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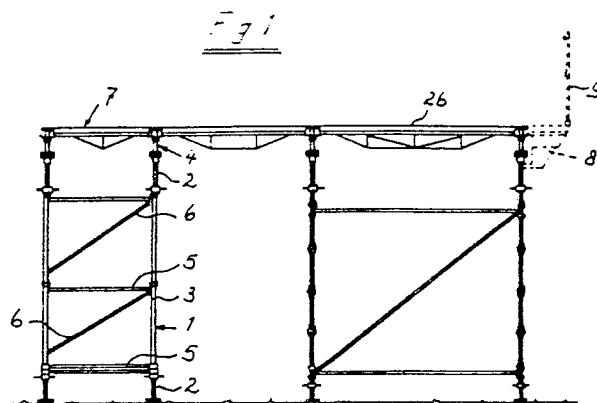
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(54) **Support system for the form plates or panels of a concrete flooring which has to be cast.**

(57) A support system for the form plates or panels of a concrete flooring which has to be cast, said support system comprising posts (1) for supporting primary beams (7), which as such may serve for supporting form plates (11) or panels (26) and secondary beams (10) if any, the upper end of a post (1) being shaped by a vertical drop head (4) over which a drop plate (19) is movable in vertical direction, said drop plate (19) serving to support the primary beams (7), said drop head comprising means (15-18) for holding the drop plate (19) at a given place, said means being executed such, that after the casted concrete is at least partly hardened, the drop plate (19) can be moved downward over a given distance for removing given parts of the support system.



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Support system for the form plates or panels of a concrete flooring which has to be cast

The invention relates to a support system for the form plates or panels of a concrete flooring which has to be cast, said support system comprising posts for supporting primary beams, which as such may serve for supporting form plates or panels with which use can be made of secondary beams.

Now the object of the invention is to execute such a system in such a way that it is possible to remove given parts of the support system after the concrete is partly hardened by which a short building cycle can be realized. In this case, however, at least a number of posts will have to be maintained till the concrete is completely hardened.

According to the invention this is obtained because the posts are provided with height-adjusting means near at least one of their ends in such a way that the upper surface of the posts is coming to lie in one plane with either the lower surface of the flooring to be cast or with the lower surface of a form plate, the upper end of a post being shaped by a vertical drop head over which a drop plate is movable in vertical direction, said drop plate being positioned in a mainly horizontal plane and serving to support the primary beams, said drop head comprising means for holding the drop plate at a given place, said means being executed such, that after casting the concrete and after this is at least partly hardened, the drop plate can be moved downward over a given distance for removing given parts of the support system.

When the upper surface of the posts, so of the support head forming the upper portion of the post, is directly engaging the concrete of the cast flooring, the primary beams as well as the form plates or the form panels and the secondary beams, if any, can be removed after the concrete is partly hardened, so that all these parts can be directly used again by which the efficiency of such a support construction can be considerably increased.

When the upper surface of the posts is engaging a form plate or a form part shaped in another way, these plates or parts will be held in position till the concrete is completely hardened. This e.g. will be the case when it is desirable that the lower surface of the concrete shows as less irregularities as possible.

According to an embodiment of the invention the means for holding the drop plate at a given place in respect of the drop head is shaped by a nut having a helically shaped lower surface resting on a round pin radially extending through the drop head, said nut being provided with an inner radial recess such that the nut can be moved along said pin upwardly in axial direction and after this can be

rotated to bring the lower surface onto the pin, after which by further rotating the nut and by this the drop plate will move gradually upwardly till it is engaging an abutment.

By rotating back the nut so the drop plate can be gradually moved downwardly so that it is then possible to remove the primary beams, the form panels and the form plates, if any. After this the nut can be further rotated so that the recess of it can be moved along the pin in the drop head and the nut can move further downwardly. In case of the device according to the invention so the primary beams and further parts, if any, can easily be removed.

In particular the drop plate will be provided with four lips which are positioned over 90° in respect of each other and are extending obliquely upwardly, the end of a beam being provided with a recess to receive a lip such that a beam is locked in respect of the drop plate and a clamping action will arise between the beam and the drop head.

In this way it is possible to execute a part of a beam in a cantilevered way when this is desirable for one reason or another.

In particular the primary beams will be provided with an obliquely upwardly extending rim along at least one of their longitudinal edges to receive the ends of secondary beams. These secondary beams may form part of a form panel or not, the upper surface of the form panel then being shaped by a form plate.

So then no connection bolts need to be applied between the beams by which the mounting and demounting of the support system is considerably facilitated.

According to a possible embodiment of the invention a primary beam may consist of an aluminium profile obtained by extrusion and being provided with end parts to be put onto and coupled with the drop plates.

The possibility consists, however, also to execute the primary beams from steel profiles so that a lattice girder exists.

The selection of executing from aluminium or steel primary will be made based on the length of the beams and the desired bearing capacity of them while further obviously the cost price, the life and the own weight will play a role.

According to a preferred embodiment of the invention the secondary beams are composed of a mainly U-shaped profile and two end parts connected to this profile and being mainly K-shaped, such that the secondary beams can be put down into two different height positions onto the upwardly extending rims of the longitudinal beams, a nail

strip being provided between the free ends of the legs of the U-profile, the legs of the profile comprising an inwardly extending support edge directly below the nail strip for supporting said nail strip.

Obviously the part of the K-shaped end parts which is extending about horizontally, will be positioned out of the height of the beam so that the upper surface of the beam may comprise two different positions in respect of the upper surface of the primary beam.

By comprising a nail strip in the profiles, the profiles can be connected to the form plate in a simple way. In this way form panels can be shaped which may fast be laid down on the primary beams.

Now the invention is described by means of embodiments, shown in the drawing, in which:

Fig. 1 schematically shows a view of a support system according to the invention;

Fig. 2 schematically shows a side view of the upper part of the system of Fig. 1;

Fig. 3 schematically shows a plan view of a part of the system of Fig. 1;

Fig. 4 shows a view of a drop head;

Fig. 5 and 6 show a side view and a plan view respectively of the drop head of Fig. 4;

Fig. 7 shows a side view of a part of a primary beam from aluminium;

Fig. 8 shows an end view of the beam of Fig. 7;

Fig. 9 shows a side view of a primary beam composed of steel profiles;

Fig. 10 shows a part, on an enlarged scale, of the end of the beam of Fig. 9;

Fig. 11 shows an end view of the beam of Fig. 10;

Fig. 12 shows a side view of a secondary beam from aluminium;

Fig. 13 shows an end, at an enlarged scale, of the beam of Fig. 12;

Fig. 14 shows an end view of the beam of Fig. 13;

Fig. 15 shows a side view of a secondary beam from a steel profile;

Fig. 16 shows an end, at an enlarged scale, of the beam of Fig. 15; and

Fig. 17 shows an end view of the beam of Fig. 16.

The support system shown in Fig. 1 comprises the posts 1, being composed of the parts 2, 3 and 4. The parts 2 are shaped by screw jacks which in a not further indicated way consist of a spindle over which a nut is rotatable so that the lower ends of the tube parts 3 of the posts can be brought at the same height and can be connected to each other by means of the horizontal connections 5. Further the diagonal rods 6 can be provided to

obtain a stable construction. The part 4 is shaped by a drop head, the construction of which is further described by means of the Figs. 4 - 6.

Fig. 1 shows the application of primary beams 7 with various lengths, all at the circumstances bring along with them. In Fig. 1 further is shown that on the outer posts a support 8 can be mounted on which a guard rail construction 9 can be placed. It is also possible that a primary beam is supported at some distance from its end and so is partly cantilevered in which case use can be made of wooden beams or such like instead of a drop head. This, however, will be obvious for an expert.

Fig. 2 again shows the upper ends of some posts 1 with the screw jacks 2 and the drop heads 4 serving to support primary beams 7 between which secondary beams 10 are provided.

Fig. 3 shows a plan view of some primary beams 7 between which secondary beams 10 are provided which may serve to support form plates 11. Fig. 3 shows only a part of one form plate 11. The possibility also exists that a form plate 11 is fixedly connected to e.g. two secondary beams as will be described afterwards. Then a form panel 26 may be obtained.

The drop head 4 shown in the Figs. 4, 5 and 6 comprises a base plate 12, being connected to a drop plate 13, indicated by dash-lines, of a screw jack 2. The base plate 12 of the drop head 4 is connected to a square tube 14 in which a radially extending round pin 15 is fixed. The pin 15 serves to support a nut 16 the lower surface 17 of which is partly helically shaped so that when rotating the nut 16 this will be moved over a given distance in vertical direction. Further the nut 16 is provided with an inner recess 18 so that the nut, after being rotated to its lowest position, may drop down along the pin 15.

On the nut 16 the drop plate 19 is lying comprising the support surface 20 and the lips 21 extending obliquely upward from it. The drop plate 19 is provided with a square opening, not further indicated, so that it is only movable in vertical direction along the tube 14 and cannot be rotated in respect of this.

The tube 14 is further provided with an abutment sleeve 22, said sleeve having a square section as well as the tube 14. When the nut 16 is rotated the drop plate 19 can be moved upwardly till it is clamped against the abutment sleeve 22.

The upper end of the tube 14 is provided with the front plate 23. The upper surface 24 of the front plate 23 may be aligned with the upper surface 25 of the form plates 11, so that afterwards it will directly support the cast concrete flooring. Also the possibility exists that the upper surface 24 of the front plate 23 serves to support the wooden form plate 11. In this case the form plates 11 will be

present as long as the posts 1 cannot be removed. See also the Figs. 1-3.

The Figs. 7 and 8 show a part of a primary beam 7 being formed by an aluminium profile 27 obtained by extrusion, the lower part of which is baffled near the end 28. In the upper tubular part 29 of the profile an end part 30 is fixed by means of rivets 31. The end part 30 is provided with a recess 32 for receiving a lip 21 of the drop plate 19 in it, as shown in Fig. 4. The lip 21 will engage a lower rim 33 forming part of the end part 30.

The support rims 34 of the aluminium profile 27 are provided with upwardly extending rims 35 for supporting secondary beams 10, as these are indicated in Fig. 2 and will be described afterwards by means of the Figs. 12-17. The Figs. 9-11 show a primary beam 7 being composed of steel profiles, to wit the mainly U-shaped profile 36 comprising the upper plane 37 and the side planes 38 which at their free ends are bended to form a support rim 39 which in turn is bended to form an upwardly extending rim 40 being provided with the rolled reinforcing rim 41. The end part 42 is provided within the beam at its end, said part 42 at its lower end being provided with a recess 43. Near this recess a reinforcing strip 44 is present being connected to the parts 39 and 40 such that a recess 45 is obtained for receiving a lip 21 of the drop plate 19, see Fig. 4. Near the upper end of the end part 42 the safety plate 46 is provided which prevents that the upper end of the beam 7 is moving towards the tube 14, see Fig. 4, of a drop head 4 when the lower end of the end part 42 engages the abutment sleeve 22.

Further a strip 47 is mounted in the end part 42 and serving for connecting a T-profile 48 extending obliquely downwardly as in particular appears from Fig. 9 and which together with a vertical profile 49 is forming a reinforcement of the profile 36.

As appears from Fig. 1 more vertical profiles 49 can be provided in case of longer primary beams 7 which then can be mutually connected by horizontal profiles.

The Figs. 12-14 show a secondary beam fabricated from an aluminium profile 50 being obtained by extrusion and being mainly U-shaped and comprising the body 51 with the legs 52 extending from it. Between the ends of the legs 52 a nail strip 53 is provided which can be fixed by means of some pop rivets 54. Further the nail strip 53 is supported by the inwardly extending support rims 55 of the profile 50.

By means of the nail strip 53 a connection can be obtained between a form plate 11 and a secondary beam 10, so that form panels 26 may be obtained which may be directly mounted on the primary beams 7.

The ends of the profile 50 are provided with end parts 56 being mainly K-shaped and comprising a flange 57, a connecting piece 59 extending mainly horizontally from it and two support lips 59. Because the connecting piece 58 is not positioned in the middle of the height of the profile 50, the secondary beam 10 can be laid down onto the support rims 35 or 40, see the Figs. 8 and 11, of a primary beam 7 in two different manners such that the upper surface of the secondary beam may be positioned at different levels in respect of the upper surface of the primary beams 7.

The secondary beam 10 according to the Figs. 15-17 mainly corresponds with that according to the Figs. 12-14. In this case, however, the beam comprises a U-profile 60 being obtained by bending steel plate. A nail strip 53 is present again between the legs of the U-profile and being fixed by means of pop-nails 54 and being supported by support rims formed by inwardly extending portions of the legs of the U-profile. The ends of the U-profile 60 are connected to the end parts 61 which are executed in a corresponding way as the end parts 56, but now are provided with a part 62 welded to it and being extended inwardly into the profile 60 and being connected to the profile by means of pop-nails 63.

It will be obvious that also the end part 56 can be provided with a portion extending inwardly in the profile and that the end part 61 can be connected to the profile 60 directly by means of the flange plate.

Further it can be remarked that during the mounting of the secondary beams 10 on the primary beams 7 a clamping action can be executed on the last mentioned beams so that they will not have the tendency to twist also not when they are supporting secondary beams only at one side.

It will be obvious that only some possible embodiments are shown in the drawing and described above and that many modifications can be provided without leaving the inventive concept.

Claims

1. Support system for the form plates or panels (11,26) of a concrete flooring which has to be cast, said support system comprising posts (1) for supporting primary beams (7) which as such may serve for supporting form plates (11) or panels (26) with which use can be made of secondary beams (10), characterized in that the posts (1) are provided with height-adjusting means (2) near at least one of their ends in such a way that the upper surface (24) of the posts (1) is coming to lie in one plane with either the lower

surface of the flooring to be cast or with the lower surface of a form plate (11) or such like, the upper end of a post (1) being shaped by a vertical drop head (4) over which a drop plate (19) is movable in vertical direction, said drop plate being positioned in a mainly horizontal plane and serving to support the primary beams (7), said drop head (4) comprising means (15-18) for holding the drop plate (19) at a given place, said means (15-18) being executed such, that after casting the concrete and after this is at least partly hardened, the drop plate (19) can be moved downward over a given distance for removing given parts of the support system.

2. Support system according to claim 1, characterized in that the means for holding the drop plate (19) at a given place in respect of the drop head (4) is shaped by a nut (16) having a helically shaped lower surface (17) resting on a pin (15) radially extending through the drop head (4), said nut (16) being provided with an inner radial recess (18) such that the nut (16) can be moved along said pin (15) upwardly in axial direction and after this can be rotated to bring the lower surface (17) onto the pin (15), after which by further rotating the nut (16) and by this the drop plate (19) will move gradually upwardly till it is engaging an abutment sleeve (22).

3. Support system according to claim 1 or 2, characterized in that the drop plate (19) is provided with four lips (21) which are positioned over 90° in respect of each other and are extending obliquely upwardly, the end of a primary beam (7) being provided with recesses (32,45) to receive the lips (21) such that a primary beam (7) is simultaneously locked in respect of the drop plate (19).

4. Support system according to one of the preceding claims, characterized in that the primary beams (7) are provided with an obliquely upwardly extending rim (35,40) along at least one of their longitudinal edges (34,39) to receive the ends of secondary beams (10).

5. Support system according to one of the preceding claims, characterized in that a primary beam (7) consists of an aluminium profile (27) obtained by extrusion and being provided with end parts (30) to be put onto and coupled with the drop plates (19).

6. Support system according to one of the claims 1-4, characterized in that a primary beam consists of steel profiles (36, 48,49) so that a lattice girder exists, said girder being provided with end parts (42) to be put onto and coupled with the drop plates (19).

7. Support system according to one of the preceding claims, characterized in

that the secondary beams (10) are composed of a mainly U-shaped profile (50,60) and two end parts (56,61) connected to this profile and being mainly K-shaped, such that the secondary beams (7) can be put down into two different height positions onto the upwardly extending rims (35,40) of longitudinal beams (7), a nail strip (53) being provided between the free ends of the legs (52) of the U-profile, the legs of the profile comprising an inwardly extending support edge (55) directly below the nail strip (53) for supporting said nail strip (53).

8. Form panel for applying in case of the support system according to one of the preceding claims, characterized in

that said form panel (26) consists of a form plate (11) being connected to at least two secondary beams (10).

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Fig 1

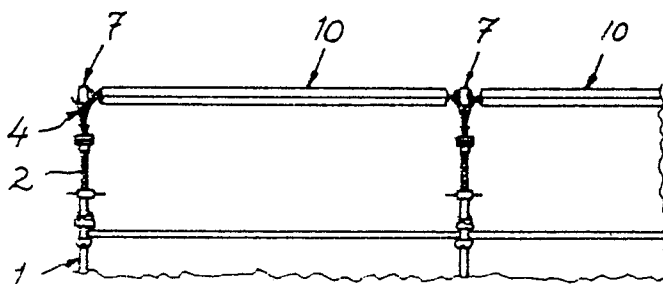
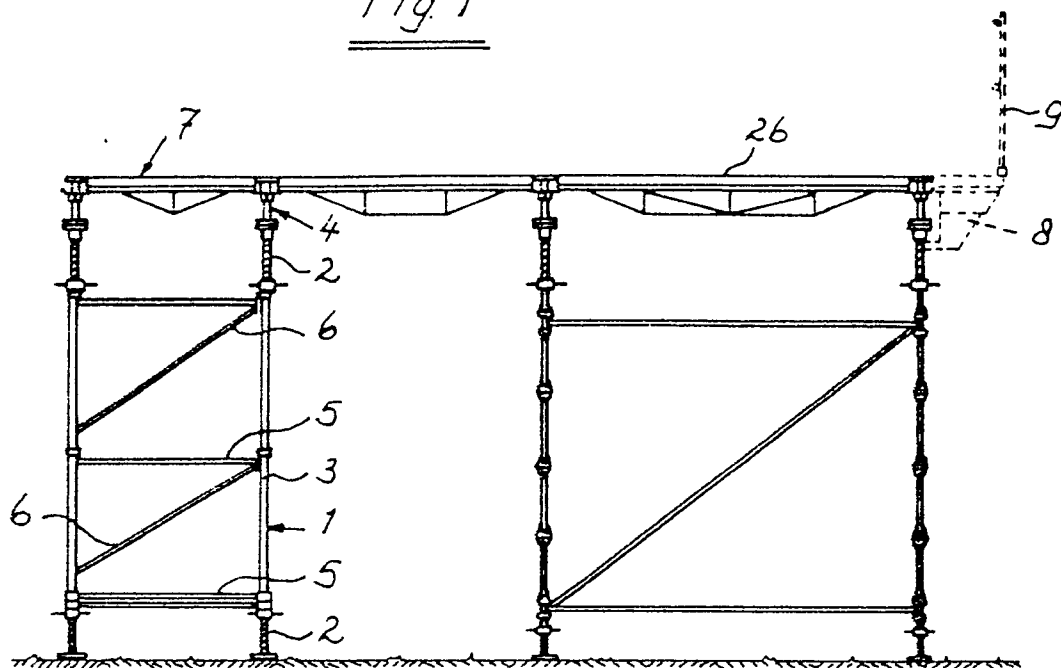


Fig. 2

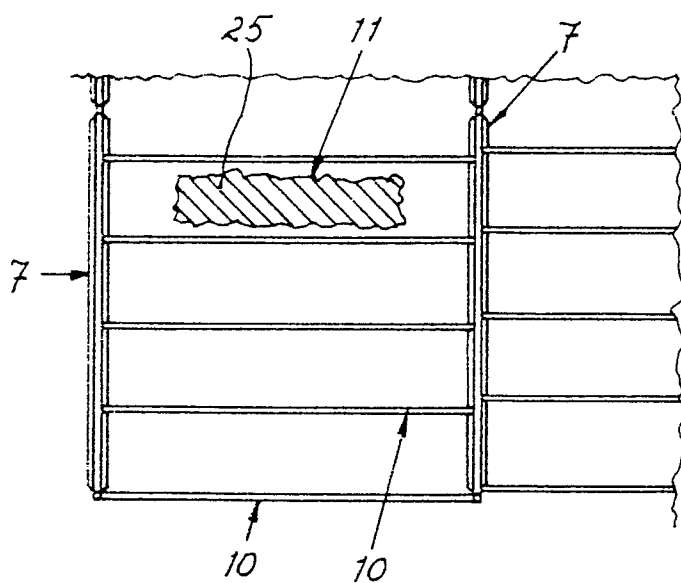


Fig. 3

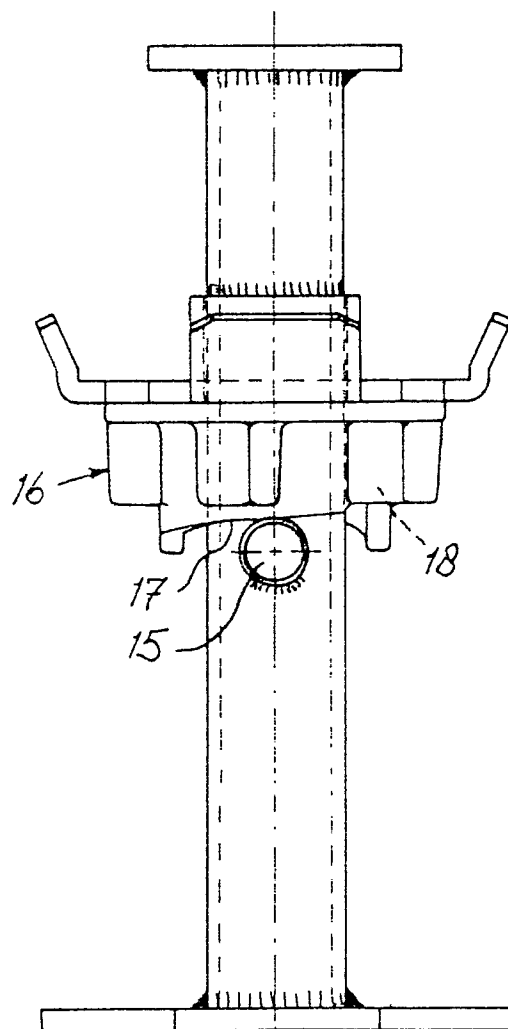
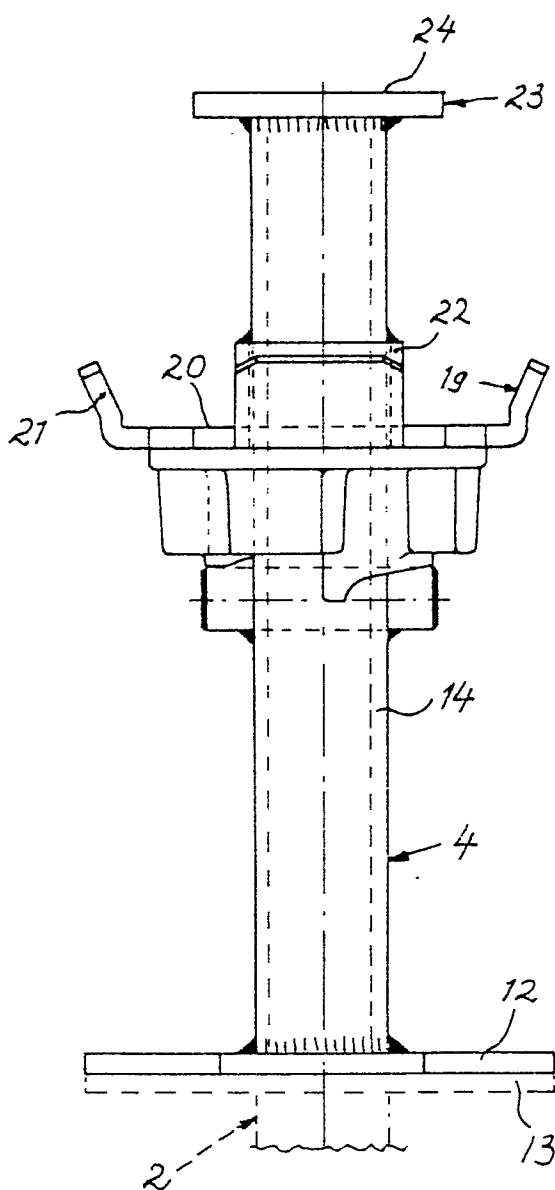
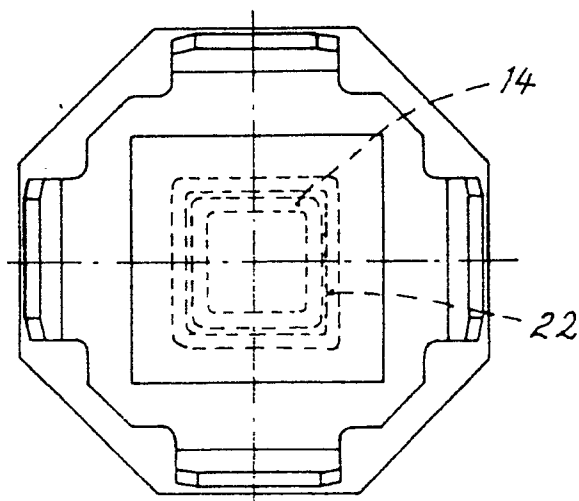


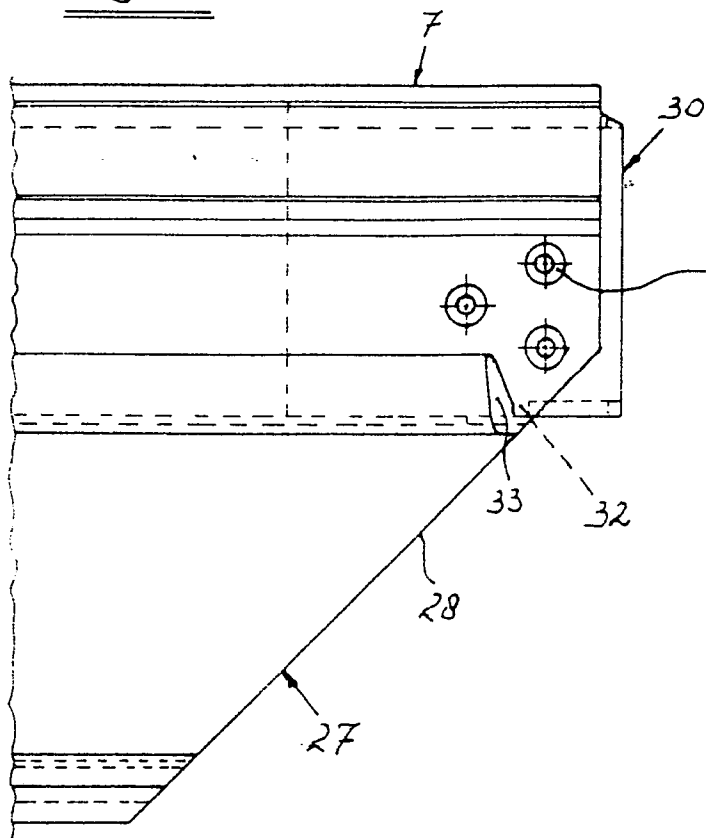
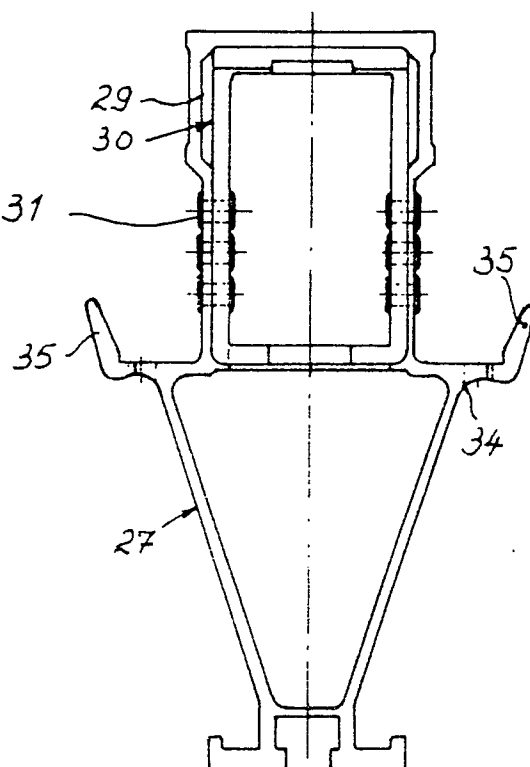
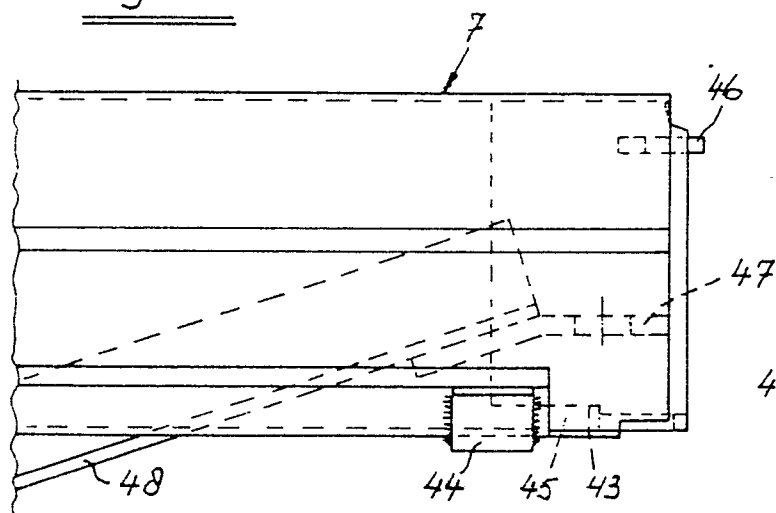
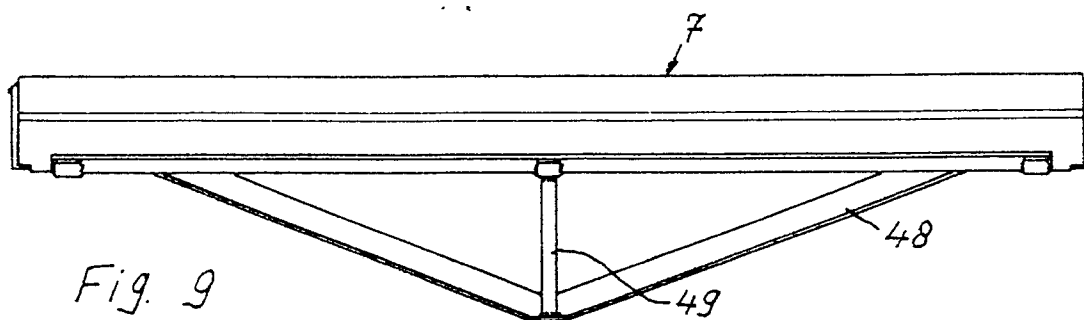
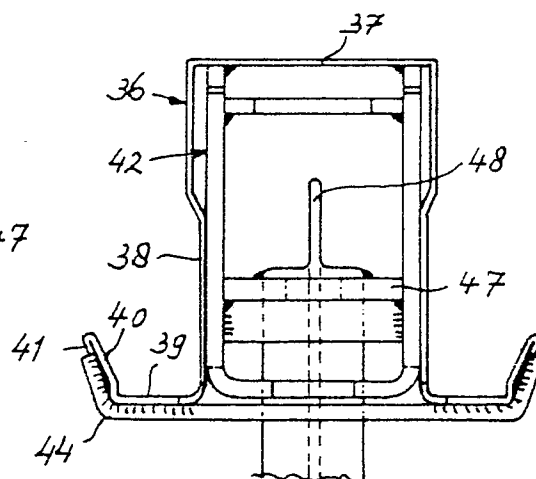
Fig. 7Fig. 8Fig. 10Fig. 11Fig. 9

Fig. 12

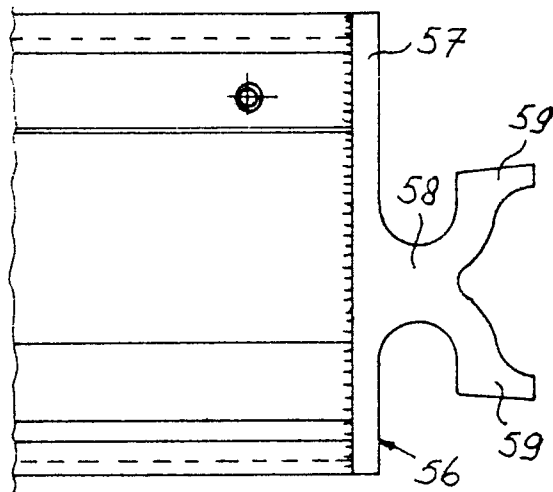


Fig. 13

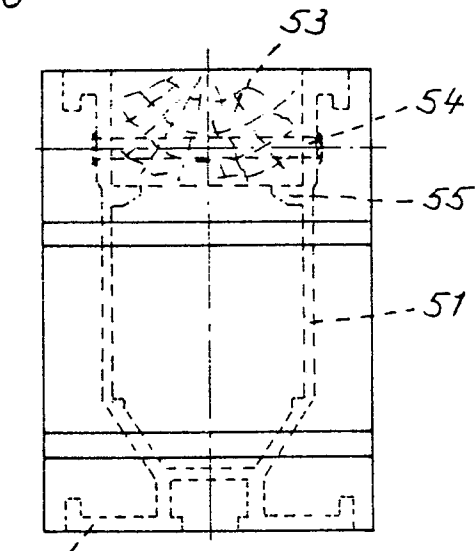


Fig. 14

Fig. 17

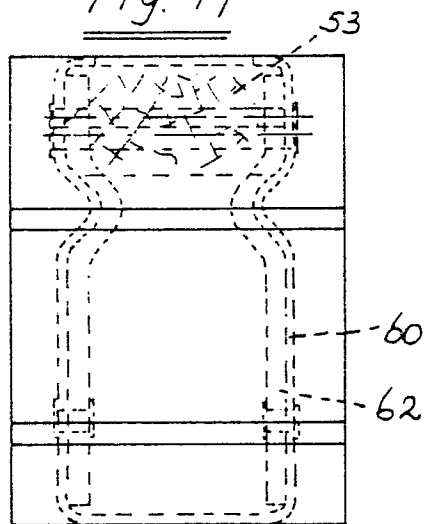


Fig. 16

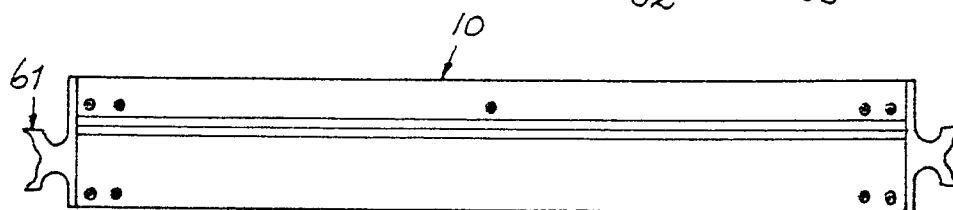
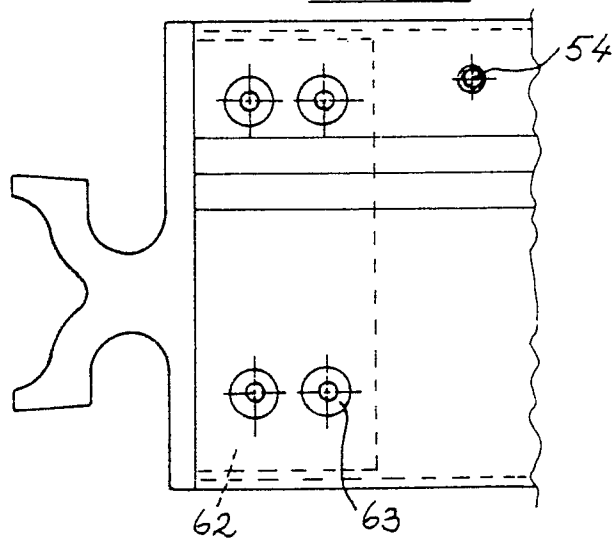


Fig. 15