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(54) **Title:** DUAL GAUGE-CHANGING DEVICE ON SINGLE PLATFORM

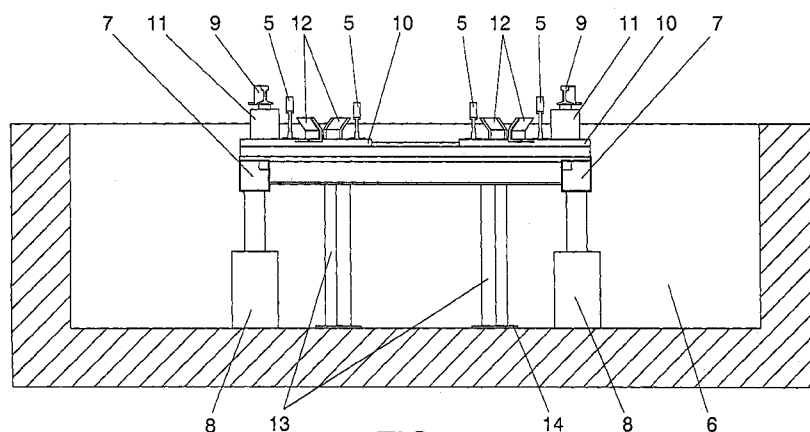


FIG. 4
A-A

(57) **Abstract:** Dual gauge-changing device on single platform. It permits the change of gauge for two different technologies as are TALGO and CAF, in a single platform provided in a pit (6), forming part of which are a set of sliding guides (9), displacement check rails (12) and bolt activation guides (5), usable with both types of train when being located in the corresponding positions. The displacement check rails (12) are fixed to a bracket column (13) emerging from the bottom of the pit (6). The sliding guides (9) and the bolt activation guides (5) are provided on some moving bedframes (10) displaceable in the transverse direction and in turn fixed on two support pieces (7) arranged on hydraulic cylinders (8) anchored to the bottom of the pit (6). The sliding guides (9) are mounted with the mediation of other hydraulic cylinders (11) which rest on the moving bedframes (10).



DUAL GAUGE-CHANGING DEVICE ON SINGLE PLATFORM

OBJECT OF THE INVENTION

The invention relates to a dual gauge-changing device on single platform,
5 presenting notable relevant and advantageous characteristics with regard to platform changing devices currently existing for this task.

It is an object of the invention to eliminate the change of platforms of present-day dual changers with the aim of reducing the space needed for their implementation and reducing overheads, at the same time increasing the
10 reliability.

BACKGROUND OF THE INVENTION

The track gauge changer is the facility where trains change the gauge of their axles in order to pass from gauge 1,435 mm to gauge 1,668 mm and vice versa.

15 Trains pass over a platform at a speed of 15 km/h and, by means of some mechanisms, the separation between the wheels is made wider or narrower.

In Spain there exist two train manufacturers who have developed a gauge change system: TALGO and CAF. Each manufacturer has its own
20 technology and CAF trains can physically only pass over their own platform, as occurs with TALGO trains.

In order to permit both technologies to be able to coexist in the same infrastructure, there currently exist dual changers whose main characteristic is that the gauge change platforms of the two technologies are changed by means
25 of a hydraulic system. Dual changers need to have a width that varies between 9.4 and 12.4 m, which is greater than that of the track box. In spaces with confined clearance, such as in marshalling yards or railway stations, it can be complicated to find a location.

The dual changer has a change time of 5.5 minutes, a time that can be
30 reduced with the dual gauge changer on single platform.

The solution creates a compatible new design of sliding guides, displacement check rails and bolt activation guides that change their position with a hydraulic system, in such a way that, depending on the type of train that is going to use the changer, it is configured in one of the two positions using
35 common elements which permit its locking in such a way that it remains

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supported and secured for the passage of the train.

DESCRIPTION OF THE INVENTION

In general terms, the dual gauge-changing device on single platform, the inventive object, is based on the design of a new assembly of sliding guides, displacement check rails and bolt activation guides that can be used with both
5 types of train, repositioning the sliding guides with a set of hydraulic-electrical mechanisms and retracting the bolt activation guides with a hydraulic system when the configuration is for the passage of CAF trains.

The mechanical assembly rests mechanically locked in the CAF or
10 TALGO passage position. When it is necessary to change the position, let us assume that it is from the TALGO to the CAF position, first of all the rods of the cylinders are mechanically unlocked in order to permit movement and then a movement takes place in the axis perpendicular to the plane of the track of the assembly formed by the sliding and bolt activation guides in order to conceal
15 these latter; simultaneously the assembly comprising the sliding guides is raised up and, once the necessary height has been reached for the passage of CAF trains, the moving bedframes (supports for the structure and endowed with movement) commence a movement in the axis transverse to the track in such a way that the two sliding guides are adjusted to the necessary width for the
20 passing of the CAF trains and the bolt activation guides are displaced as one piece without this accepting the normal passage of trains.

Both the sliding guides and the bolt activation guides are provided with a water lubrication system, which is needed for the TALGO configuration.

The set of moving bedframes is fixed to a support beam at each end and
25 these in turn to the set of main cylinders. Each cylinder is fixed to an anchor plate with leveling capacity. The cylinders have a double mechanical interlocking directly to the rod and hydraulic locking in such a way that guarantees the stability of the assembly.

The displacement check rails are common elements for the two
30 configurations of use and they perform the guiding of the axles gradually with the optimum striking angle for the two types of train. They are fixed to a stiffened bracket-column assembly connected to the pit with leveling anchor plates as we will see clearly later on in the figures.

The fundamental characteristics of the structural elements are:

- 35 ○ They must support the vertical loads produced by the actual

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weight of the platforms (15,000 kg) and of the train (load greater than 36,000 kg).

- 5 ○ It is also considered possible for there to be braking stresses tangential to the platform of 10,000 kg in the longitudinal direction and 10,000 kg in the transverse direction to it.
- The moving bedframes will be actuated by a mechanical spindle and double locking system in order to guarantee at all times the width of the displacement check rails and the bolt activation guides.
- 10 ○ The anchors for the frames to the concrete pit will be created by locating chemical bolts of diameter 30 mm and length 500 mm. A resin of type HIT RE500 from HILTI or similar will be used. Upper and lower nuts will be placed in the bolts. For the leveling of the bedframes, these incorporate four screws per piece.
- 15 The leveling of the support surfaces is very important for making sure that the platforms have adequate supports. In order to complete the assembly and after having assembled, leveled and tested the movement of the platforms, the gaps between the floor of the pit and the base plates will be filled with a
- 20 SIKADUR 42 or similar type resin, which confers sufficient resistance on the supports for withstanding the weight of a train composition circulating on top of the corresponding gauge change platform. The gap between the floor and the base plates of the mechanical elements will also be filled.
- 25 ○ The assembly will be mounted and perfectly leveled in such a way that there are no differences of level between two points in the sliding guides with tolerances of the order of ± 2 mm.
- Given that the design of this changer has been done bearing in mind the reliability and availability of the facility with regard to
- 30 any incident, the elevation and travel systems are prepared with systems that permit manual movement. In the same way, all the mechanical and hydraulic elements have been designed to permit their rapid replacement without any auxiliary means.

The advantages shown by this device are the following:

- 35 ○ Reduction in space. The system is designed for being installed

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in a pit with the same width of track box, and it is able to be located in places in which it has not so far been possible even though it would have been strategically suitable.

- Integration of the CAF, TALGO and dual systems in any of their variants into a single mechanical assembly.
- Mechanical simplicity, since for the configuration of the platform in its TALGO or CAF position there is no need to move large masses as in previous systems and it is possible to use electro-hydraulic displacement systems with a high precision of positioning which guarantee the alignment and fixing of the moving guides; the pit also does not need the special reinforcement zones.
- Economical, as a consequence of the reduction in space, the mechanical simplicity and the integration of the three classical components into a single one, obtaining a notable costs saving.
- Reliability and availability of the facility, since it is possible to position and lock the moving guides by simple and rapid auxiliary means; there are no mechanical elements that could imply obstacles to the movement in degraded or emergency mode; and the mechanical elements that move the platforms can be replaced using manual tools.

In order to facilitate the understanding of the characteristics of the invention and forming an integral part of this descriptive specification, some sheets of plans are attached in which figures the following has been represented by way of illustration and non-limiting.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1.- Is a schematic view in perspective of the device forming the object of the invention, in which can be seen the pit and with the platform being in the TALGO working position.

Figure 2.- Is a schematic view in perspective of the device forming the object of the invention, in which can be seen the pit and with the platform being in the CAF working position.

Figure 3.- Is a plan view of that shown in figure 1.

Figure 4.- Is a cross-section along the line of cut A-A of figure 3.

Figure 5.- Is a plan view of that shown in figure 2.

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Figure 6.- Is a cross-section along the line of cut B-B of figure 5.

Figure 7.- Is a partial view in elevation of that shown in figure 6, on a larger scale.

Figure 8.- Is a partial view in perspective of that shown in figure 7.

5

PREFERRED EMBODIMENT OF THE INVENTION

Making reference to the numbering adopted in the figures, we can see how the dual gauge-changing device on single platform, which the invention proposes, is located inside a pit and permits the TALGO and CAF configurations, giving continuity to the track both at the entrance to the changer and at the exit from it.

10

In figure 1, the CAF configuration is in a position to permit the change of gauge and in figure 2 it is the TALGO configuration that is in a position to permit the change of gauge. In these same figures, on the right can be seen the fixed sections of track of gauge 1,435 mm, referenced with 1, and on the left those of gauge 1,668 mm, referenced with 2.

15

The connection ends of the platform with said fixed sections 1 and 2 include separate track sections 3 and 4, as an extension of them.

The bolt activation guides are referenced with the number 5.

Located in the pit 6 is the platform of the dual gauge changer.

20

The change of configuration is carried out on the support beams 7 which are vertically displaceable by means of the main hydraulic cylinders 8. The sliding guides 9 are horizontally displaced due to being linked to some moving bedframes 10 by means of spindles. Other cylinders 11 are responsible for adjusting the corresponding height to the sliding guides 9, when these are directly coupled on them.

25

The set of moving bedframes 10 rests on the support beams 7.

In the TALGO configuration the cylinders 11 have the rod retracted and the cylinders 8 have the rod extended. In the same way the moving bedframes 10 are at the limit position at the maximum width.

30

In the CAF configuration the cylinders 11 have the rod extended and the cylinders 8 have the rod retracted. In the same way the moving bedframes 10 are at the limit position at the minimum width.

All the moving elements are mechanically locked in the limit positions and are also associated with limit switches, both the cylinders and the locks.

35

The displacement check rails 12 are fixed to the bracket-column

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assemblies **13** with screws and nuts and these assemblies are in turn welded to the leveling anchor plates **14**.

The fixing of the plates **14** to the bottom of the pit **6** will be done by means of chemical bolts in which upper and lower nuts will be provided, in such a way that the appropriate screws are incorporated in order to level the moving bedframes **10**, the leveling of the support surface being important for making sure that the platforms have suitable supports. All this is in such a way that at the end of the assembly and after having mounted, leveled and tested the movement of the moving elements, the gaps between the floor of the pit and the base plates will be filled with a resin, which confers sufficient resistance on the supports for withstanding the weight of a train composition circulating on top of the corresponding gauge change platform. The gap between the floor and the base plates of the mechanical elements will also be filled.

The bedframes thus constituted provide effective support for vertical loads produced by the actual weight of the platforms and of the train, which can be established at 15,000 kilograms for the platform and 36,000 kilograms for the train, also considering possible braking stresses tangential to the platform of approximately 10,000 kilograms in the longitudinal direction and 10,000 kilograms in the transverse direction.

The hydraulic facility assembly which will form part of the system will include a main hydraulic plant with two electric motors coupled to individual double pumps which will supply the appropriate working pressure, with some blocks of electrovalves for movement of the facility being located at the outlet of the pressure line, these movements being managed by a programmable automaton.

The emergency movements that are performed with the auxiliary explosion motor will be carried out by means of regulators located in a manual command panel mounted in an accessible position inside the changer.

The hydraulic oil ducts for the actuation of the different cylinders which the facility includes are made of rigid piping located on the bedframes, between the metal profiles. The connection of the cylinders is carried out with flexible strips category R2.

Moreover, backed onto the said main hydraulic plant is an explosion motor coupled to a double pump for being able to move the facility in the event of failure of the electricity supply or failure of the automata, with both the main

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plant and the auxiliary one being installed in a module that is prefabricated or located on the outside where the cupboards for the electrical distribution and for the programmable automata for movement control will be located. Associated with the explosion motor are some regulators located in a manual command
5 panel mounted in an accessible place for controlling the emergency movements originated by that explosion motor.

In terms of the electronic facility which will be located on the corresponding pit 6, this will comprise the programmable automaton, already mentioned, which will be located in a prefabricated module outside of the pit
10 and together with the hydraulic plants, which programmable automata will manage the controls, the orders, as well as the information on the changer, the restrictions imposed on the actual changer and the communications among components, likewise including the limit switches which report the relative positions of the maneuvers, as well as analog displacement transducers, anti-
15 intrusion barrier and photoelectric cells which halt the movements if any intrusion takes place while a maneuver is being carried out.

The electronic facility likewise includes light and acoustic indicators giving warning that movements are being carried out and that one platform is locked, while the other is being moved into the working position, furthermore
20 comprising a logic safety box which takes the signals from the limit switches and determines which platform is being positioned, all this complemented with the appropriate control means and other elements for the correct functioning of the entire system.

CLAIMS

1.- DUAL GAUGE-CHANGING DEVICE ON SINGLE PLATFORM,
which, being intended for permitting compatibility between two types of gauge
change systems corresponding to different technologies, as are TALGO and
5 CAF, where the corresponding mechanisms with which the gauge change is
carried out are located in a pit (6), is characterised in that it comprises a set of
displacement check rails (12) fixed to a bracket column (13) and this to the pit
(6), as well as some moving bedframes (10) with vertical and horizontal
10 displacement for some bolt activation guides (5) and some sliding guides (9),
the horizontal movement being assured with some spindles and the vertical
movement with hydraulic cylinders (8, 11), these moving bedframes (10) being
in turn fixed to two support beams (7) which are vertically displaced by means
of the hydraulic cylinders (8) anchored to the bottom of the pit (6); being
15 complemented with a main hydraulic plant to which are associated some motors
coupled to respective double pumps for supplying the correct actuation position
of the hydraulic elements, and including the corresponding electronic facility for
the functioning of the entire system.

2.- DUAL GAUGE-CHANGING DEVICE ON SINGLE PLATFORM,
20 according to claim 1, characterised in that the displacement check rails (12)
have been designed with a striking angle that can be used by CAF and TALGO
technologies, being fixed to the pit (6) with a structure that is compatible with
the rest of the moving structures.

3.- DUAL GAUGE-CHANGING DEVICE ON SINGLE PLATFORM,
25 according to claim 1, characterised in that the sliding guides (9) have been
designed for being used by CAF and TALGO technologies, being equipped with
a lubrication system and supported directly on other hydraulic cylinders (11).

4.- DUAL GAUGE-CHANGING DEVICE ON SINGLE PLATFORM,
according to claim 1, characterised in that the bolt activation guides (5) have
30 been designed to be integral with the moving bedframes (10) for being
concealable when the configuration of the platform is CAF, and equipped with a
lubrication system.

5.- DUAL GAUGE-CHANGING DEVICE ON SINGLE PLATFORM,
according to claim 1, characterised in that the moving bedframes (10) are fixed
35 on support beams (7) reinforced and equipped with securing housings for the

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rods of the main hydraulic cylinders (8) and their locking system.

6.- **DUAL GAUGE-CHANGING DEVICE ON SINGLE PLATFORM**,
according to claim 1, characterised in that the moving bedframes (10) are
equipped with a horizontal displacement system by means of spindle and
5 double mechanical interlocking and a vertical displacement system with
hydraulic cylinders (8) provided with double mechanical interlocking, in such a
way that it is possible to position these sliding guides (9) and bolt activation
guides (5) in the CAF and TALGO configurations, and each moving bedframe
(10) is stiffened in order to guarantee the width of all the sliding guides (9) and
10 bolt activation guides (5).

7.- **DUAL GAUGE-CHANGING DEVICE ON SINGLE PLATFORM**,
according to any of the above claims, characterised in that it includes a
programmable automaton for managing the movements of the different
components.

15 8.- **DUAL GAUGE-CHANGING DEVICE ON SINGLE PLATFORM**,
according to any of the above claims, characterised in that it includes an
auxiliary explosion motor associated with a double pump for permitting
actuation in the event of a failure of the electricity supply or of the respective
automatism of the system, said actuation being carried out by means of the
20 appropriate regulators provided in a control panel.

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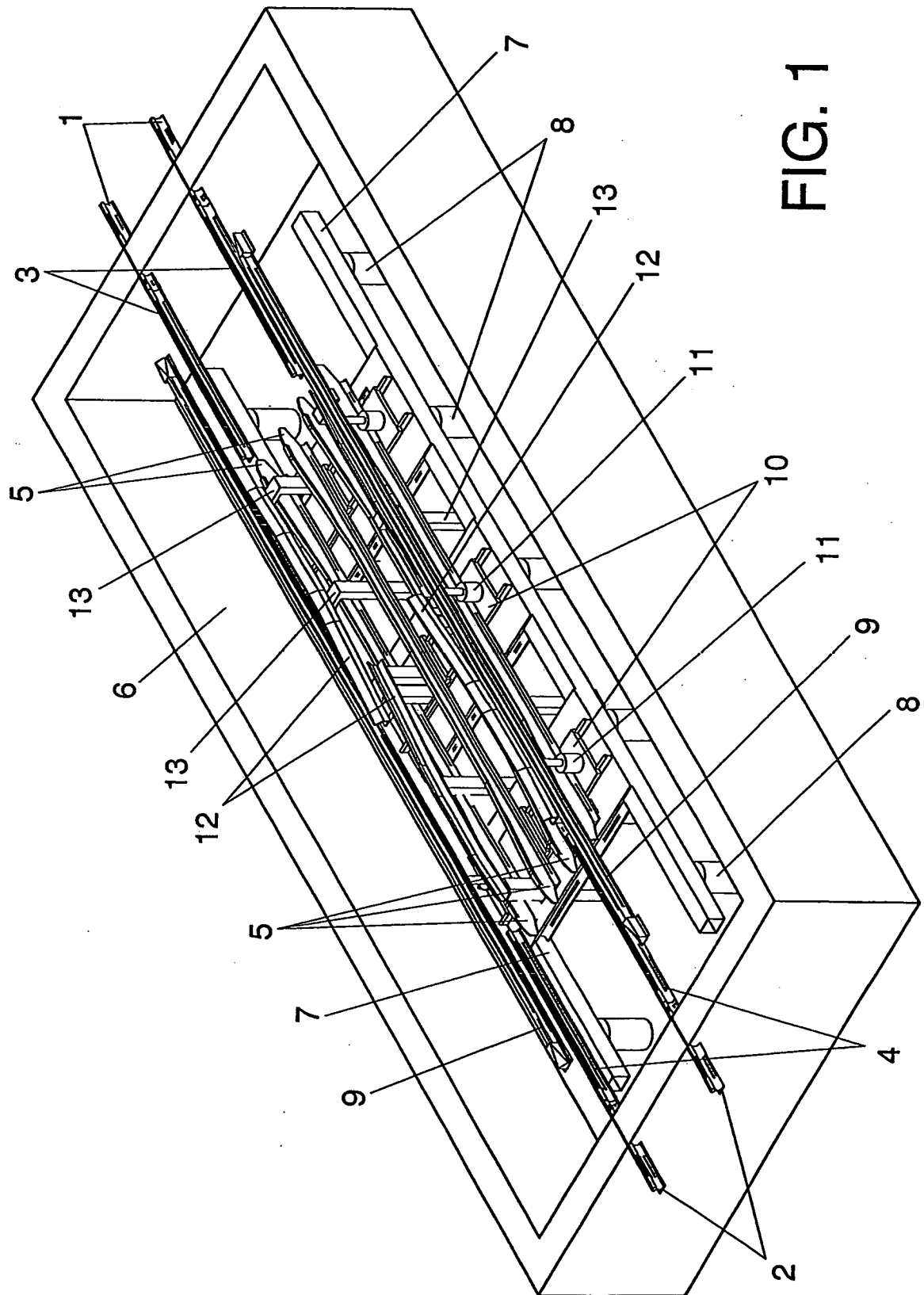
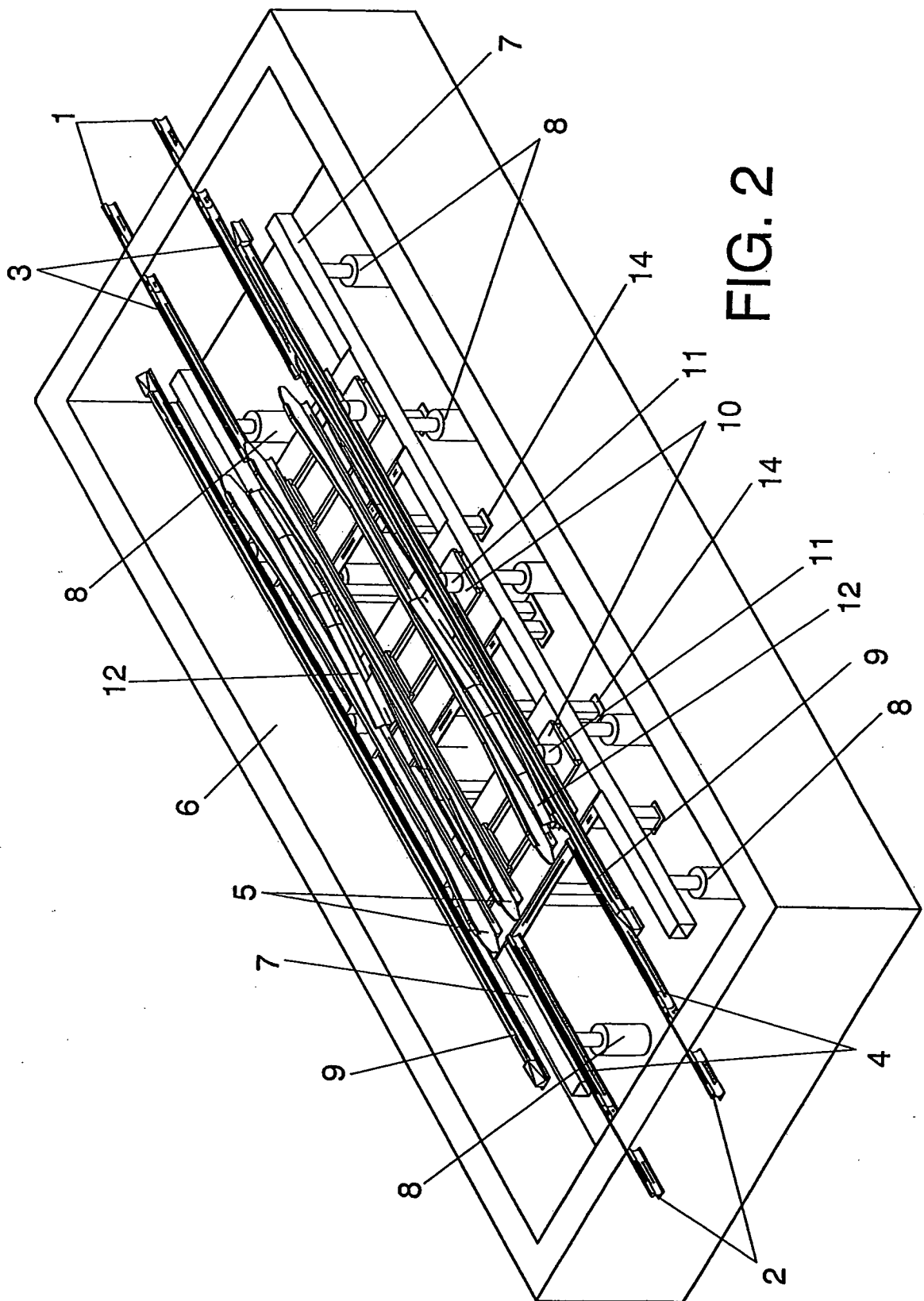


FIG. 1

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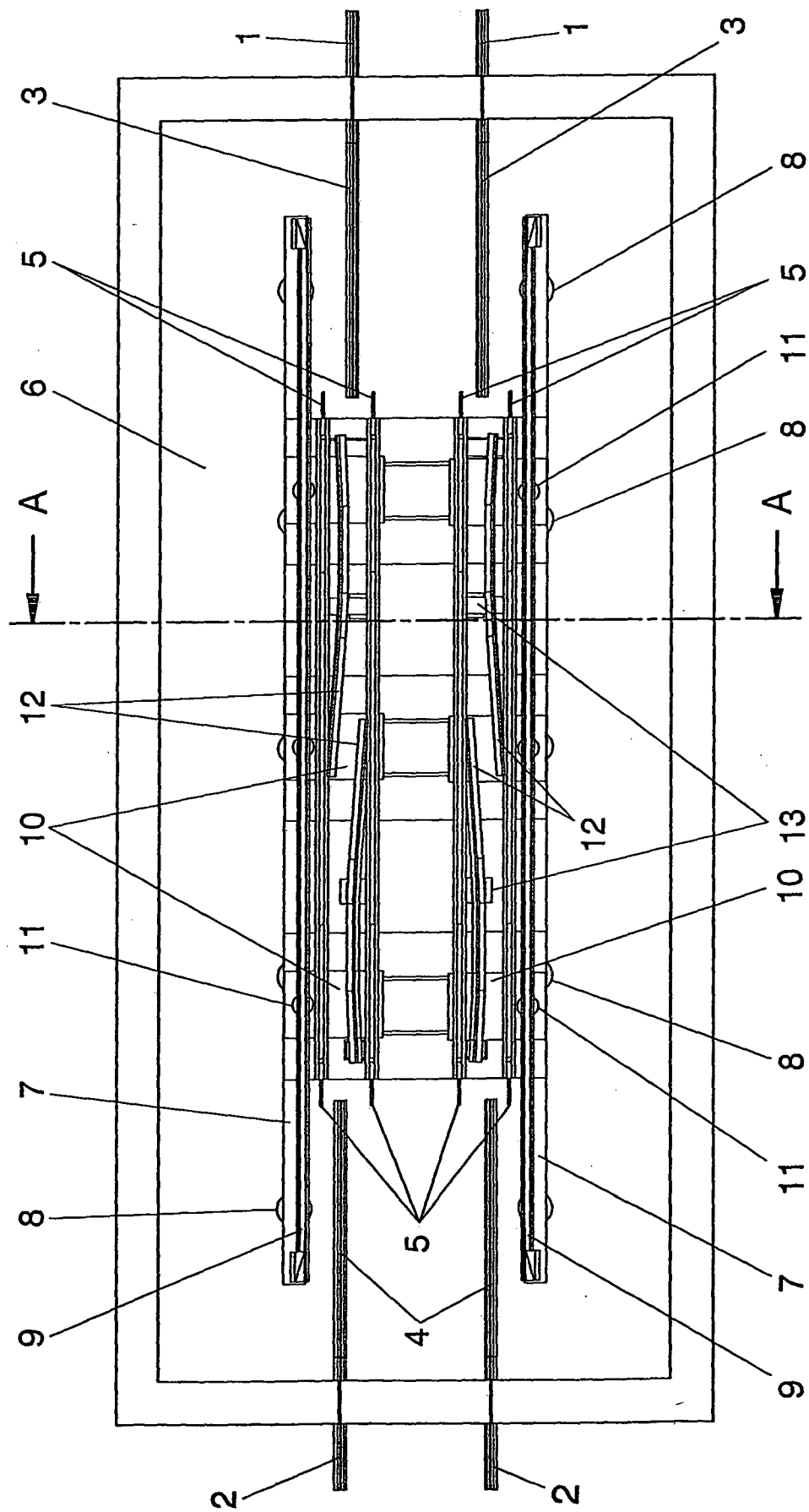


FIG. 3

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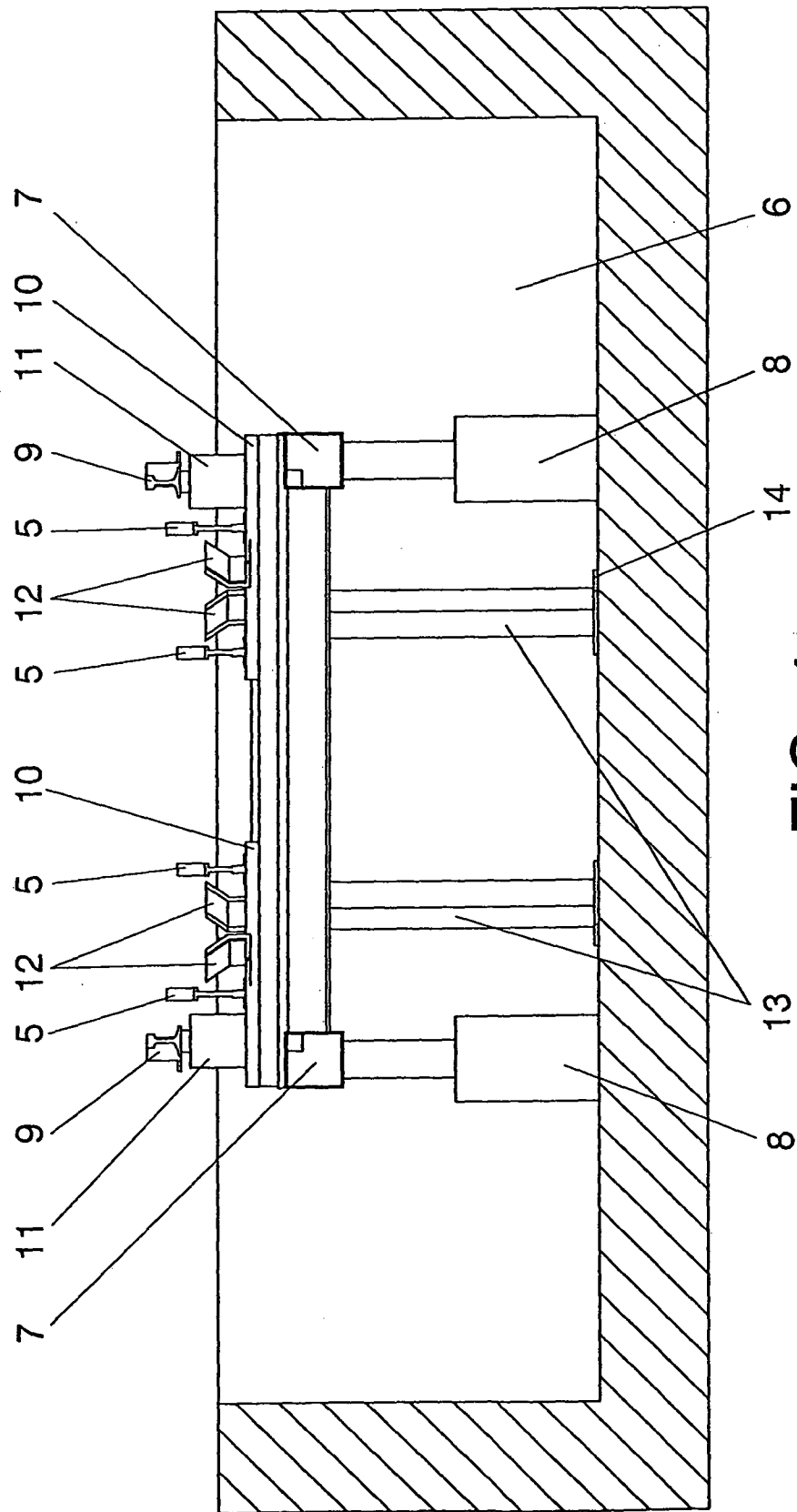


FIG. 4
A-A

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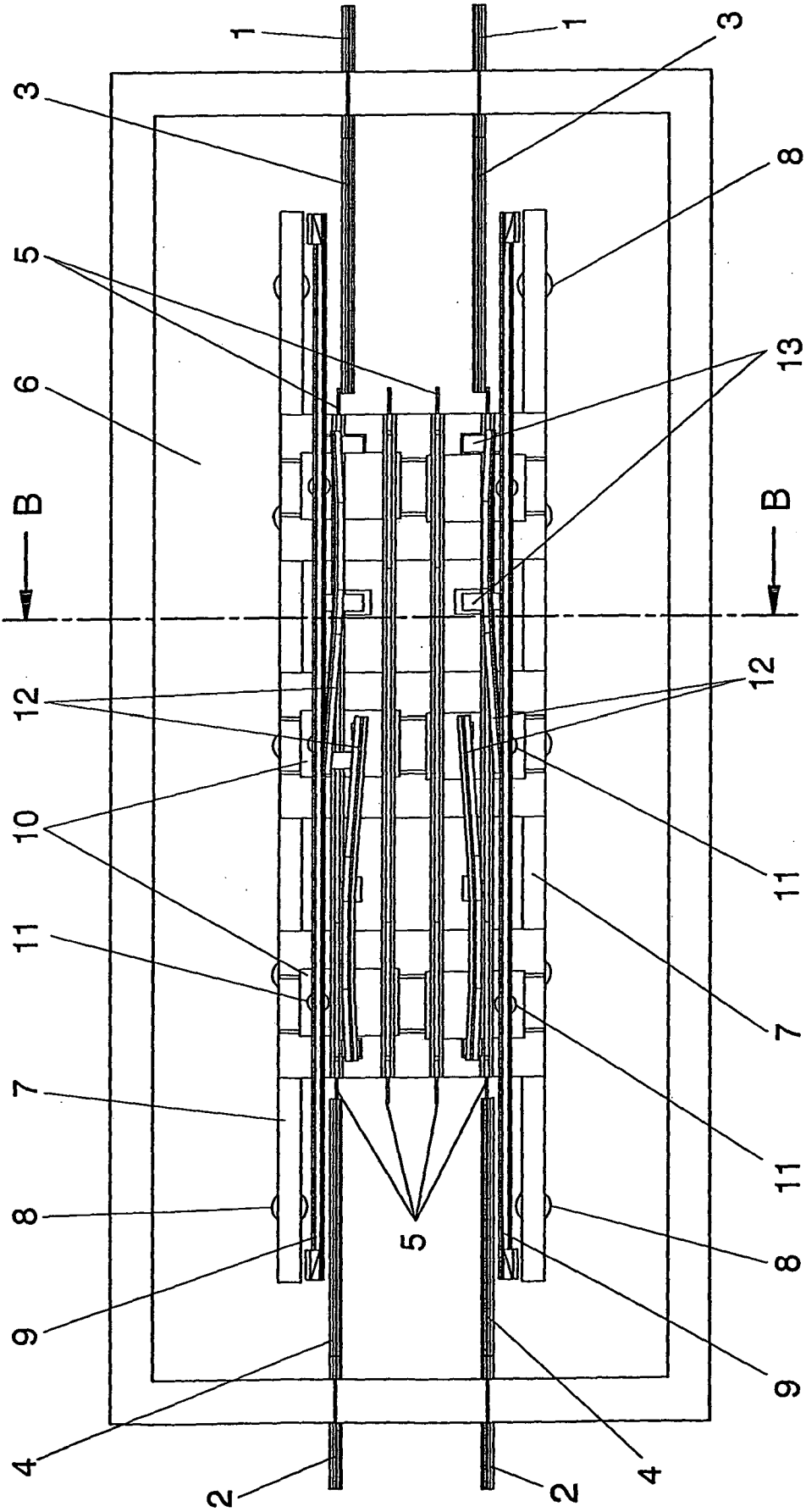


FIG. 5

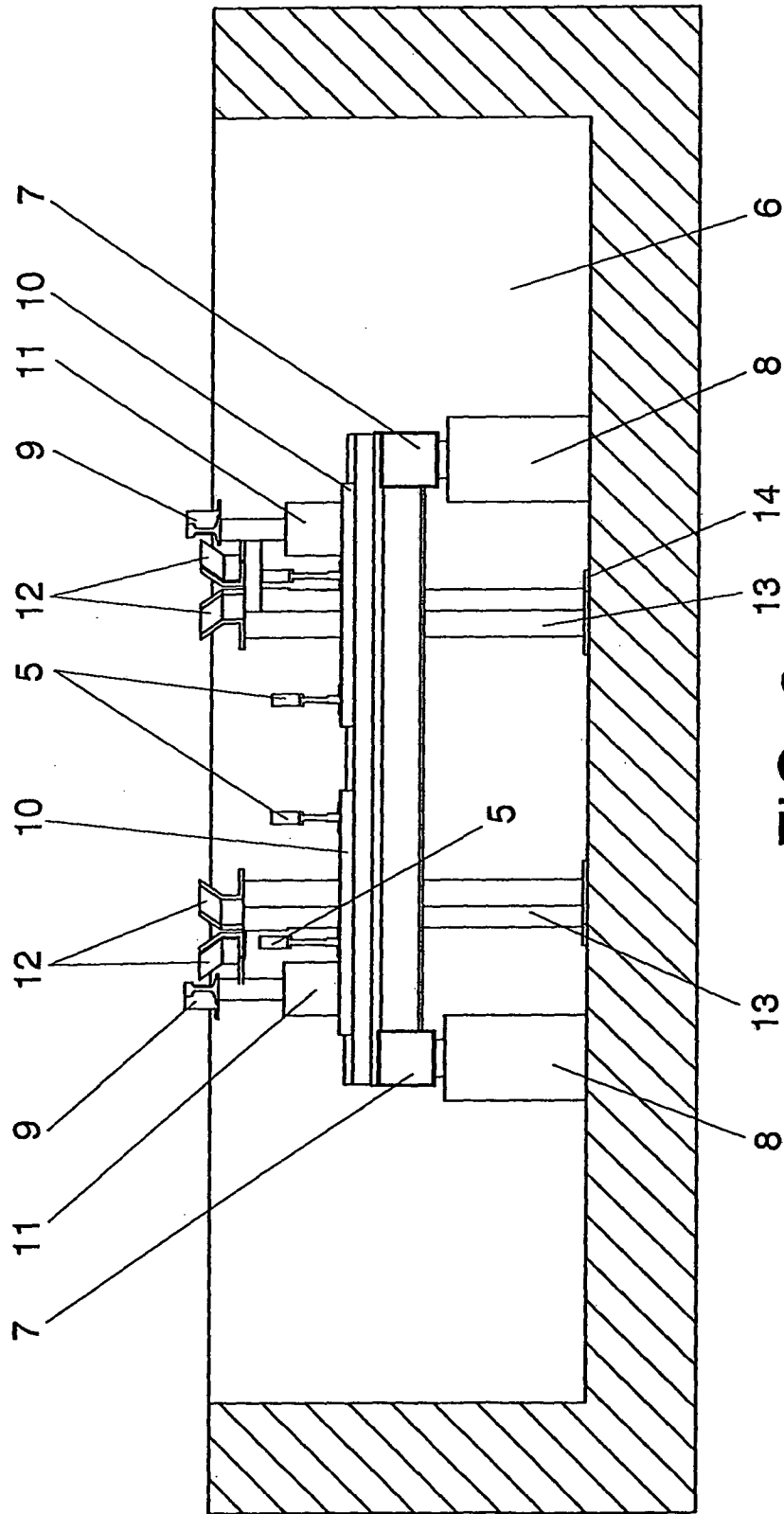


FIG. 6
B-B

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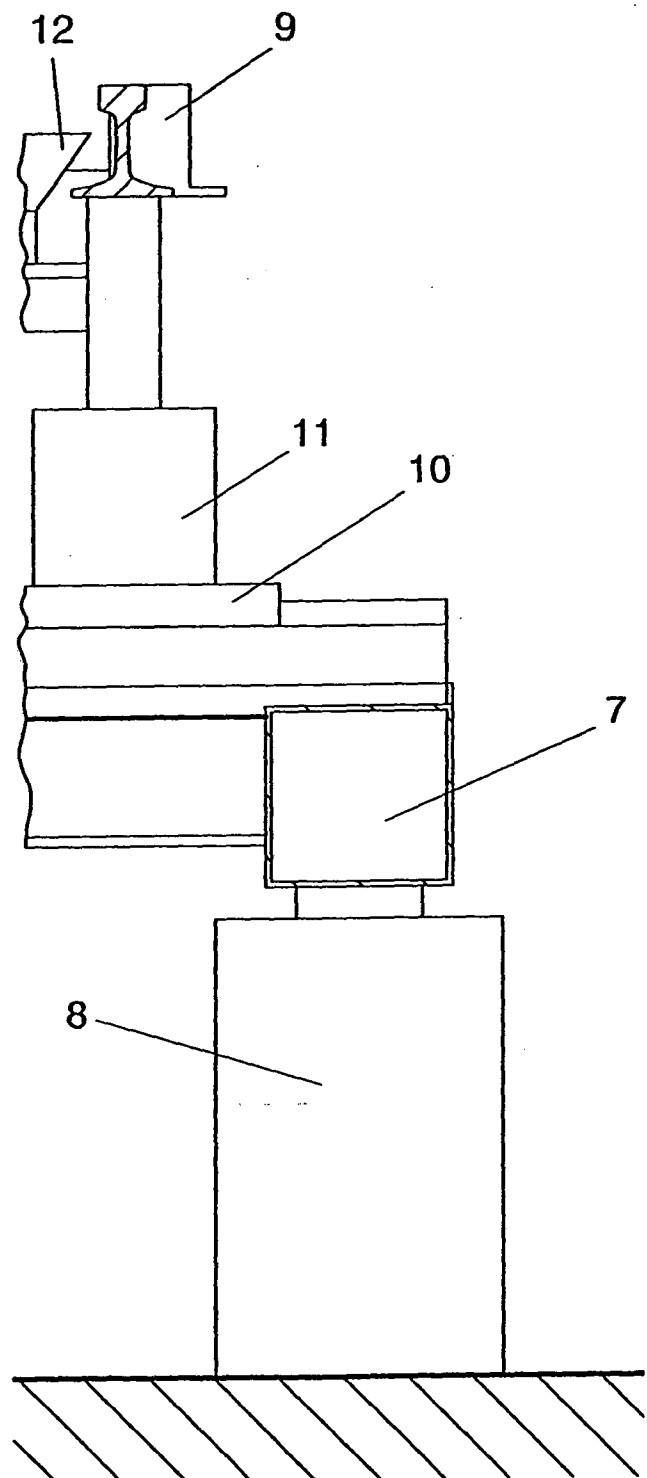


FIG. 7

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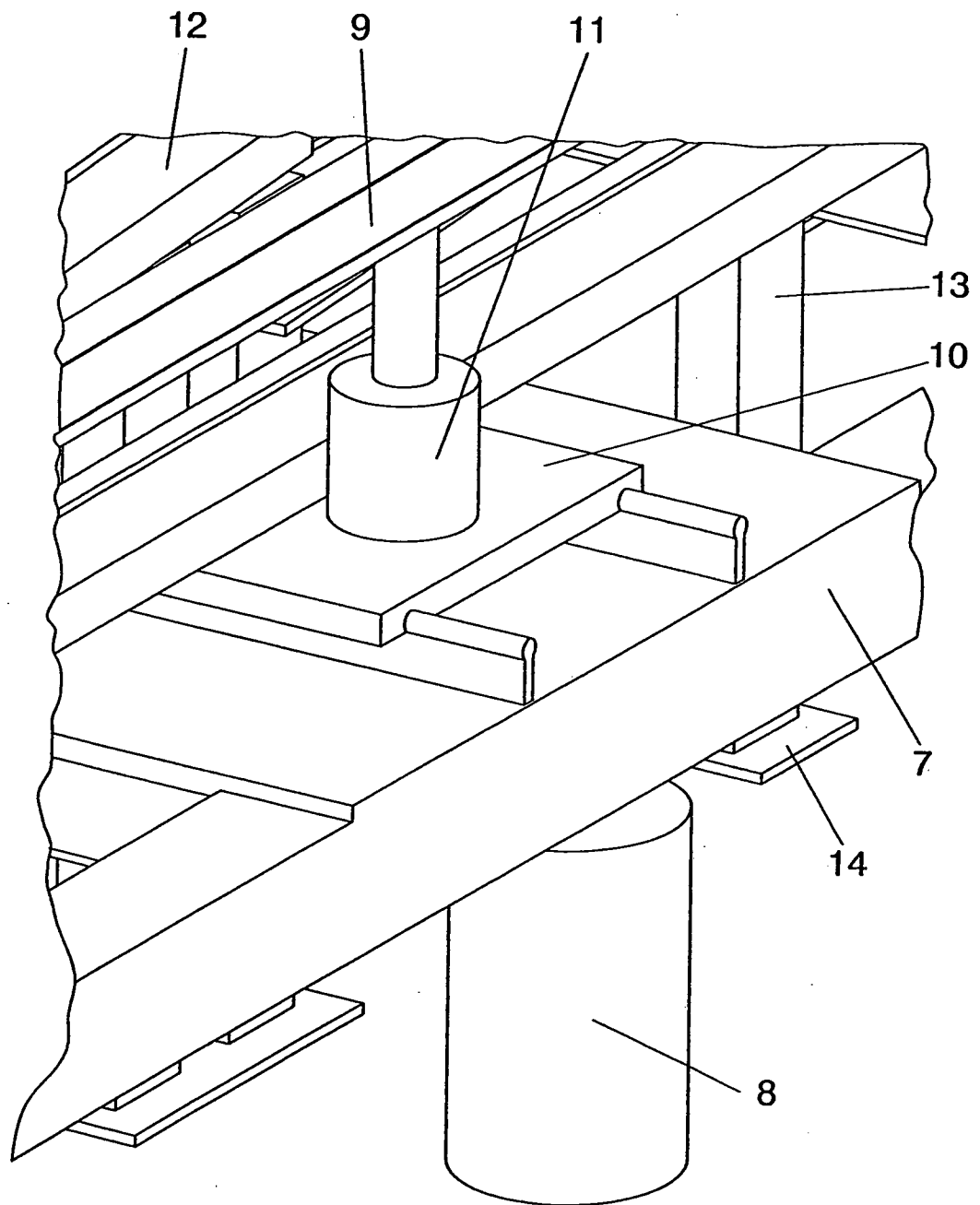


FIG. 8