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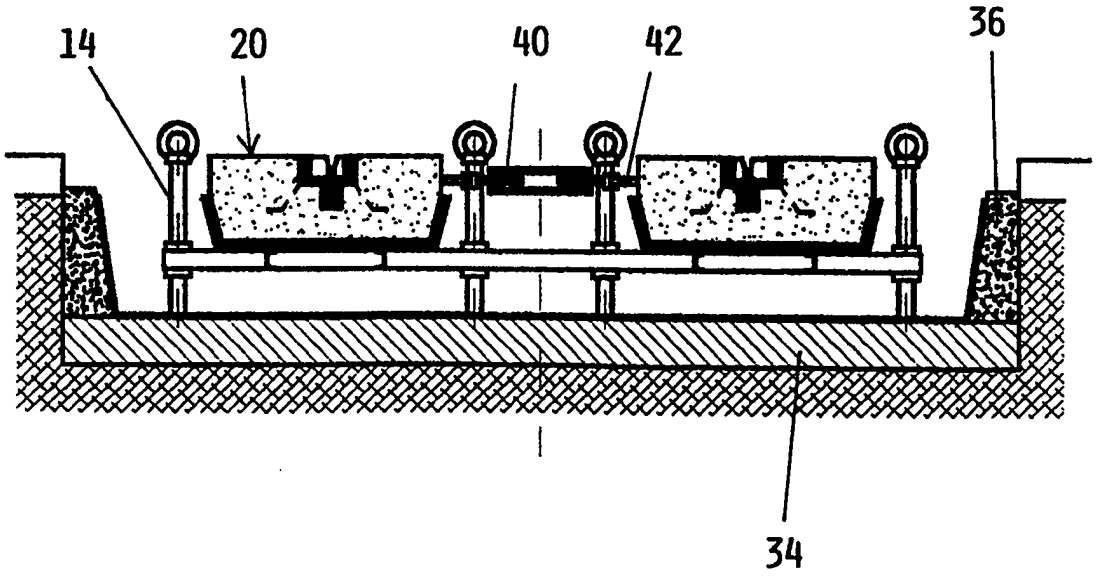

(57) Abstract

A track superstructure, in particular for tramway, tram–railway and underground railway lines, characterised by comprising within a continuous trench in the roadway: a level–adjustable modular metal structure, means (12, 14) for adjusting the level of said structure, a plurality of modular platforms (20) supporting rail pieces (26), said platforms being at least partly covered with an anti–vibration blanket (22) and resting on said structure, a concrete casting (44) filling the interior of the trench to incorporate the metal structure and the lower and lateral surface of said platforms, substantially to the level of the roadway surface.

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TRACK SUPERSTRUCTURE, IN PARTICULAR FOR TRAMWAY, TRAM-RAILWAY AND UNDERGROUND RAILWAY LINES

This invention relates to a track superstructure, in particular for tramway, tram-railway and underground railway lines.

Track superstructures are well known. A first known type of superstructure uses a plurality of sleepers supported by a bed of ballast and to which the rails are fixed. To the sides of and between said rails there is then cast a covering to the level of the upper surface of the rails.

This known type of superstructure has however the drawback of being laborious in terms of the operations involved in refilling with ballast and packing it around the sleepers, this requiring breakage of the road surface with consequent interruption of the line.

Another known type of superstructure consists of a foundation cast on a seat and on which there rest a plurality of reinforced concrete platforms spaced from said foundation by an anti-vibration blanket. The rails are fixed on said platforms and a filling layer is applied to level the rail surface with the roadway.

This type of superstructure also has certain drawbacks, and in particular:

- the need to rigorously check the planarity of the foundation to ensure a uniform platform level,
- time loss in replacing or levelling platforms,
- the need to provide adequately equipped road sites which interrupt the tram service.

An object of the invention is to eliminate the drawbacks jointly or separately present in known types of superstructure by providing a superstructure which is reliable and of lesser cost than such known types.

A further object of the invention is to provide a superstructure which can be maintained at low cost without requiring the line to be interrupted for long periods.

A further object of the invention is to provide a superstructure which enables maintenance to be effected in a simple and comfortable manner.

These and further objects which will be apparent from the ensuing description are attained according to the invention through a track superstructure, in particular for tramway, tram-railway and underground railway lines as described in claim 1.

A preferred embodiment of the invention is described hereinafter with reference to the accompanying drawings, on which:

Figure 1 shows a cross-section through the metal structure of the superstructure, mounted in the trench,

Figure 2 shows an enlarged cross-section through a prefabricated platform,

Figure 3 shows a longitudinal section through the platforms while under adjustment after being mounted on the metal structure,

Figure 4 shows a longitudinal section through the superstructure after the concrete has been cast,

Figure 5 shows the superstructure in plan view,

Figure 6 is an enlarged detailed view of the sleeper adjustment screw,

Figure 7 shows the platform removal,

Figure 8 shows a particular superstructure configuration with a grass covering, and

Figure 9 shows the platform removal for renovating the concrete casting.

As can be seen from the figures, the superstructure according to the invention is mounted within a continuous trench 2 formed in the roadway 4, and comprises substantially a modular load-bearing structure 6 consisting of four channel-shaped longitudinal members 8 to which there are welded a plurality of cross-members 10 formed by channel beams coupled together by welding them to an internally threaded bush 12 within there engages a corresponding screw 14 acting as a bearing foot for the cross-members.

Specifically, each cross-member is supported by four screws which in pairs form two channels bounding each rail of the track, each screw being housed in a sleeve 18. The superstructure also comprises a plurality of prefabricated modular reinforced concrete platforms 20 of substantially inverted isosceles trapezium cross-section which are covered on their sides and lower surface with a first layer of elastic material 22 for damping purposes, and an outer layer of glass-reinforced plastic 24.

A rail portion 26 of the railway, tramway or tram-railway line is fixed to the upper surface of said platforms. Specifically, the rail is housed in a suitable channel 16 preferably of stainless steel, which is embedded in the platform and is fixed thereto by a plurality of bolts 28 engaged in a threaded bush 32 by way of a previously interposed coil spring 30.

It is also possible that the rail is a traditional rail emerging from the upper surface of the platforms.

The superstructure of the invention is assembled in the following manner:

A reinforced concrete bed 34 is cast on the bottom of the trench, after which a plurality of prefabricated concrete panels 36 are positioned along the

sides of the trench. The trench is covered with a layer of insulating material 38, after which the structures 6 are placed in position and the cross-members 10 adjusted in height by operating the adjustment screws 14. The prefabricated platforms 20 are then rested on said cross-members, the gauge between the two rails then being adjusted by means of suitable spacers 40. Said spacers 40 consist of a cylindrical sleeve provided with threaded endpieces which engage corresponding rods 42 secured to the platforms 20.

Rotation in one direction or the other causes the two platforms and hence the two rails to approach or withdraw from each other. A final level adjustment of the platforms 20 is then made by operating the screws 14.

Having made the adjustment, concrete is then cast, interrupted at predetermined distances by transverse sheets of insulating material (not show on the drawings), so as to cover the trench as far as the level of the upper surface of the panels (see Figure 4).

The screw 14 are then removed from the containing sleeves 18 and a plurality of prefabricated reinforced concrete panels 46 are then laid to level the roadway.

If the rails project from the platform, turf 48 is applied between the rails so as to fill the space between the rails and the roadway to improve the appearance of the railway line (see Figure 8).

If the rail need to be replaced because of wear, it is sufficient to disengage the bolts 30 and extract the various damaged rail pieces from their housing channel.

If the insulating blanket 22 needs to be replaced due to infiltration or wear with time, the platforms 20 are raised and their base blanket is then replaced (see Figure 7).

If work is required on the concrete casting 44, the panels 46 and platforms 20 are firstly removed, after which the screws 14 are inserted into the sleeves 18 to engage the bushes 12 rigid with the cross-members 10 in order to be able to rotate the screws and return the casting 44 to the correct level together with the structure 6 incorporated in it (see Figure 8). A contribution to the renewal work is also obtained by injecting concrete through suitable tubes previously installed during assembly.

From the aforegoing it is apparent that the superstructure of the invention presents many advantages, and in particular:

- it enables the line parts to be rapidly replaced by merely removing the platform from the region concerned, this being an operation which can be carried out during the night when the traffic level is reduce,
- it considerably reduces vibro-acoustic pollution because of the presence of the insulating blankets,
- it enables the rails to be easily and comfortably levelled and aligned.

CLAIMS

1. A track superstructure, in particular for tramway, tram-railway and underground railway lines, characterised by comprising within a continuous trench in the roadway:

- a level-adjustable modular metal structure,
- means (12,14) for adjusting the level of said structure,
- a plurality of modular platforms (20) supporting rail pieces (26), said platforms being at least partly covered with an anti-vibration blanket (22) and resting on said structure,
- a concrete casting (44) filling the interior of the trench to incorporate the metal structure and the lower and lateral surface of said platforms, substantially to the level of the roadway surface.

2. A superstructure as claimed in claim 1, characterised in that the structure (6) consists of C-shaped longitudinal members (8) and cross-members (6).

3. A superstructure as claimed in claim 1, characterised in that the adjustment means consist of threaded screws (14) engaging in corresponding bushes (12) rigid with the structure, the ends of said screws acting as support elements during the installation of the superstructure.

4. A superstructure as claimed in claim 3, characterised in that said screws (14) are housed in corresponding sleeves (18).

5. A superstructure as claimed in claim 1, characterised in that each platform (20) is substantially of inverted isosceles trapezium cross-section and is constructed of reinforced concrete.

6. A superstructure as claimed in claim 1, characterised in that each platform (20) houses a channel (16) in which a corresponding track rail (26) is inserted.

7. A superstructure as claimed in claim 6, characterised in that each rail (26) is fixed in the channel by bolts (28) which engage in corresponding threaded bushes (32) by way of a previously interposed coil spring (32).

8. A superstructure as claimed in claim 1, characterised in that each platform (20) is covered externally with a layer of glass-reinforced plastic.

9. A superstructure as claimed in claim 1, characterised by comprising a plurality of panels (36) interposed between the platforms and positioned laterally to them for their levelling with the roadway.

10. A superstructure as claimed in claim 1, characterised by comprising a plurality of turfs (48) positioned between the rails for their levelling with the roadway.

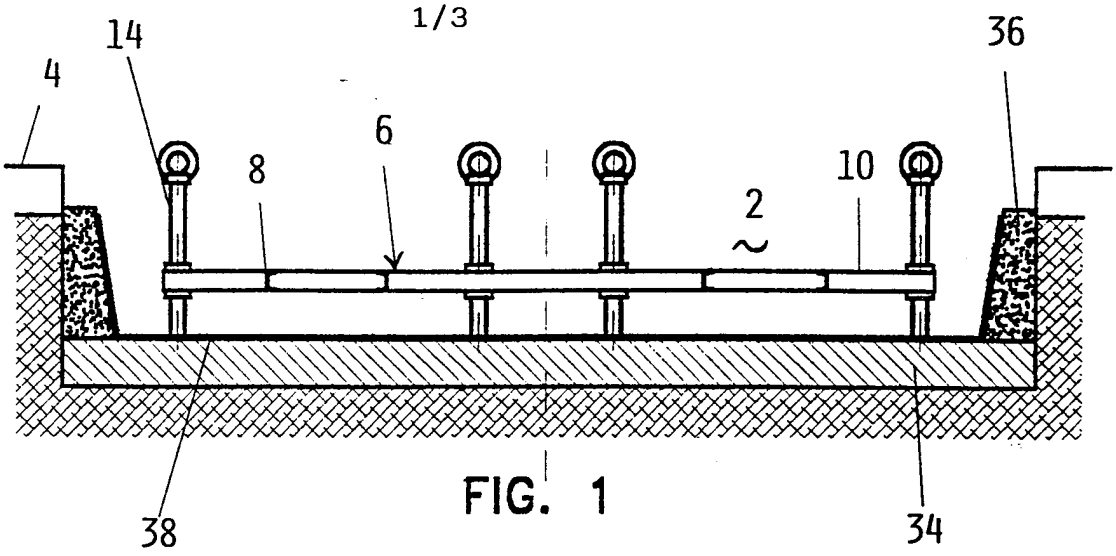

FIG. 1

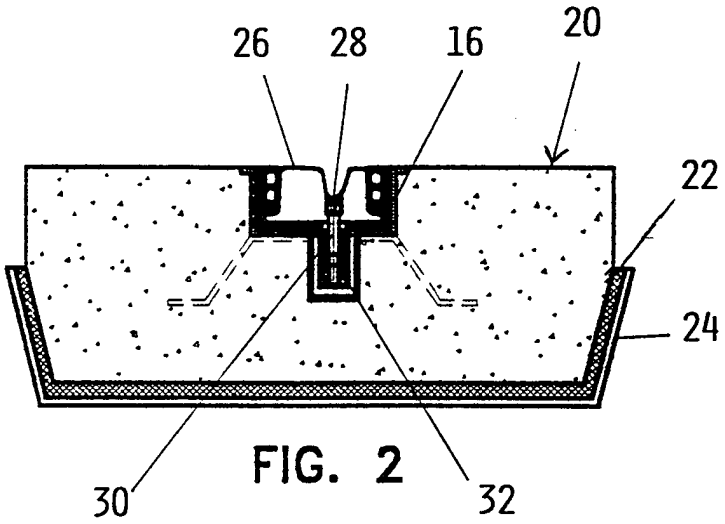

FIG. 2

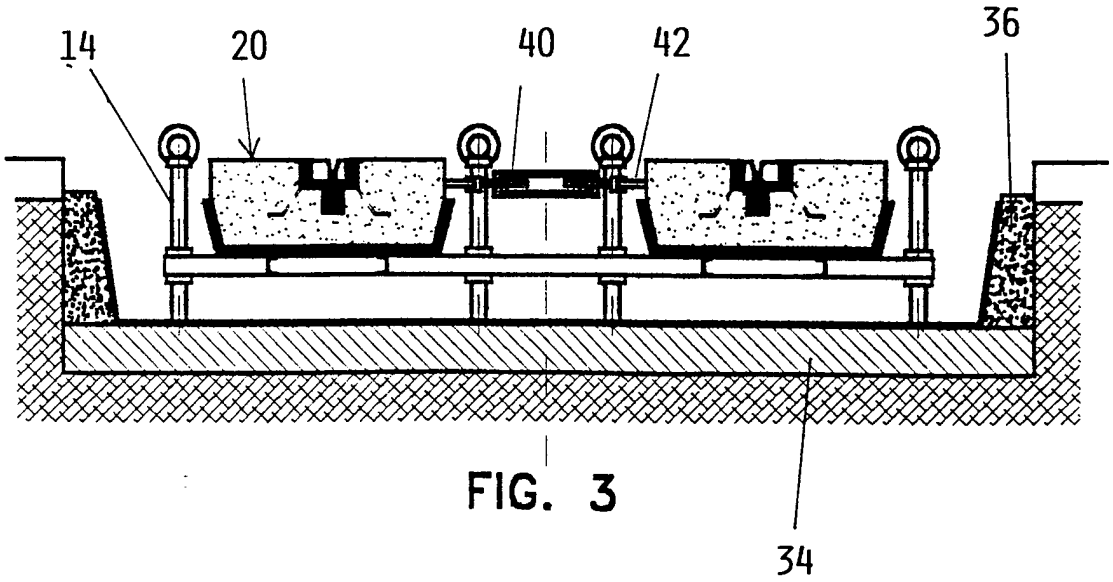

FIG. 3

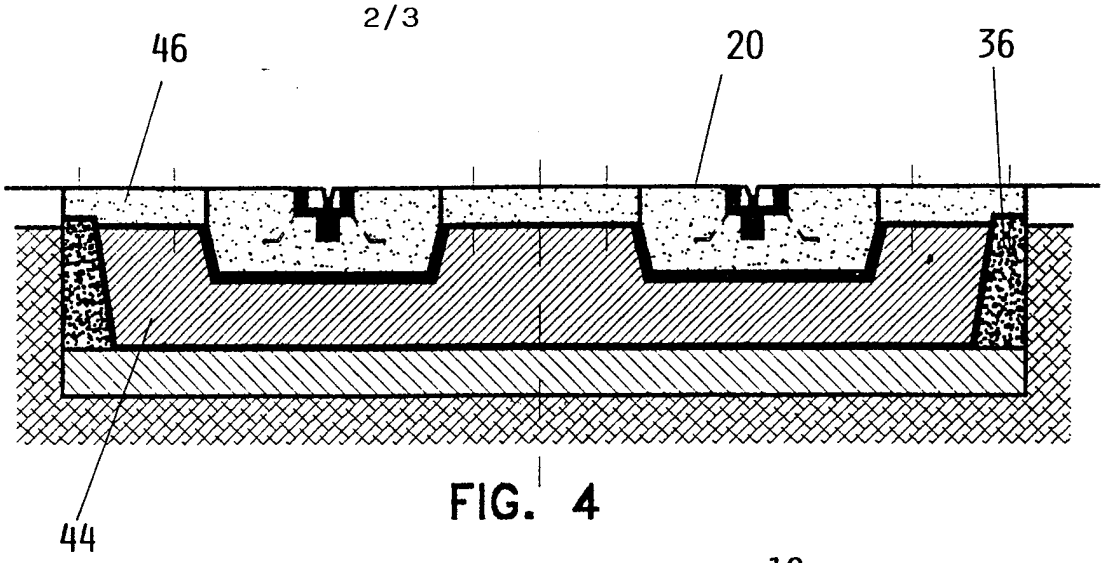

FIG. 4

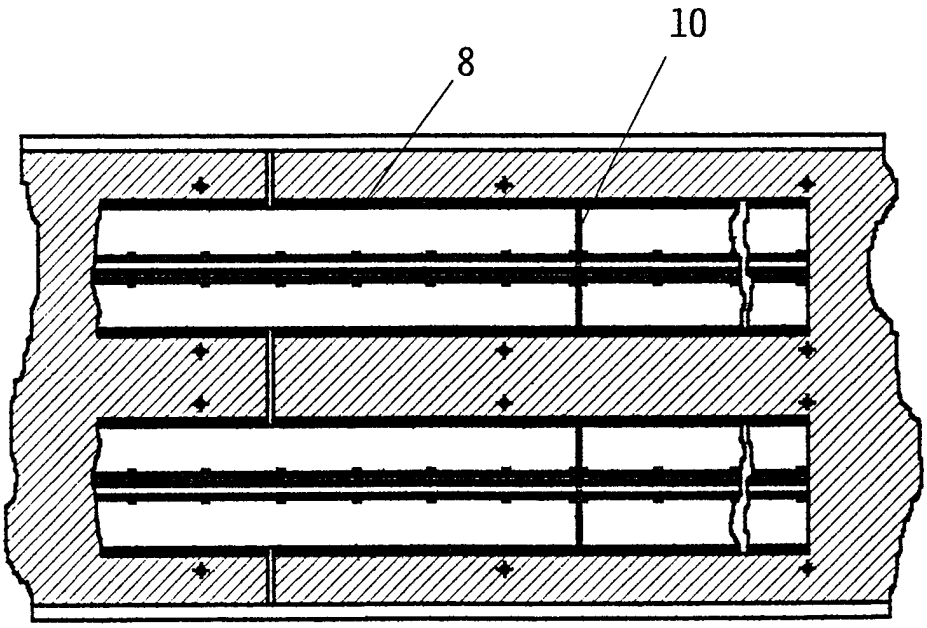

FIG. 5

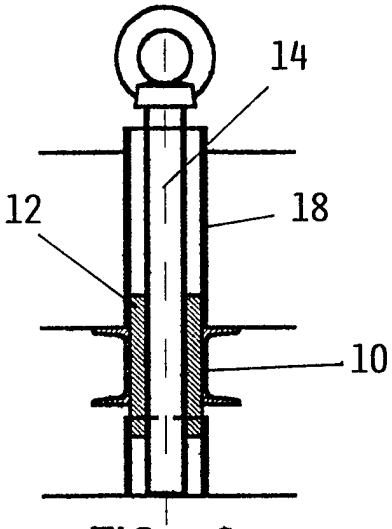

FIG. 6

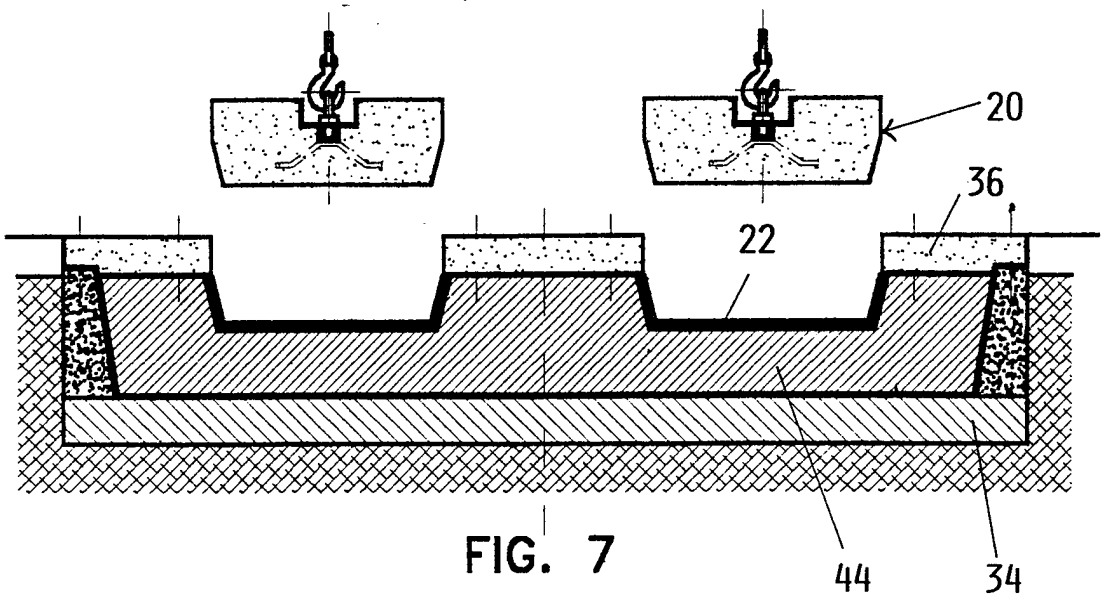

FIG. 7

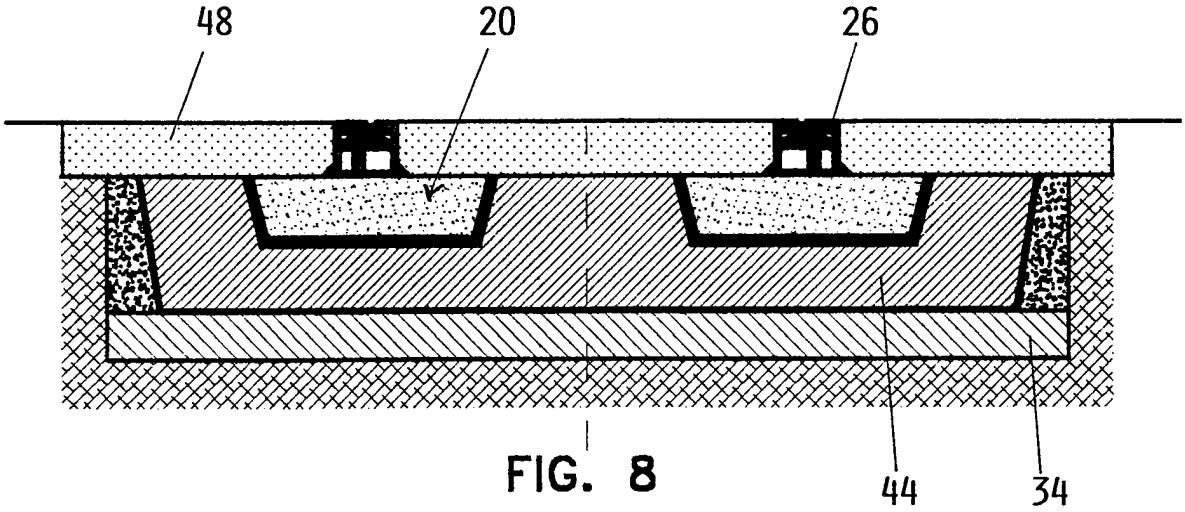

FIG. 8

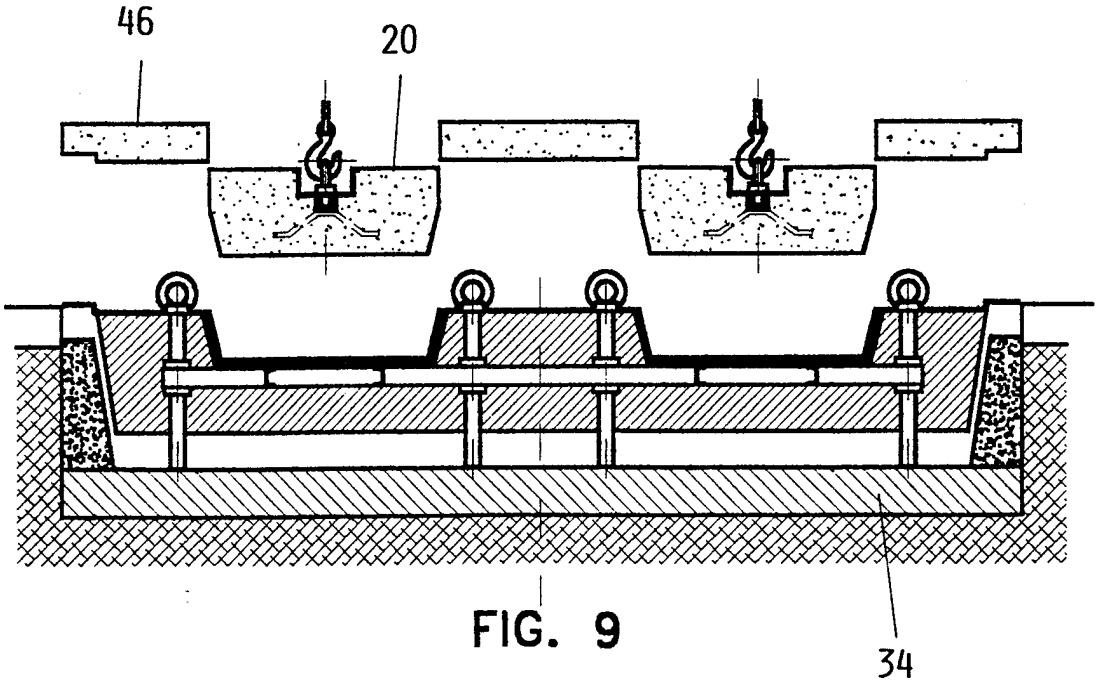

FIG. 9

INTERNATIONAL SEARCH REPORT

I ational Application No	PCT/EP 98/02764

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 E01B21/00 E01B2/00

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Minimum documentation searched (classification system followed by classification symbols)
IPC 6 E01B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	EP 0 697 485 A (MONTCOCOL TP) 21 February 1996 see column 1, line 18 - column 4; figures ---	1-3
A	DE 35 39 225 A (MAX KNAPE GMBH & CO FA) 14 May 1987 see column 1, line 55 - column 4; figure ---	1,3,4
A	FR 2 657 096 A (SUD OUEST TRAVAUX) 19 July 1991 ---	
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[X] Patent family members are listed in annex.

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national Application No
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