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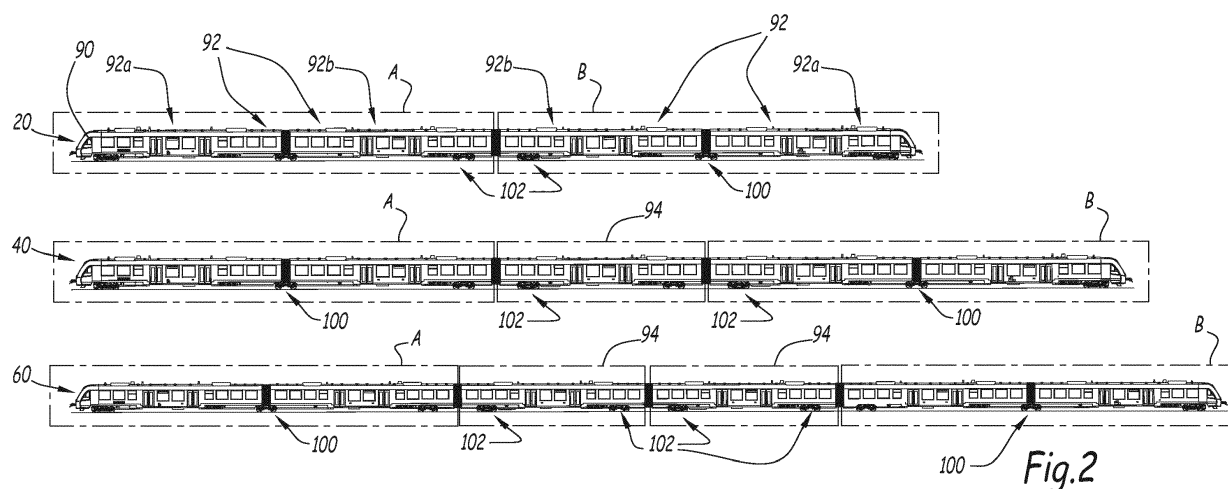
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(54) **MODULAR PASSENGER TRAIN**

(57) Modular passenger train (90) comprising:
- two couples (A, B) of articulated railcars (92), each couple (A, B) including an end railcar (92a) and an adjacent railcar (92b) connected each other through respective articulated bogies (100), said couples (A, B) of articulated railcars (92) being placed at respective ends of said mod-

ular passenger train (90), and
- a predetermined number of intermediate railcars (94), connected between the adjacent railcars (92b) of each couple (A, B) of articulated railcars (92).



Description

[0001] The present invention relates to a modular passenger train.

[0002] It is known that trains for railway applications can be assembled by coupling individual railcars with either articulated or non-articulated bogies.

[0003] Document US20020073878 A1 discloses a system for articulating trains having mixed articulated and non-articulated cars.

[0004] In particular, it discloses that in a railyard, wheelless railroad freight cars can be loaded with freight and then individually sent over a hump to connect to a train being formed. The cars can be sent over the hump to be stopped by bumpers which are individually sent over the hump to take position between the cars being articulated in the yard.

[0005] Cars having one side with an instant articulation device permanently attached thereto can be sent over the hump to have their wheelless other side supported by the articulating device of a car already previously sent over the hump.

[0006] An articulation device can be sent over the hump to connect to the engine of the train or to other railcars. This allows the train to mix articulated and non-articulated cars in the same train.

[0007] Document CH708807 (A1) and internet disclosure <http://www.astrarail.com/products/sggrss-80/> describe non-driven railcars having non-articulated bogies at one end and articulated bogies at the other end. Such railcars can be coupled with other railcars having either non-articulated or articulated bogies.

[0008] The trains referred to in the above indicated documents are freights trains, but nowadays, also passenger trains have the possibility to be decoupled for maintenance purposes. In particular, on the market, there are articulated as well as non-articulated trains, and even a mix of these solutions, as for example the trains of Stadler produced for the Brünigbahn in Switzerland.

[0009] Figure 1 shows a lateral view of three configurations 2, 4, 6 of a freights train 9 according to the prior art, wherein only articulated bogies 10, also known as Jakob bogies, are used.

[0010] In case the passenger capacity of the train 9 in the first configuration 2 has to be increased to reach the second configuration 4, or the third configuration 6, it is necessary to bring the train to the depot to change its structure by adding extra railcars, or to connect together two trains 9.

[0011] Nowadays, in particular for intercity trains, there is an increased demand to have more passenger capacity with longer trains. However, due to the need bring each time the train to the depot to change its structure to modify the number of railcars or to connect together two trains, these operations are time consuming and expensive.

[0012] One object of the present invention is therefore to provide a modular passenger train which allows to add

or to take out railcars in an easy and comfortable way, without the need to bring the train in the depot for modifying its structure, in order to have great flexibility in the train length configuration.

[0013] This and other objects are achieved by a modular passenger train having the characteristics defined in claim 1.

[0014] Preferred embodiments of the invention are the subject matter of the dependent claims, whose content is to be understood as forming an integral part of the present description.

[0015] Further characteristics and advantages of the present invention will become apparent from the following description, provided merely by way of non-limiting example, with reference to the enclosed drawings, in which:

- Figure 1 shows a lateral view of four configurations of a freights train according to the prior art; and
- Figure 2 shows a lateral view of four configurations of a modular passenger train according to the present invention.

[0016] Figure 2 shows a lateral view of three configurations 20, 40, 60 of a modular passenger train 90 according to the present invention, each configuration 20, 40, 60 including articulated bogies 100 and non-articulated bogies 102.

[0017] In particular, the modular passenger train 90 in the first configuration 20 comprises two couples A and B of articulated railcars 92. Each couple of articulated railcars 92 comprises an end railcar 92a, which is a locomotive, and an adjacent railcar 92b, connected each other through respective articulated bogies 100.

[0018] In the second configuration 40 and in the third configuration 60, the train 90 comprises the same couples A and B of articulated railcars 92 placed at respective ends of the modular passenger train 90 itself, and a predetermined number of intermediate classical railcars 94, each comprising two non-articulated bogies 102, connected between the adjacent railcars 92b of each couple A, B of articulated railcars 92.

[0019] The intermediate railcars 94 are connected each other and are connected to the respective adjacent railcars 92b in a manner known per se.

[0020] Thanks to such modular configuration it is possible to easily increase the length of the passenger train 90 from the first configuration 20 by simply adding a predetermined numbers of intermediate railcars 94.

[0021] Thanks to the configuration of the present invention, it is not necessary to have an auxiliary bogie to support the carbody of the train 90 for coupling/decoupling the intermediate railcars 94.

[0022] The modular passenger train 90 in the second 40 and third 60 configuration comprises articulated bogies 100 only at its ends (in the articulated railcars 92); in the central portion (in the intermediate railcars 94) there are only standard non-articulated bogies 102.

[0023] The intermediate classical railcars 94 have no motorized bogie and no traction equipment. A train control and monitoring system (TCMS) provided in a manner known per se on the modular passenger train 90, is able to set, in a manner per se known by using software products, the configuration of the train itself by adding or removing one or more intermediate railcars 94.

[0024] The modular passenger train 90 of the present invention can have a length ranging from 50m to 200m and it can be easily decoupled, for maintenance purpose and without any auxiliary bogie, by simply disconnecting the coupler present between the railcars.

[0025] In a preferred embodiment of the invention, the modular passenger train 90 is a low-floor passenger train.

[0026] In this case, the modular low-floor passenger train 90 is adapted to allow level boarding either at about 550mm or about 760 mm platforms.

[0027] The traction of the modular passenger train 90 is concentrated on the articulated end railcars 92 (in particular, the locomotive 92a) and the train 90 can be either standard or broad gauge.

[0028] The modular passenger train 90 of the present invention is therefore based on a mixed articulated and non-articulated configuration in order to reach highest flexibility and different comfort levels. Thanks to the facility of the assembly operation of the railcars, it is possible to put in the train 90 first or second class railcars, bistros, quiet areas or multipurpose areas, etc.

[0029] One big advantage of the modular passenger train of present invention with respect to the solution based on joining together two different trains is that the passengers are able to transit on the full length of the train rather than being stopped in correspondence of the end of the train on which they were originally placed. In this way, for example, it is possible to have on the train itself only one coffee bar car, with a reduced overall cost, because it can be accessed from all point of the train, this solution not being possible in the case for two adjacent trains coupled together.

[0030] The length of the train can be adapted to the capacity needs as well an increase of installed power via motorized bogies.

[0031] The arrangements of the present invention allow a wider choice of train car types and lengths, with the possibility to easily decouple the trains in the workshop for maintenance purposes, without any need for an auxiliary bogie.

[0032] Clearly, the principle of the invention remaining the same, the embodiments and the details of production can be varied considerably from what has been described and illustrated purely by way of non-limiting example, without departing from the scope of protection of the present invention as defined by the attached claims.

- two couples (A, B) of articulated railcars (92), each couple (A, B) including an end railcar (92a) and an adjacent railcar (92b) connected each other through respective articulated bogies (100), said couples (A, B) of articulated railcars (92) being placed at respective ends of said modular passenger train (90), and

- a predetermined number of intermediate railcars (94), each comprising two non-articulated bogies (102), connected between the adjacent railcars (92b) of each couple (A, B) of articulated railcars (92).

2. Modular passenger train (90) according to claim 1, wherein the end railcar (92a) is a locomotive.
3. Modular passenger train (90) according to claim 1 or 2, wherein the train (90) is a low-floor passenger train.
4. Modular passenger train (90) according to any of the preceding claims, wherein the train has a length comprised in the range from 50m to 200m.

Claims

1. Modular passenger train (90) comprising:

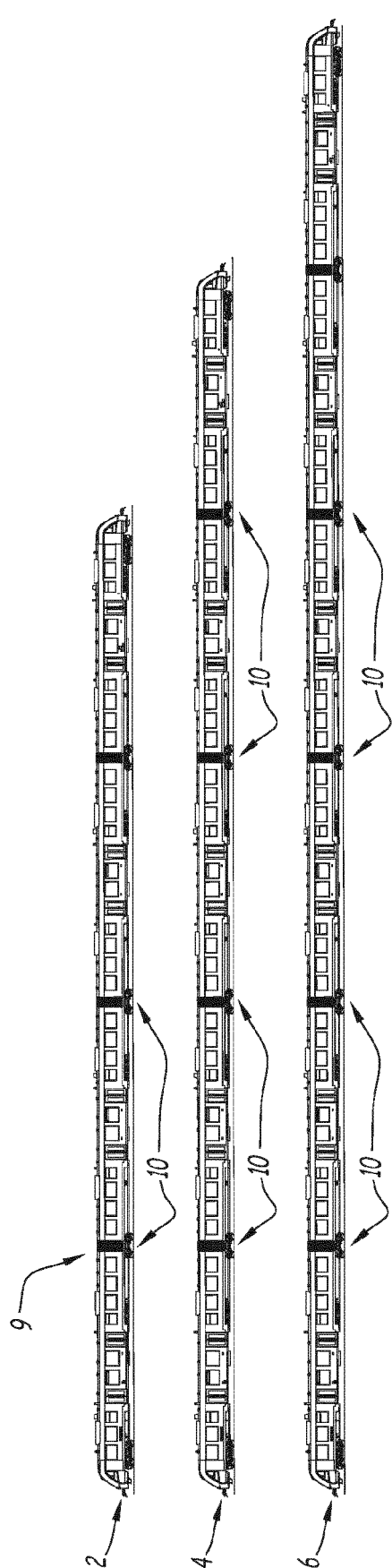


Fig. 1

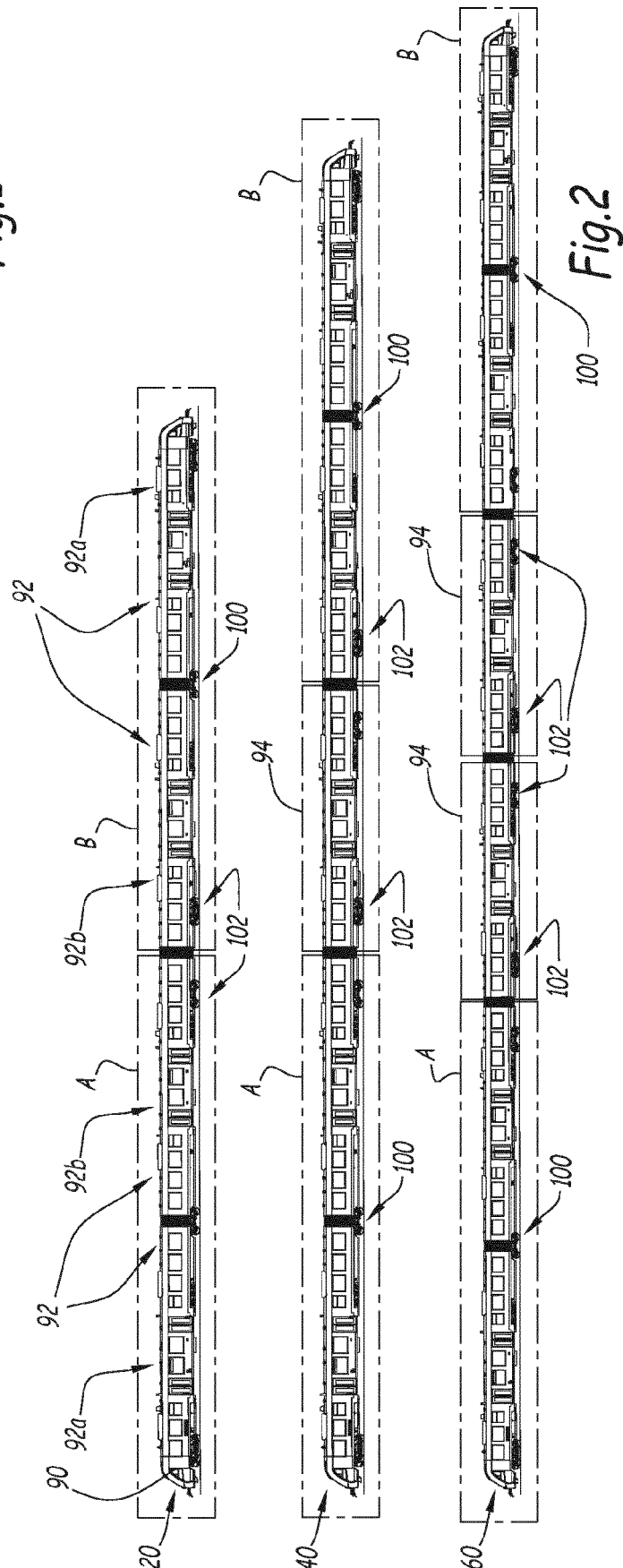


Fig. 2



EUROPEAN SEARCH REPORT

 Application Number
 EP 17 30 6562

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 April 2018	Examiner Crama, Yves
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 17 30 6562

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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