, for example against an adjacent corresponding beam, said channel being capable of housing at least one reinforcing member and of receiving a concrete mixture whilst the beam is or beams are in a bridged condition between two supports and without the aid of any continuous shuttering to support the beam or beams.

2. A building element as claimed in Claim 1 in which the structural beam has an internal cavity extending through the length of the beam.

3. A building element as claimed in Claim 1 or Claim 2 wherein the structural beam has flange projecting laterally from each side, the lower face of each flange being substantially co-planar with the base of the beam.

4. A pre-cast reinforced concrete beam comprising a plurality of building elements as claimed in Claim 1 or Claim 2 or Claim 3, in which the structural beams are arranged end to end and wherein reinforcing members are arranged longitudinally above the flanges, the whole being embedded in concrete by moulding.

5. A method of forming in situ a laminated floor or roof from concrete or like material and wood wool bound with cement or similar lightweight material comprising forming a continuous shuttering from the building elements as claimed in any of Claims 1 to 3 supported by bearers at each end of the structural beams, pouring the concrete or like setable material onto the beams so as to cover them to the desired depth and to fill the channels between the beams and allowing the concrete or like material to set to leave the beams as a permanently bonded soffit.

6. A method of forming a roof or floor as claimed in Claim 5 in which reinforcing bars are inserted into the channels prior to the pouring of the concrete or like setting material.

7. A method as claimed in any of Claim 5 or Claim 6 wherein at least some of the bearers are temporary and are removed after the concrete or like setable material has set.

8. A shuttering for carrying out the method as claimed in any of the preceding Claims 5 to 7 comprising the building elements as claimed in any of Claims 1 to 3 arranged so that the flanges on the structural beams abut against an adjacent and parallel arranged beam to leave channels between the beams and bearers supporting the beams at their ends, the said assembly of beams forming a load supporting mould without any underneath all-over support, said beams having a substantially continuous undersurface which serves as a soffit when the concrete or like setable material poured onto the top of the beams has set and any bearers removed.

9. Building elements for reinforced concrete flooring or roofing for buildings substantially as described with reference to and as illustrated in Figures 1 to 5 of the accompanying drawing.

10. A pre-cast reinforced concrete beam substantially as described with reference to and as illustrated in Figure 6 of the accompanying drawing.

11. A method of forming in situ a laminated floor or roof from concrete substantially as described with reference to the accompanying drawing.

12. A laminated floor or roof when made by the method claimed in any of Claims 5 to 7 or 11.

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Abingdon: Printed for Her Majesty's Stationery Office, by Burgess & Son (Abingdon), Ltd.—1964.
Published at The Patent Office, 25, Southampton Building, London, W.C.2,
from which copies may be obtained.

A beam constructed in accordance with the present invention is substantially fireproof and heat insulating.

In the Specification and claims the term "monolithic" means formed in one piece as distinct from a beam fabricated from two or more pieces.

WHAT WE CLAIM IS:—

1. A building element for use in the construction of reinforced concrete flooring or roofing comprising a monolithic structural beam made of wood wool bonded with Portland cement or of similar lightweight material having a main body of generally rectangular or trapezoidal cross section and having a flange projecting substantially coplanar with the base of the beam on at least one longitudinal side of the beam said flange being designed to form a channel between the beam and an abutting member, for example against an adjacent corresponding beam, said channel being capable of housing at least one reinforcing member and of receiving a concrete mixture whilst the beam is or beams are in a bridged condition between two supports and without the aid of any continuous shuttering to support the beam or beams.

2. A building element as claimed in Claim 1 in which the structural beam has an internal cavity extending through the length of the beam.

3. A building element as claimed in Claim 1 or Claim 2 wherein the structural beam has flange projecting laterally from each side, the lower face of each flange being substantially co-planar with the base of the beam.

4. A pre-cast reinforced concrete beam comprising a plurality of building elements as claimed in Claim 1 or Claim 2 or Claim 3, in which the structural beams are arranged end to end and wherein reinforcing members are arranged longitudinally above the flanges, the whole being embedded in concrete by moulding.

5. A method of forming in situ a laminated floor or roof from concrete or like material and wood wool bound with cement or similar lightweight material comprising forming a continuous shuttering from the building elements as claimed in any of Claims 1 to 3 supported by bearers at each end of the structural beams, pouring the concrete or like setable material onto the beams so as to cover them to the desired depth and to fill the channels between the beams and allowing the concrete or like material to set to leave the beams as a permanently bonded soffit.

6. A method of forming a roof or floor as claimed in Claim 5 in which reinforcing bars are inserted into the channels prior to the pouring of the concrete or like setting material.

7. A method as claimed in any of Claim 5 or Claim 6 wherein at least some of the bearers are temporary and are removed after the concrete or like setable material has set.

8. A shuttering for carrying out the method as claimed in any of the preceding Claims 5 to 7 comprising the building elements as claimed in any of Claims 1 to 3 arranged so that the flanges on the structural beams abut against an adjacent and parallel arranged beam to leave channels between the beams and bearers supporting the beams at their ends, the said assembly of beams forming a load supporting mould without any underneath all-over support, said beams having a substantially continuous undersurface which serves as a soffit when the concrete or like setable material poured onto the top of the beams has set and any bearers removed.

9. Building elements for reinforced concrete flooring or roofing for buildings substantially as described with reference to and as illustrated in Figures 1 to 5 of the accompanying drawing.

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