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(54) IMPROVEMENTS IN OR RELATING TO SUPPORTING STRUCTURE FOR SHUTTERING

(71) We, KWIKFORM LIMITED, a British Company of Waterloo Road, Birmingham, B25 8LE, in the County of Warwick, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a supporting structure for use in supporting shuttering panels for forming concrete and like floors, ceilings and roofs, which structure is of the kind, herein called the kind specified, comprising a number of vertically disposed props each provided with a supporting head at its upper end, and a plurality of elongate horizontal members having panel engaging faces at their upper sides for supporting the shuttering panels, some of said members extending horizontally between the upper end portions of horizontally adjacent props with opposite ends of such members supported on the supporting heads of such props, and the remaining members extending transversely between parallel pairs of the prop-supported members with the ends of such transversely extending members supported by the prop-supported members so as to be supported indirectly by said props and to provide additional support for the shuttering panels at positions intermediate the prop-supported members.

Hitherto, as far as we are aware, it has been the practice for the horizontal members to comprise mutually parallel beams supported by the props and transversely extending transoms supported by such beams, with transom supporting means on the beams in the form of projections fixed to the beams at predetermined intervals along the length of the beams and engageable within openings provided in the ends of the transoms. Such an arrangement is open to the objection that the transoms can only be located at those particular positions along the length of the beams at which the projections are provided.

[Price 33p]

It is an object of the invention to provide an improved arrangement in which such transoms or equivalent members can readily be supported at any desired position in relation to the beams or equivalent members while extending transversely of the length thereof, thus permitting of the structure being readily assembled in the optimum manner to meet the requirements of the particular site at which it is being utilised.

According to this invention a supporting structure of the kind specified is provided wherein the ends of the horizontal members are provided with dependent projections adapted to overlap the inner faces of up-standing connecting flanges provided on opposite lateral edges both of the supporting heads and of at least some of the horizontal members themselves, the connecting flanges on the lateral edges of each such flanged horizontal member extending along the entire length thereof and being arranged to be in alignment with connecting flanges on any such prop heads which support the ends of such flanged horizontal member, whereby any of said horizontal members, whether themselves flanged or not, may extend between and be carried by, either a pair of prop heads, or a pair of mutually parallel prop-supported flange horizontal members at any desired position along the length of those members, with the panel engaging faces of the horizontal members all in the same plane to provide a flush support for the shuttering panels.

The advantages of the structure according to this invention are:—

- (a) Insofar as opposite ends of a horizontal member can in accordance with this invention be carried by either a pair of the prop heads, or by a pair of parallel horizontal members supported by such prop heads, necessarily the indirectly supported horizontal members can always be located in the optimum position, for example,

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on opposite sides of columns forming part of the building structure and extending vertically through the spaces between adjacent parallel members.

(b) The indirectly supported members when in situ can be adjusted if required longitudinally of the members they are carried by.

(c) The same type of support is provided by the aforesaid prop heads for the ends of the prop-supported members and for the ends of the indirectly supported members. Thus not only can the ends of all such members, whether flanged or not, be supported with equal facility from the prop heads, but the dependent projections on the ends of the all such members are engageable with equal facility with the connecting flanges of either the prop heads or the flanged members.

(d) No packing is necessary between the shuttering panels and the adjacent faces of the horizontal members, a feature of especial importance where the shuttering panels take the form of flat, e.g. plywood or other laminate sheet material.

The foregoing feature of this invention is preferably achieved by forming the flanged members to top-hat shape in cross section so as to embody dependent sides having at their lower edges outwardly extending margins terminating in said connecting flanges to provide grooves extending continuously one along each side of the flanged horizontal members intermediate the ends thereof, which grooves are adapted to receive the dependent projections at the ends of the horizontal members, the arrangement being such that each projection is located between respective connecting flange and the adjacent side of the horizontal member so as to be positively located in a direction perpendicular to the length of the flanged horizontal member.

Where it is desired to minimise the capital cost of the structure, the supporting heads of the props would be fixed against downward movement relative to the upper end portion of the associated props as by forming them as simple capping plates spaced below the shuttering panels.

Preferably, however, the props are provided with means for lowering their respective supporting heads relative to the props, the arrangement permitting of the horizontal members being lowered in one and the same operation by the lowering merely of the supporting heads to effect removal of the horizontal members after the concrete has sufficiently set as to allow this.

In such preferred arrangement, the props

would desirably be provided at their upper extremities with concrete supporting caps, and have provision for lowering the supporting heads relative to the caps which then provide local support for the concrete at the positions of the props during its final setting after the horizontal members have been removed.

In each of the two foregoing preferred arrangements just described, advantageously the means for lowering the supporting heads relative to the props comprise means arranged to effect progressively controlled initial lowering of the heads with these still held against free vertical downward movement relative to their respective props, and then to allow the heads to be freely slidden axially downwardly through a limited distance relative to their respective props to facilitate rapid removal of the horizontal members.

The invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a perspective view of part of one preferred form of formwork-supporting structure for use in forming a concrete floor in accordance with this invention;

Figure 2 is a cross sectional view on the line 2—2 of Figure 1 depicting in cross section a flanged horizontal member and showing its connection to an end of a further horizontal member,

Figure 3 is a plan view of part of the construction depicted in Figure 1.

Figure 4 is a sectional view on the line 4—4 of Figure 3.

Figure 5 is an elevational view looking in the direction of the arrow 5 of Figure 4.

Figure 6 is a cross sectional view on the line 6—6 of Figure 5.

Figure 7 is a view similar to Figure 1 showing a modification.

Figure 8 is a part sectional side elevation of the upper end portion of one of the props, depicting a modified form of supporting head.

Figure 9 is a view similar to Figure 6, but depicting a further modified form of supporting head.

Figures 10 and 11 are cross sectional views on the lines 10—10 and 11—11 respectively of Figure 9.

Referring firstly to Figures 1 to 6 of the drawings, and initially to Figure 1, the structure there depicted comprises a number of shuttering panel supporting, horizontal members of externally flanged construction, hereinafter called beams 10, formed in strip steel or other suitable strip material and of top-hat form in cross section. Thus each beam 10, as shown in Figure 2, comprises an upper horizontal web 10a, a pair of dependent sides 10b having at their lower edges outwardly horizontally extending margins 10c terminating in upstanding connecting flanges 10d, each spaced from the adjacent

side 10b of the beam to provide therebetween a groove 10e.

The structure further comprises a number of further shuttering panel supporting, horizontal members of internally flanged form, hereinafter called transoms 11, also formed in strip steel or other suitable strip material, and of inverted rectangular channel form in cross section so as to embody an upper horizontal web 11a and a pair of dependent sides 11b having at their lower edges intumed stiffening flanges 11c.

The upper faces of the beam and transom webs 10a, 11a serve to support and engage with shuttering panels 12 which may be formed of plywood or other suitable shuttering panel forming material.

At least the majority of the beams 10 are intended to extend between and be supported from the upper end portions 13 of vertically disposed extensible props 14 spaced horizontally apart in rows so that the beams 10 can be supported in spaced mutually parallel relationship.

The upper end portion 13 of each prop 14 carries a square supporting head 15, the lateral edges of which are provided with upstanding connecting flanges 16, with the two flanges at each pair of opposite edges of the head mutually parallel and spaced apart by a distance the same as the distance between the two upstanding connecting flanges 10d at opposite sides of the beams 10.

The prop heads 15 may also support the ends of the transoms 11, and each end of both the beams 10 and transoms 11 is provided with a dependent projection in the form of a dependent flange 17 formed integrally with the lower edge of the web 18a of a horizontally disposed channel shaped bracket 18, the arms 18b of which are secured to the outer faces of the adjacent sides 10b, 11b of the beam or transom respectively.

The dependent flanges 17 at the ends of the beams 10 and transoms 11 are adapted to overlap and engage with the inner faces of the upstanding connecting flanges 16 on the prop heads 15, thereby connecting and locating the ends of the beams and transoms in relation to the props 14 and in a position in which, as shown in Figure 3, each of the two upstanding flanges 10d of a beam 10 so connected to one of the four head flanges 16 is aligned with one of two other and mutually parallel head flanges 16 of such head 15.

Also, the dependent flanges 17 at the ends of the transoms are adapted to overlap with and engage with the inner faces of the upstanding connecting flanges 10d, i.e. to extend within the grooves 10e.

Thus the two ends of each transom can, in precisely the same manner, be supported and located either by the connecting flanges

10d of a pair of mutually adjacent parallel beams, or by the connecting flanges 16 aligned with such beam flanges of two mutually adjacent prop heads 15, and in a position in either case in which the transom extends perpendicularly transverse to the above mentioned two beams.

Insofar as the upstanding beam flanges 10d and the associated grooves 10e are continuous along the length of the beams 10, the transoms 11 can be disposed at any desired position between two mutually parallel adjacent beams, and adjusted along the length of the two beams when in engagement therewith if so desired.

Usually all of the beams 10 would extend in one direction in spaced apart mutually parallel relation, with the transoms 11 extending at right angles to the length of the beams, so that the shuttering panels 12 are supported by both beams and transoms. However, if desired the panels may be supported entirely by the top-hat section beams, namely as shown in Figure 1, by providing short beams 10A of length corresponding to that of the transoms 11 so as to extend between the heads 15 of two mutually adjacent props, and the edge flanges 10d of these short beams 10A are adapted to engage with and support, as already described dependent flanges 17 provided at the ends of intermediate beams 10B similar to the beams 10.

The lower horizontal edges of the dependent flanges 17 at the ends of the beams and transoms are adapted to abut against the upper surface of the prop heads, as well as against the bases of the grooves 10e at the inner sides of the connecting flanges 10d, the bases of which grooves would be at the same horizontal level as that of the upper sides of the prop heads 15, and this fact, together with the fact that the overall depth of these dependent flanges 17 in relation to the upper faces of the beam and transom webs 10a, 11a is the same, ensures that the upper faces of the beam and transom webs are always supported at the same horizontal level so as to provide a flush support for the shuttering panels 12.

As shown in Figures 3 and 4, the prop heads 15 are provided on their undersides along one pair of lateral edges with outrigger plates 19 of elongated form which project beyond the adjacent corners of the square shaped heads, the ends of which outrigger plates are bent up slightly at positions beyond the lateral confines of the beams to prevent these from tilting in a sideways direction during assembly, but it should be understood that this particular feature may be omitted if desired.

To facilitate the rapid dismantling of the beams and transoms after the concrete has partially set, the heads 15 may, as best shown in Figures 5 and 6, be mounted for

limited vertical sliding movement along the upper end portions 13 of the props 14, which end portions would then carry at their upper extremities shuttering supporting caps 20 which are adapted to provide local support for short pieces of shuttering panel when the beams and transoms are lowered by downward movement of the heads relative to the upper end portions 13 of the props.

For this purpose the head 15 is formed centrally with a hole to permit of the vertical movement of the head relative to the end portion 13, and vertically slidable along the latter is an annular flange 21 afforded by a generally frusto-conical part 22 connected to the lateral edges of the head 15.

The underside of the flange 21 is in thrust engagement with the upper end of a sleeve 23 rotatable about, and vertically slidable along, part of the upper end portion of the prop, the lower end of the sleeve being formed with a pair of inclined circumferential cam faces 24 which in one rotational position of the sleeve engage, as shown in Figure 4, with opposite ends of a diametrically extending pin 25. The sleeve 23 is, however, formed with a pair of diametrically opposed protuberances affording internal axially extending pin end receiving recesses 26, the arrangement being such that the sleeve 23 can be turned through 90° from the position depicted in Figure 4, and in a direction which is anti-clockwise looking upwardly of the prop, so as by reason of the cam faces 24 bearing on the ends of the pin 25 to cause a progressive controlled lowering of the sleeve 23 until the recesses 26 thereof are in alignment with the ends of the pin 25, whereupon the sleeve 23 is allowed to slide freely downward by a distance corresponding substantially to its entire length, to a position in which the upper ends of lateral openings 27 formed in the sleeve in alignment with the recesses 26 abut the ends of the pin 25, thus preventing further downward movement.

The arrangement enables the pressure on the shuttering panels carried by the beams and transoms consequential on the weight of the concrete initially to be relieved by the rotational movement of the sleeve 23, and afterward simultaneous lowering of all of the sleeves 23 enables all of the beams 10 and transoms 11 carried thereon to be simultaneously lowered as a whole to effect rapid release of the beams and transoms and shuttering panels thereon, while leaving the concrete locally supported by the caps 20 until the concrete has set sufficiently for the props 14 and their associated caps to be removed.

Provision is made for maintaining the heads 15 in a horizontal position despite eccentric vertical loading thereof having regard to the freedom of the heads to be

slidden down the upper end portions 13 of the props. This is an important constructional feature since without it, in the event of the vertical loading of the heads 15 being eccentric, the heads might tilt about a horizontal axis extending diametrically through the adjacent upper end portion 13 of the prop.

The foregoing provision comprises in part the annular flanges 21 which are in slidable engagement with the exterior of the prop end portions 13, and are spaced vertically below the heads 15.

In addition, however, the heads 15 are provided with guide means which engage with the end portion of the prop at at least two positions spaced axially along the length of the prop end portion 13. These guide means in the arrangement depicted in Figures 4 to 6 comprise a cylindrical tube 28 (see Figure 6) the exterior of which is in slidable engagement with the adjacent interior of the prop end portion 13, which is of the customary tubular configuration. The guide means provided by this tube 28 accordingly is in slidable engagement with the interior of the prop end portion 13 over the entire axial length of such tube.

Each prop end portion 13 is formed with a pair of axially extending diametrically opposed slots 29, the lower extremities of which accommodate the pin 25, with the slots extending to the upper extremity of the prop portion 13 and receiving a strap 30 of the head 15 which extends through the two slots 29 between diametrically opposite sides of the flange 21 and has welded to its upper face the adjacent lower edge of the tube 28.

Upward movement of the head 15 relative to the prop end portion 13 is limited by the latter having welded around its tubular exterior a stop collar 31 adapted to abut against the upper face of flange 21.

The caps 20 may carry small square shaped shuttering portions 32 cut out of the main shuttering panels 12, but to avoid the necessity specially to shape the main shuttering panels 12 at these positions, the caps 20 may instead carry shuttering strips 33 of short length aligned with longer shuttering strips 34 of the same width secured to the centre portions of the beam webs 10a.

Alternatively, the centre portions of the beam webs 10a may be displaced upwardly by a distance corresponding to the thickness of the shuttering panels 12.

The arrangement in either case provides the beams 10 with locating shoulders 35 of depth corresponding to the thickness of the shuttering panels 12 for locating the latter against movement transversely of the beams having these locations.

The beam and transom webs may be formed with holes 36 for receiving suitable

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fastening members such as nails or small self-tapping screws, for fastening the shuttering panels in position, and the small shuttering panels 32, and strips 33 and 34, may similarly be secured to the caps 20 and beam webs 10a respectively.

If desired, as shown in Figure 1, some of the prop heads 15 may support further horizontal members in cantilever fashion, such as further short beams 10C of configuration otherwise similar to that of the beams 10, between the extremities of which cantilever beams there may extend, supported therefrom in the above manner described, outrigger beams 10D which are identical in form to the beams 10.

The outer ends of these cantilever beams 10C are supported from the adjacent props 14 by struts 37, the lower ends of which have a wedge spigot connection to spigot receiving sockets 38 on the exterior of the prop 14 or prop upper end portion 13.

All of the above described beams 10 may be reinforced against bending in the known manner by providing them on their undersides with bracing elements 39 of known form.

To permit of the underside of the floor being formed with one or more reinforcing ribs, namely at the position depicted at 40 in Figure 7 of the drawings, provision is made, as shown in this figure, for supporting additional horizontal members, in this case additional beams 10, at a horizontal level lower than that of the remaining beams, namely by providing cross members 41 also of top-hat form in cross section so as to be adapted to support the ends of the lower level beams 10 in like manner to the beam 10A of the Figure 1 arrangement.

These cross members 41 are, however, provided at each end with channel-shaped brackets adapted for wedging connection with sockets 38 carried from the props 14, between which the cross members 41 extend, the wedging connection being preferably of the particular form described in our prior Patent Specification No. 1,180,562.

The sockets 38 may be provided on the upper end portions 13 of the props, or on parts of the props 14 below these upper end portions.

As will be apparent from Figure 7 of the drawings, the arrangement permits of some of the shuttering panels being disposed at a horizontal level lower than that of the other panels, with vertically extending panels on each side of the lower panels. Otherwise the construction of Figure 7 is similar to that already described in reference to Figure 1, except that there is no provision for progressive lowering of the crossmembers 41 and beams thereby supported.

Referring now to Figure 8 of the drawings, there is here depicted a further form of guide

means of a supporting head 15 for maintaining the latter horizontal despite eccentric loading. In this case, the head 15 comprises a plate 42 spaced vertically from the aforementioned annular flange 21 and formed centrally with a circular hole of diameter corresponding to the peripheral diameter of the cylindrical prop end portion 13, so that the edges 43 of the hole are, as in the case of the flange 21, in axially slidable engagement with the prop end portion 13. In addition, between the diametrically opposite sides of the apertured portion of the plate 42 extends a strap 44 spaced vertically above the strap 30 and which, as in the case of the strap 30, extends through the two slots 29 in the prop end portion 13, with the lateral edges of both straps in slidable engagement with the vertical edges of the two slots 29.

Thus the two straps 30, 44, together with the flange 21 and plate 42, provide guide means which engage with the upper end portion of the prop at two positions spaced axially along the length of the prop.

With this last described arrangement the stop collar 31 is arranged to abut the upper face of plate 42 to limit the upward movement of head 15.

In Figures 9 to 11 of the drawings there is depicted a further form of guide means for the supporting head 15. In this construction the aforementioned annular flange 21 is formed with an upwardly extending tube 45 which is in slidable engagement with the entire periphery of the cylindrical prop end portion 13. This tube 45 is formed at diametrically opposed positions corresponding to the two slots 29 with part circular axially extending portions 46 which engage slidably with the exterior of the prop end portion on horizontally opposite sides of its slots 29, and these portions 46 are formed with diametrically opposed axially extending lugs 47 which project within the slots 29 so as on their lateral edges to be in slidable engagement with the vertical edges of these slots. Thus again the head guide means engage with the prop end portion at positions corresponding to the flange 21, as well as at the upper ends of the lugs 47, in addition to so engaging at locations intermediate these two positions. In this construction upward movement of the head 15 is limited by the engagement of the upper edge of each part circular guide portion 46 with the underside of the aforementioned stop collar 31.

Preferably the upper end portion 13 of each prop 14 is formed as a unit adapted for detachable mounting on the upper end of the prop 14 so as to provide a removable extension thereto carrying the supporting head 15 and associated parts, including sleeve 23, as earlier described.

In both the modified constructions of Figure 8 and Figures 9 to 11, the heads 15

are supported for downward movement relative to the prop end portions 13 through sleeves 23 supported and operating as already described with reference to Figures 4 and 5 to effect progressive lowering of the beams and transoms.

WHAT WE CLAIM IS:—

1. A supporting structure of the kind specified wherein the ends of the horizontal members are provided with dependent projections adapted to overlap the inner faces of upstanding connecting flanges provided on opposite lateral edges both of the supporting heads and of at least some of the horizontal members themselves, the connecting flanges on the lateral edges of each such flanged horizontal member extending along the entire length thereof and being arranged to be in alignment with connecting flanges on any such prop heads which support the ends of such flanged member, whereby any of said horizontal members, whether themselves flanged or not, may extend between and be carried by, either a pair of prop heads, or a pair of mutually parallel prop-supported flanged horizontal members at any desired position along the length of those members, with the panel engaging faces of the horizontal members all in the same plane to provide a flush support for the shuttering panels.

2. A structure according to claim 1, wherein the flanged members are of top-hat form in cross-section so as to embody dependent sides having at their lower edges outwardly extending margins terminating in said upstanding connecting flanges spaced from the adjacent side of the flanged horizontal member to accommodate the dependent projections of other horizontal members.

3. A structure according to claim 1 or claim 2, wherein the dependent projections on the ends of the horizontal members comprise on each such end a dependent flange adapted for overlapping engagement with the inner faces of the upstanding connecting flanges.

4. A structure according to claim 3 as appendant to claim 2, wherein the dependent flanges on the ends of the horizontal members are adapted to engage with either the upper sides of the prop heads or the outwardly extending margins of the flanged members, the arrangement being such that the upper faces of these prop heads and said outwardly extending margins are at the same horizontal level with the dependent flanges extending downwardly by the same distance in relation to the panel engaging faces at the upper sides of the horizontal members.

5. A structure according to any of claims 1 to 4, wherein the props are provided with means for lowering their respective support-

ing heads relative to the props, the arrangement permitting of the horizontal members being lowered in one and the same operation by the lowering merely of the prop supporting heads to effect removal of the horizontal members after the concrete has sufficiently set as to allow this.

6. A structure according to claim 5, wherein the props are provided at their upper extremities with concrete supporting caps and have provision for lowering the supporting heads relative to the caps which thereby provide local support for the concrete at the positions of the props during its final setting after the horizontal members have been removed.

7. A structure according to claim 5 or 6, wherein the means for lowering the supporting heads relative to the props comprise means arranged to effect progressive controlled initial lowering of the heads with these still held against free vertical downward sliding movement relative to their respective props and then to allow the heads to be freely slidden axially downwardly through a limited distance relative to their respective props to facilitate rapid removal of the horizontal members.

8. A structure according to claim 7, wherein each supporting head is provided with guide means which engages with an upper end portion of the prop at at least two positions spaced axially along the length of said end portion so as to maintain opposite lateral edges of each axially slidable supporting head at the same horizontal level during its downward axial movement relative to the prop irrespective of any eccentricity of the loading of the head from the horizontal members.

9. A structure according to claim 8, wherein the upper end portion of each prop comprises a tubular portion and the guide means comprises a tube in axially slidable engagement with the interior of said tubular portion of the prop, said guide means tube being carried on a web portion of the supporting head which extends transversely through a pair of axially extending slots formed in diametrically opposite sides of said tubular end portion of the prop.

10. A structure according to claim 8, wherein the guide means of each supporting head comprises a pair of guide apertures whereof the edges are in axially slidable engagement with the upper end portion of the prop at positions spaced axially thereof, each aperture being spanned by a diametrical strap which extends through an axially slotted part of the prop end portion in slidable engagement with the axially extending edges of the slot.

11. A structure according to claim 8, wherein the upper end portion of each prop is of tubular form and embodies a pair of



are supported for downward movement relative to the prop end portions 13 through sleeves 23 supported and operating as already described with reference to Figures 4 and 5 to effect progressive lowering of the beams and transoms.

WHAT WE CLAIM IS:—

1. A supporting structure of the kind specified wherein the ends of the horizontal members are provided with dependent projections adapted to overlap the inner faces of upstanding connecting flanges provided on opposite lateral edges both of the supporting heads and of at least some of the horizontal members themselves, the connecting flanges on the lateral edges of each such flanged horizontal member extending along the entire length thereof and being arranged to be in alignment with connecting flanges on any such prop heads which support the ends of such flanged member, whereby any of said horizontal members, whether themselves flanged or not, may extend between and be carried by, either a pair of prop heads, or a pair of mutually parallel prop-supported flanged horizontal members at any desired position along the length of those members, with the panel engaging faces of the horizontal members all in the same plane to provide a flush support for the shuttering panels.

2. A structure according to claim 1, wherein the flanged members are of top-hat form in cross-section so as to embody dependent sides having at their lower edges outwardly extending margins terminating in said upstanding connecting flanges spaced from the adjacent side of the flanged horizontal member to accommodate the dependent projections of other horizontal members.

3. A structure according to claim 1 or claim 2, wherein the dependent projections on the ends of the horizontal members comprise on each such end a dependent flange adapted for overlapping engagement with the inner faces of the upstanding connecting flanges.

4. A structure according to claim 3 as appendant to claim 2, wherein the dependent flanges on the ends of the horizontal members are adapted to engage with either the upper sides of the prop heads or the outwardly extending margins of the flanged members, the arrangement being such that the upper faces of these prop heads and said outwardly extending margins are at the same horizontal level with the dependent flanges extending downwardly by the same distance in relation to the panel engaging faces at the upper sides of the horizontal members.

5. A structure according to any of claims 1 to 4, wherein the props are provided with means for lowering their respective support-

ing heads relative to the props, the arrangement permitting of the horizontal members being lowered in one and the same operation by the lowering merely of the prop supporting heads to effect removal of the horizontal members after the concrete has sufficiently set as to allow this.

6. A structure according to claim 5, wherein the props are provided at their upper extremities with concrete supporting caps and have provision for lowering the supporting heads relative to the caps which thereby provide local support for the concrete at the positions of the props during its final setting after the horizontal members have been removed.

7. A structure according to claim 5 or 6, wherein the means for lowering the supporting heads relative to the props comprise means arranged to effect progressive controlled initial lowering of the heads with these still held against free vertical downward sliding movement relative to their respective props and then to allow the heads to be freely slidden axially downwardly through a limited distance relative to their respective props to facilitate rapid removal of the horizontal members.

8. A structure according to claim 7, wherein each supporting head is provided with guide means which engages with an upper end portion of the prop at at least two positions spaced axially along the length of said end portion so as to maintain opposite lateral edges of each axially slidable supporting head at the same horizontal level during its downward axial movement relative to the prop irrespective of any eccentricity of the loading of the head from the horizontal members.

9. A structure according to claim 8, wherein the upper end portion of each prop comprises a tubular portion and the guide means comprises a tube in axially slidable engagement with the interior of said tubular portion of the prop, said guide means tube being carried on a web portion of the supporting head which extends transversely through a pair of axially extending slots formed in diametrically opposite sides of said tubular end portion of the prop.

10. A structure according to claim 8, wherein the guide means of each supporting head comprises a pair of guide apertures whereof the edges are in axially slidable engagement with the upper end portion of the prop at positions spaced axially thereof, each aperture being spanned by a diametrical strap which extends through an axially slotted part of the prop end portion in slidable engagement with the axially extending edges of the slot.

11. A structure according to claim 8, wherein the upper end portion of each prop is of tubular form and embodies a pair of



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5 diametrically opposed axially extending slots, and the guide means of each supporting head comprises a tubular part in axially slidable engagement with the exterior of the prop end portion, and having a pair of axially extending lugs, the lateral edges of which are in axially slidable engagement with the vertical edges of said diametrically opposed slots.

10 12. A structure according to any of claims 1 to 11, wherein the props are provided at a position below their supporting heads with additional means for supporting additional horizontal members at a horizontal level below that of the horizontal members supported by their supporting heads so as to provide a support for shuttering for forming a dependent rib on the underside of the concrete floor, roof, or ceiling to be formed.

20 13. A structure according to any of claims 1 to 12 wherein further horizontal members having a dependent prop head engaging projection at one end only are carried by some of the props, the other end of each such further horizontal member being supported by means of a strut arranged to extend at an inclination to the vertical between the said other end and additional supporting means on the prop at a position below the level of the prop head.

30 14. A structure according to claim 12 or 13, wherein the additional supporting means comprise sockets carried by the props and adapted to receive spigots on the ends of the additional horizontal members or the lower ends of said struts which support the further horizontal members.

35 15. A structure according to any of claims 1 to 14, wherein the panel engaging faces at the upper sides of the horizontal members are formed at the lateral portions

of these upper sides with shuttering panel locating shoulders which extend longitudinally of the horizontal members and are of a vertical depth corresponding to the thickness of the shuttering panels to be supported. 45

16. A structure according to claim 15 wherein the shuttering panel locating shoulders are provided by shuttering strips of width less than the upper sides of the horizontal members and secured to said upper sides. 50

17. A structure according to any of claims 1 to 16, wherein the upper sides of the horizontal members are formed with holes for receiving shuttering panel fastening members. 55

18. A structure substantially as described with reference to and as shown in Figures 1 to 6 of the accompanying drawings. 60

19. A structure substantially as described with reference to and as shown in Figure 7 of the accompanying drawings.

20. A structure according to claim 18 modified substantially as described with reference to and as shown in Figure 8 of the accompanying drawings. 65

21. A structure according to claim 18 modified substantially as described with reference to and as shown in Figures 9 to 11 of the accompanying drawings. 70

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