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(12) # EUROPEAN PATENT SPECIFICATION

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(54) **Automatic vehicle parking apparatus with means for storing and automatically removing vehicles.**

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**FR-A- 2 049 554**
**GB-A- 1 102 661**
**GB-A- 2 166 721**

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## Description

The present invention relates to an automatic vehicle parking apparatus, provided with means for storing/arranging and automatically removing vehicles.

Automatic vehicle parking apparatus are already known, in which each motor vehicle is taken up from a vehicle input zone, and then automatically arranged in a compartment or storing space; such an apparatus is moreover designed so as to remove a vehicle from its respective compartment and convey it to a reception zone.

In a known embodiment of such an apparatus, the vehicle storing compartments are arranged on several floors and each vehicle is brought to its storing compartment by means of a lifting device which is transversely displaced to be arranged in a vehicle removing zone where there are provided fork raising devices or means adapted to transversely displace the vehicle to arrange it in its provided compartment.

These parking apparatus, however, are very complex construction wise, since the vehicle handling means are subjected to a great wear and, moreover, can damage the vehicle to be handled.

Moreover, known vehicle parking apparatus are affected by several drawbacks relating to a proper and quick displacing of the vehicle supporting carriages to be generally arranged under the vehicle to be displaced.

The GB-A-2 166 721 document discloses an automatic vehicle parking apparatus having substantially the features of the pre-characterizing portion of the main claim, but in which the vehicles are arranged on pallets which are moved by forked means from a lifting platform to the vehicle parking compartments and vice-versa.

## SUMMARY OF THE INVENTION

Accordingly, the main object of the present invention is to overcome the above mentioned drawbacks, by providing an automatic vehicle parking apparatus, including means for automatically handling vehicles, which is so arranged and designed as to quickly displace each motorvehicle both during the storing step thereof and during the removing step thereof.

Another object of the present invention is to provide such an automatic vehicle parking apparatus which is very safe and reliable in operation.

Another object of the present invention is to provide such an automatic vehicle parking apparatus which comprises vehicle handling carriages specifically adapted to quickly and safely displace the motorvehicle to be parked and/or removed.

Yet another object of the present invention is to provide such an automatic vehicle parking apparatus adapted to store a very high number of motorvehicles, while having very reduced space requirements and which can be easily made, at a comparatively low cost, starting from easily available materials and elements.

Yet another object of the present invention is to provide such an automatic vehicle parking apparatus in which the vehicles can be parked without the need of performing vehicle raising operations, thereby providing a multi-floor construction of very reduced height.

According to one aspect of the present invention, the above mentioned objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by an automatic vehicle parking apparatus, with means for automatically handling vehicles having the features of the characterizing portion of the main claim.

## BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the invention will become more apparent from the following description of a preferred, though not exclusive, embodiment of an automatic vehicle parking apparatus, with means for automatically handling motovehicles, which is illustrated by way of an indicative but not limitative example, in the accompanying drawings, where:

Figure 1 is a schematic view illustrating a vehicle at the inlet zone of the parking apparatus, and a lifting platform, with a vehicle handling carriage arranged on a bottom platform member;

Figure 2 schematically shows an operation step of the parking apparatus in which an empty carriage is arranged at the apparatus inlet zone;

Figure 3 schematically shows an operation step of the parking apparatus in which an empty carriage is removed from a compartment provided for receiving a vehicle;

Figure 4 schematically shows another operation step of the apparatus, in which a vehicle is arranged in its storing compartment;

Figure 5 schematically shows another operation step of the apparatus, in which a vehicle is removed from its storing compartment;

Figure 6 schematically shows another operation step of the apparatus, in which an empty carriage is arranged in a compartment;

Figure 7 schematically shows another operation step of the parking apparatus, in which the lifting platform is arranged at the outlet or output zone of the apparatus and an empty carriage is removed from said output zone and arranged on the platform bottom member;

Figure 8 schematically shows another operation step of the apparatus in which a vehicle is removed from the apparatus;

Figure 9 is a schematic elevation view illustrating the raising platform or cab arranged near the ve-

hicle storing compartments; and

Ffigure 10 is yet another schematic top plan view of the platform arranged between opposite vehicle storing compartments.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the figures of the accompanying drawings, the automatic vehicle parking apparatus, with means for automatically handling motorvehicles, according to the invention, comprises a fixed structure, overally indicated at the reference number 1, which includes a plurality of vehicle storing compartments 2 which, advantageously, are arranged with a piled-up opposite arrangement.

The vehicle storing compartments 2 communicate with a zone 3 in which there is provided a vertically movable cab or raising platform, which has been overally indicated at the reference number 10.

The cab or platform 10 comprises a top platform member or panel 11 and a bottom platform member or panel 12, which are spaced from one another and coupled by uprights 13 so as to define a cage construction.

The disclosed platform can be vertically displaced, by driving means, not shown, to be arranged at a desired level in communication with the apparatus compartments.

On the top platform member 11 there is arranged a vehicle carriage 20 supporting a respective vehicle whilst, on the bottom platform member 12 can be arranged an empty carriage, indicated at the reference number 20′.

A main feature of the invention is that means are provided for longitudinally displacing the carriage so as to bring said carriage to the single apparatus compartment or remove the carriage therefrom, by means of a longitudinal displacement movement.

More specifically, said displacement or driving means comprise an equalizer device 30, arranged at the longitudinal end portions of both the top and bottom platform members, which equalizer device supports, at its end portion, a pair of swinging rollers 31, 32, said swinging rollers being adapted to swing, together with said equalizer device, about a driving axis 33 so as to cause said rollers to turn.

Upon swinging, one of the rollers is brought near a window 34, formed respectively on the top platform member and bottom platform member so as to enter a cavity 40 defined in the central region of the floor of each compartment, to remove the carriage from said compartment or cause said carriage to enter said compartments.

As shown in figure 1, in order to store in the apparatus a coming vehicle, indicated at A, the platform or cab 10 is arranged at the inlet zone 50 where is arranged the vehicle A supported on a carriage 20; the platform 10 has, on the bottom platform member or panel, an empty carriage.

During a first operation step, the carriage 20 is loaded on the platform by causing the equalizer device 30, arranged at the vehicle inlet zone, to swing so as to bring the roller 31 in engagement with the bottom surface of the carriage 20 so as to load said carriage on the top platform panel and cause said carriage to engage with the roller 31 of the equalizer device arranged at the other end, while disengaging the equalizer device 30 provided at the inlet zone.

After having loaded a vehicle, the equalizer devices arranged under the top platform panel are driven so as to both engage the carriage and practically operate as a braking assembly for this carriage.

Then, the platform is raised so as to bring the platform bottom planel flush with the inlet zone 50, in order to discharge the empty carriage at the inlet zone, in a ready condition for receiving another vehicle.

After having discharged the empty carriage, the platform 10 is further driven so as to cause the bottom platform panel or member 11 to be arranged at a compartment floor thereon the vehicle is to be stored (see figure 3).

During a preliminary operation step, a carriage 20 is taken up by causing the equalizer device 30 to swing so as to arrange its roller 31 in the cavity 40 thereby longitudinally displacing the carriage which is loaded on the bottom platform panel.

After having removed the carriage from the compartment provided for receiving the vehicle, the platform 10 is driven so as to bring in communication with the compartment its top platform panel, and discharge the vehicle supporting carriage by a longitudinal type of displacement.

For removing a vehicle, the above disclosed operating steps are reversely carried out and, more specifically, the platform is preliminarly arranged as shown in figure 5, so as to remove a carriage-vehicle assembly and then said platform being raised to arrange an empty carriage at the removed vehicle compartment.

Then, the platform will be driven to the outlet zone 60 therefrom said platform will remove an empty carriage; then the platform will be lowered to discharge the vehicle-carriage assembly, as shown in figure 8.

It should be apparent that the disclosed operating steps can be automatically repeated with very short operating times.

From the above disclosure it should be apparent that the invention fully achieves the intended objects.

In particular, the fact is to be pointed out that the provision of a platform including two superimposed platform members which can be respectively used for a vehicle-carriage assembly and an empty carriage, affords the possibility of properly driving the carriag-

es.

Moreover, since the carriages are longitudinally displaced, a very safe handling of the vehicles can be performed during all of the apparatus operating steps.

Another very important feature of the invention is the provision of the equalizer assembly, including driven rollers which, by engaging with the bottom surface of the carriages, causes said carriages to be displaced, which displacement can be carried out owing to the provision of the compartment floor cavity for receiving the driven roller so as to both store and remove a carriage.

While the invention has been disclosed and illustrated with reference to a preferred embodiment thereof, it should be apparent that the disclosed embodiment is susceptible to several modifications and variations all of which will come within the scope of the appended Claims.

## Claims

1. An automatic vehicle parking apparatus, with means for automatically handling vehicles, comprising a fixed structure (1), including a plurality of vehicle storing compartments (2), said compartments communicating with a zone in which there is provided a vertically movable lifting platform (10), said lifting platform including a top platform member (11) for removably supporting a vehicle (A) arranged on a supporting means (20) and a bottom platform member (12) for supporting an empty supporting means (20′), on said lifting platform there being moreover provided means (30, 31, 32) for longitudinally displacing a supporting means (20) with a vehicle supported thereon and an empty one (20′) to selectively remove and store a vehicle from/in a said compartment (2), characterized in that said supporting means (20, 20′) are carriages and in that said means (30, 31, 32) for longitudinally displacing said carriage comprise swing assemblies (30) pivotally mounted at the longitudinal end portions of said bottom and top platform (11, 12) panels and supporting, at their end portions, a respective pair of driven rollers (31, 32) adapted to be engaged with the top surface of a carriage.

2. An automatic vehicle parking apparatus, according to Claim 1, characterized in that said lifting platform (10) is provided with windows (34) to be engaged by one of said driven rollers (31, 32).

3. An automatic vehicle parking apparatus, according to Claim 1, characterized in that each vehicle compartment (2) comprises a floor including a respective cavity (40) for engaging with one or more of said driven rollers (31, 32).

## Patentansprüche

1. Vorrichtung zum automatischen Parken von Fahrzeugen, mit Mitteln zum automatischen Bewegen von Fahrzeugen, mit einer festen Stiktur (1), die mit mehreren Unterstellungsabteilungen (2) für Fahrzeugen vorgesehen ist, wobei diese Abteilungen mit einem Raum, wo eine Aufzugsbühne (10) senkrecht bewegbar vorgesehen ist, in Verbindung steht, wobei diese Aufzugsbühne mit inem oberen Bühneelement (11) zur abnehmbaren Unterstützung eines auf Lagerelementen (20) angeordneten Fahrzeuges (A) und einem unteren Bühneelement (12) zum Unterstützen einer leeren Lagerelementes (20′) vorgesehen ist, wobei auf diese Aufzugsbühne, ausserdem, zur Längsbewegung eines Lagerelement (20) mit einem über dasselbe gelagerten Fahrzeugen und eines leeren Lagerelementes (20′), Lagerelementen (30, 31, 32)vorgesehen sind, die zum wechselnd Abholen und Einstellen eines Fahrzeuges aus/in einer Abteilung (2) dienen, dadurch gekennzeichnet, dass diese Lagermittel (20, 20′) Schlitten sind, und dass die obengenannten Mittel (30, 31, 32) zur Längsbewegung des obengenannten Schlittens mit Schwenkgruppen (30), die and die Längsendportionen der obengenannten oberen und unteren Bühneelementen (11, 12) angelenkt sind, vorgesehen sind und, an deren Endportionen, ein entsprechenden Paar von Führungsrollen (31, 32) lagern, die zur Anbringung mit der oberen Fläche eines Schlittens geeignet sind.

2. Vorrichtung zum automatischen Parken von Fahrzeugen, nach Anspruch 1, dadurch gekennzeichnet, dass die obengenannte zur Anbringung über einen der obengenannten Führungsrollen (31, 32) Aufzugsbühne (10) mit Fensteröffnungen (34) versehen ist.

3. Vorrichtung zum automatischen Parken von Fahrzeugen, nach Anspruch 1, dadurch gekennzeichnet, dass jede Fahrzeugsabteilung (2) mit einem Boden versehen ist, der eine zur Anbringung mit einem oder mehreren obengenannten Führungsrollen (31, 32) eine entsprechende Aufnahme weist auf.

## Revendications

1. Dispositif de parcage automatique de véhicules, avec moyens pour mouver automatiquement les véhicules, comprenant une structure fixe (1) mu-

nie de plusieurs compartiments (2) pour stocker les véhicules, lesdits compartiments se trouvant en communication avec une région où il y a prévu une plateforme d'élévation (10) movible en vertical, ladite plateforme d'élévation comprenant un élément (11) de plateforme supérieur pour supporter d'une manière amovible un véhicule (A) arrangé sur des moyens de support (20) et un élément (12) de plateforme de fond poursupporter un élément de support (20′) vide, sur ladite plateforme d'élévation il y étant prévu en outre des moyens (30, 31, 32) pour déplacer dans un sens longitudinal un élément de support (20) avec un véhicule y supporté ed un élément vide (20′) pour enlever et stocker sélectivement un véhicule de/dans l'un desdits compartiments (2), caractérisé en ce que lesdits éléments de support (20, 20′) sont des chariots et en ce que lesdits moyens (30, 31, 32) pour déplacer dans un sens longitudinal ledit chariot comprennent des groupes oscillants (30) montés pivotés sur les portions d'extrémité longitudinale desdits panneaux supérieur et inférieur (11, 12) de la plateforme et supportant, sur leurs portions d'extrémité, un pair respectif de rouleaux commandés (31, 32) aptes à s'engager avec la surface supérieure d'un chariot.

2. Dispositif de parcage automatique de véhicules, selon la revendication 1, caractérisé en ce que ladite plateforme d'élévation (10) est munie de fenêtres (34) pour être engagé par l'un desdits rouleaux commandés (31, 32).

3. Dispositif de parcage automatique de véhicules, selon la revendication 1, caractérisé en ce que chaque compartiment (2) pour les véhicules ocmprend un plancher muni d'une cavité (40) respective pour s'engager avec l'un ou plusieurs desdits rouleaux commandés (31, 32).

Fig. 1

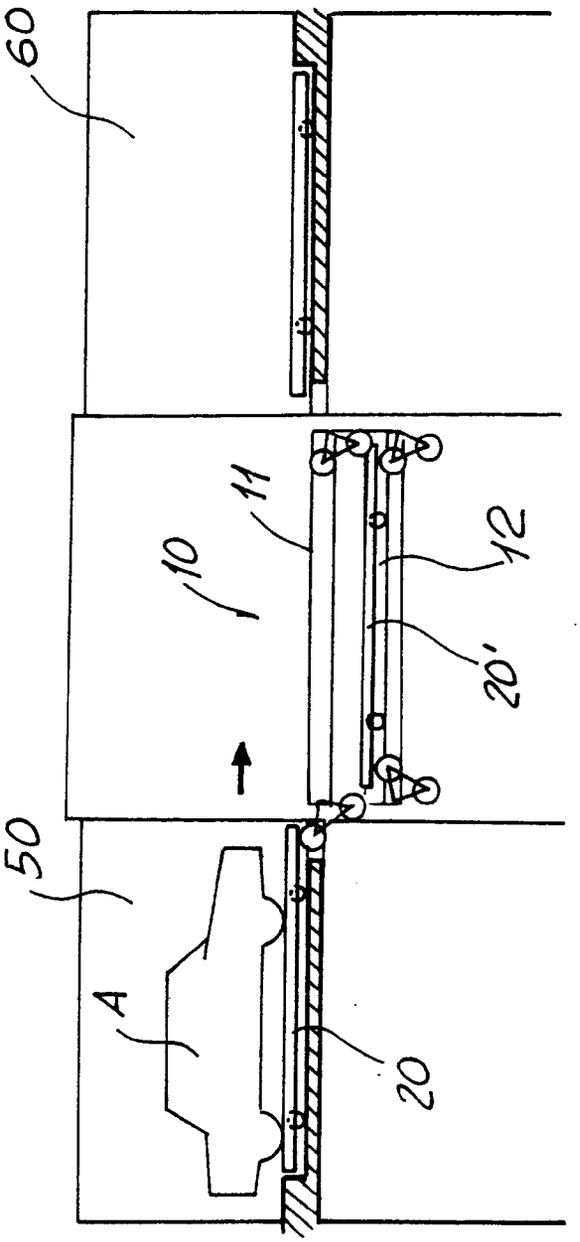



Fig. 2

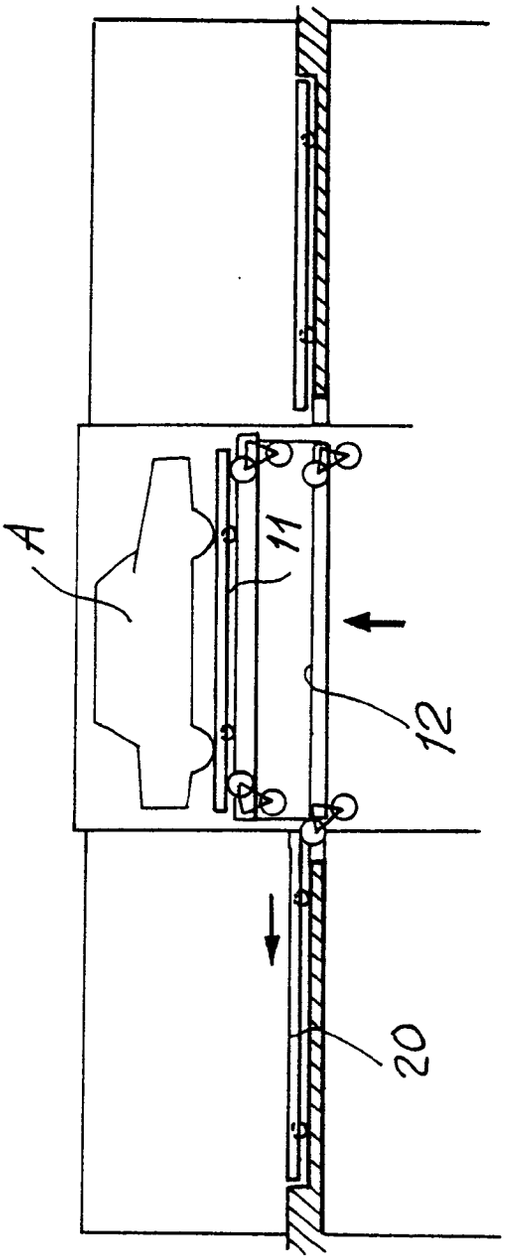


Fig. 3

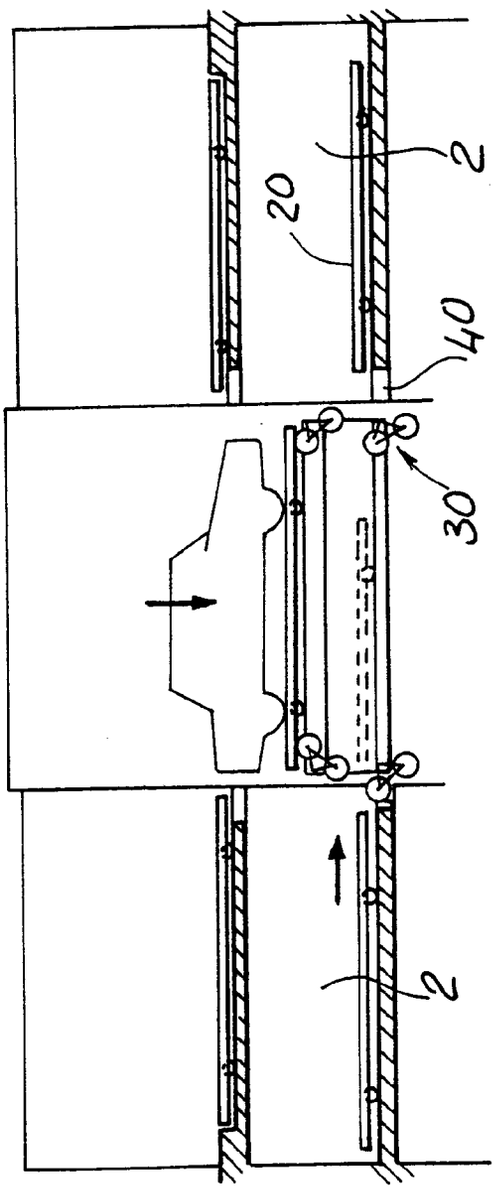



Fig. 4

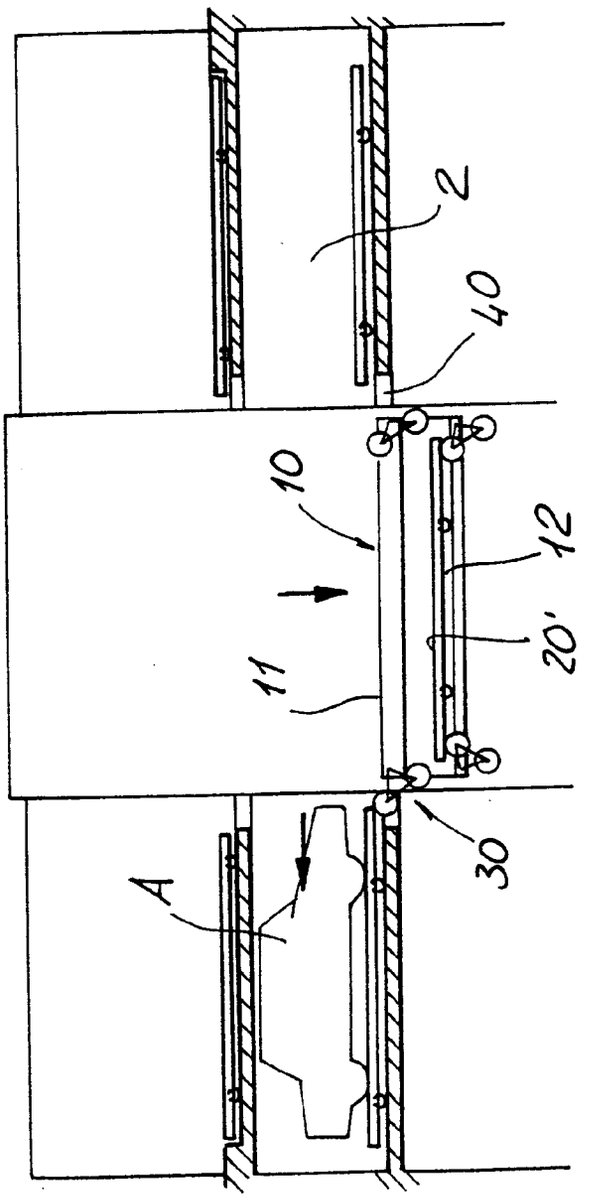


Fig. 5

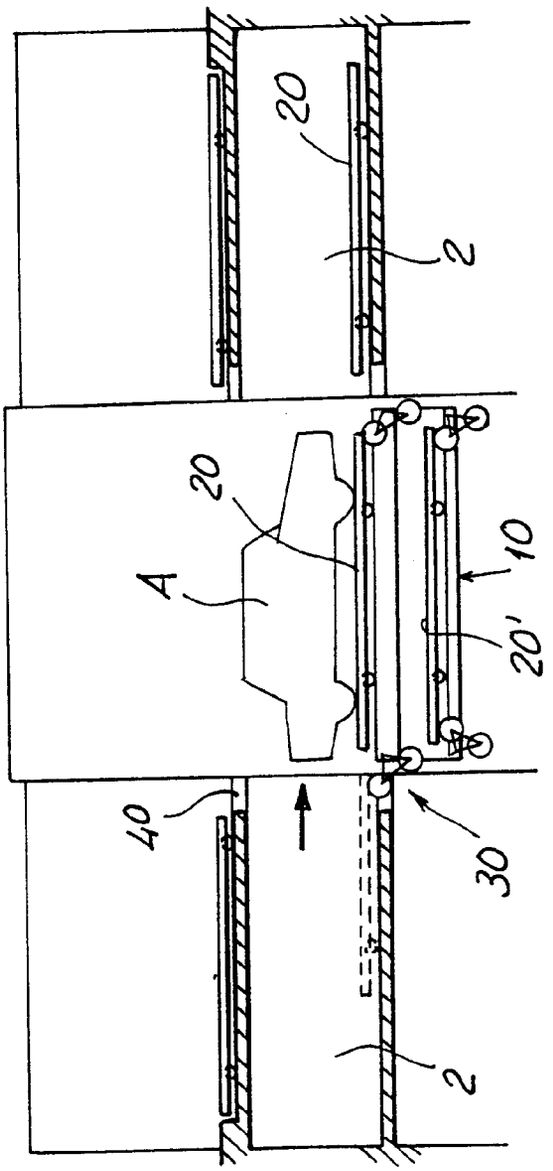



Fig. 6

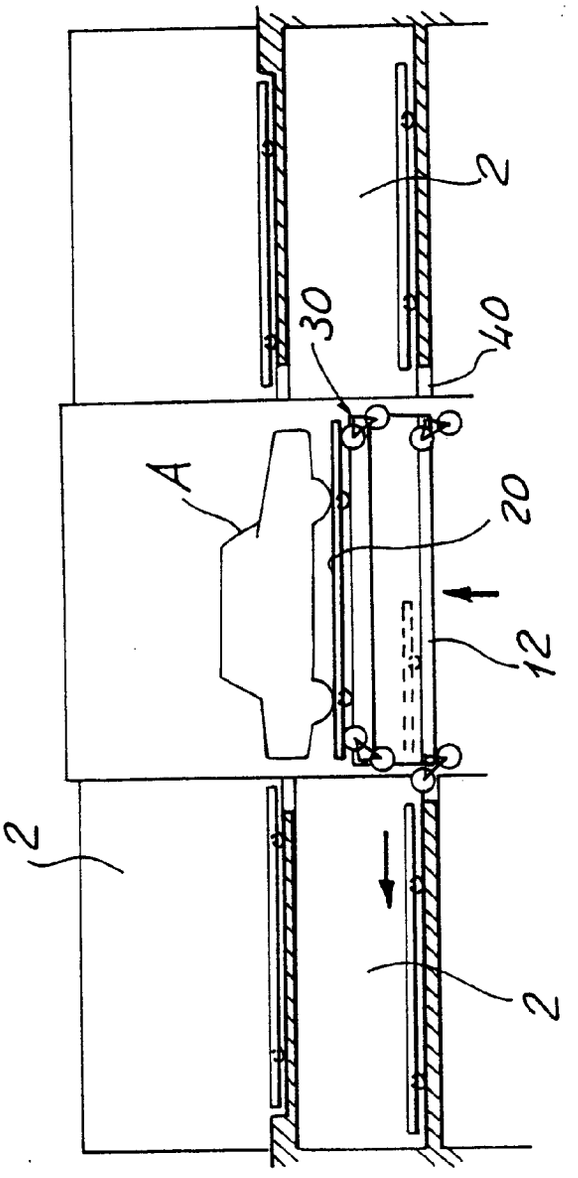


Fig. 7

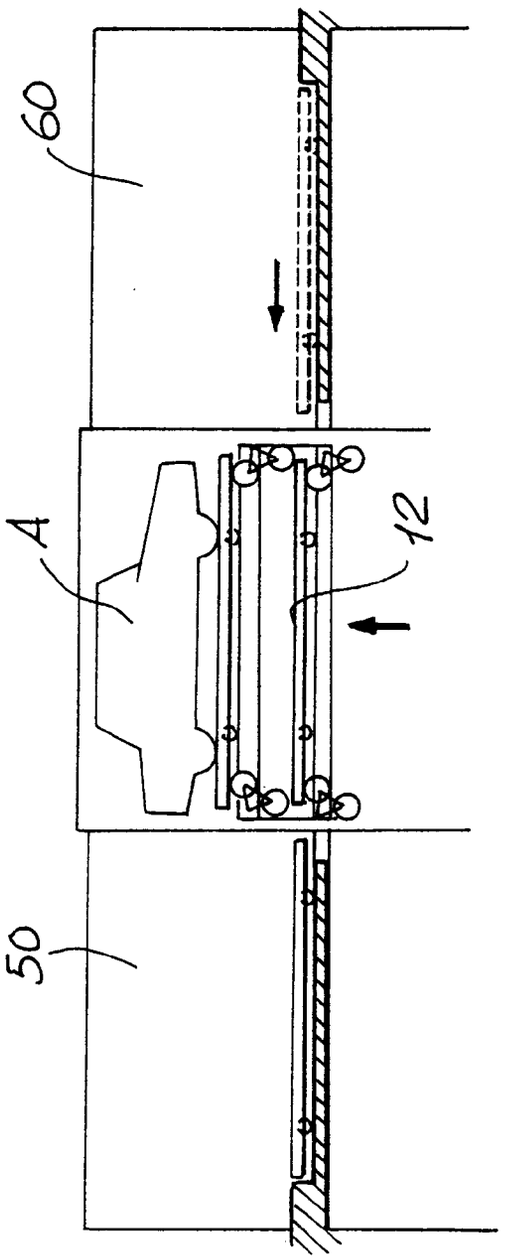
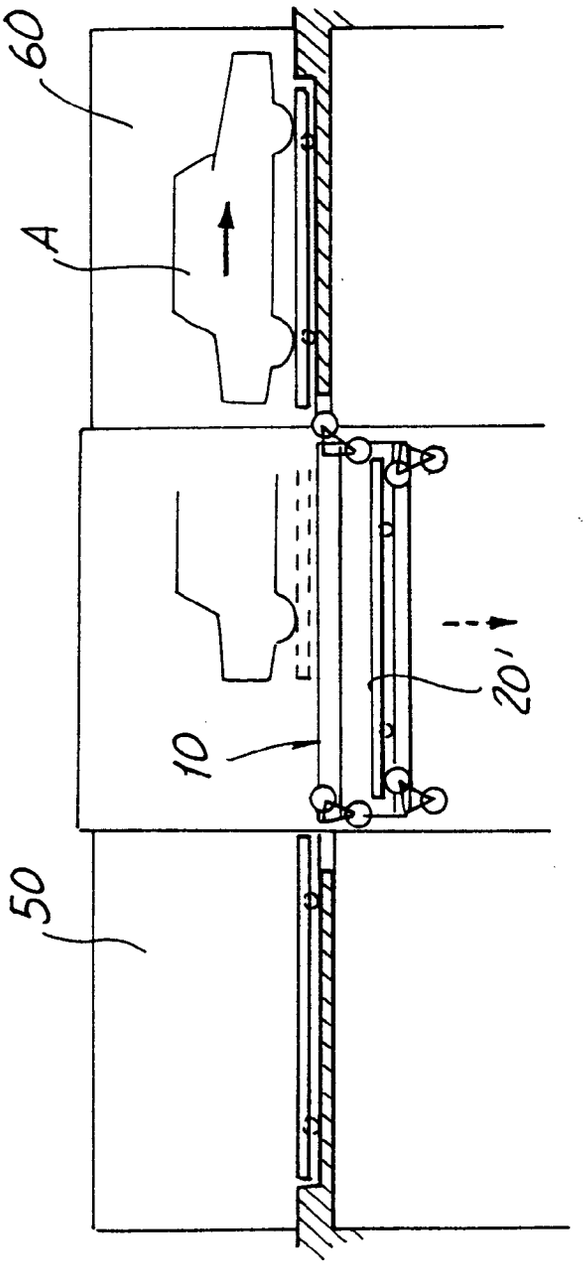
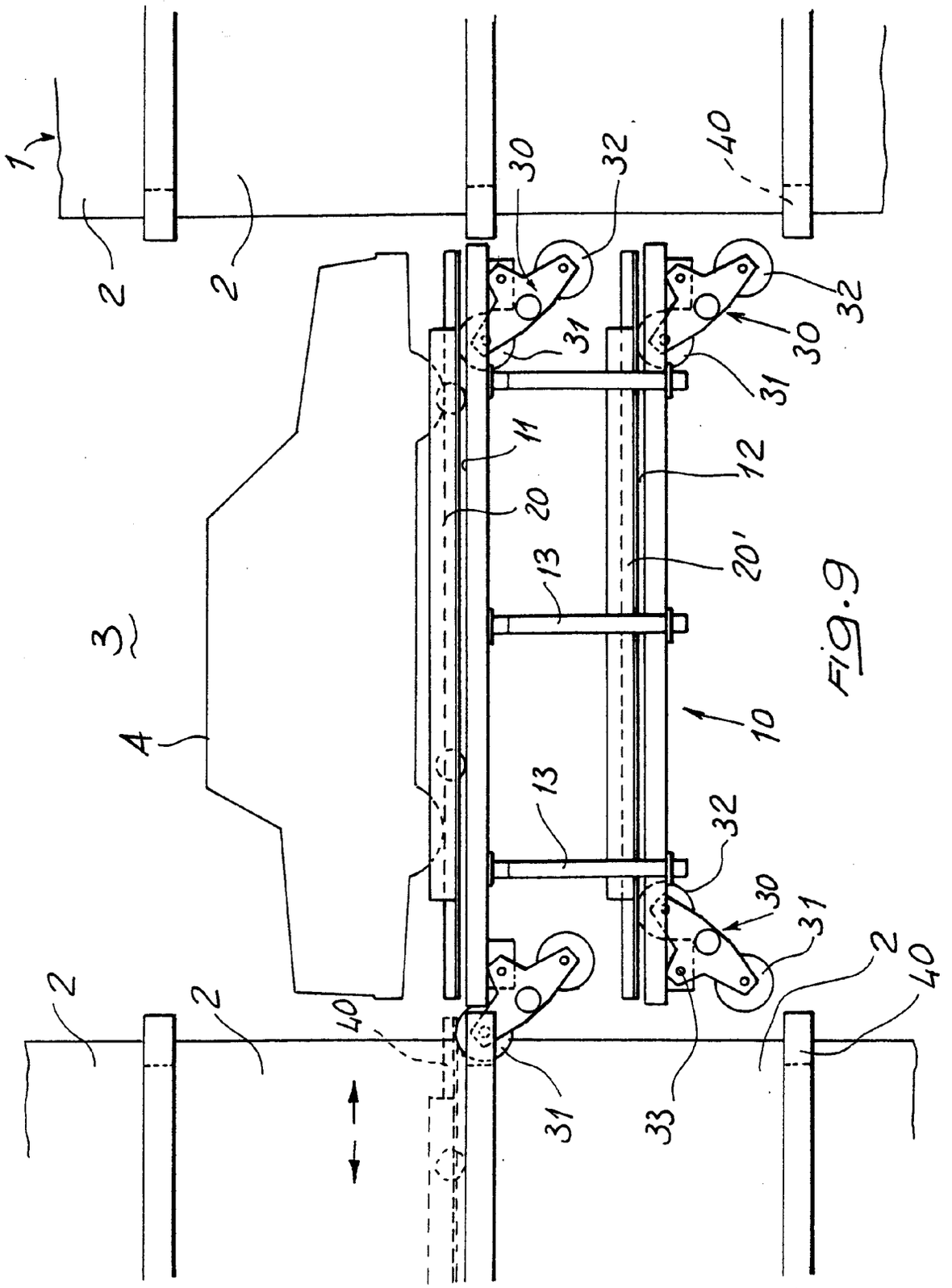



Fig. 8




1
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33

FIG.9

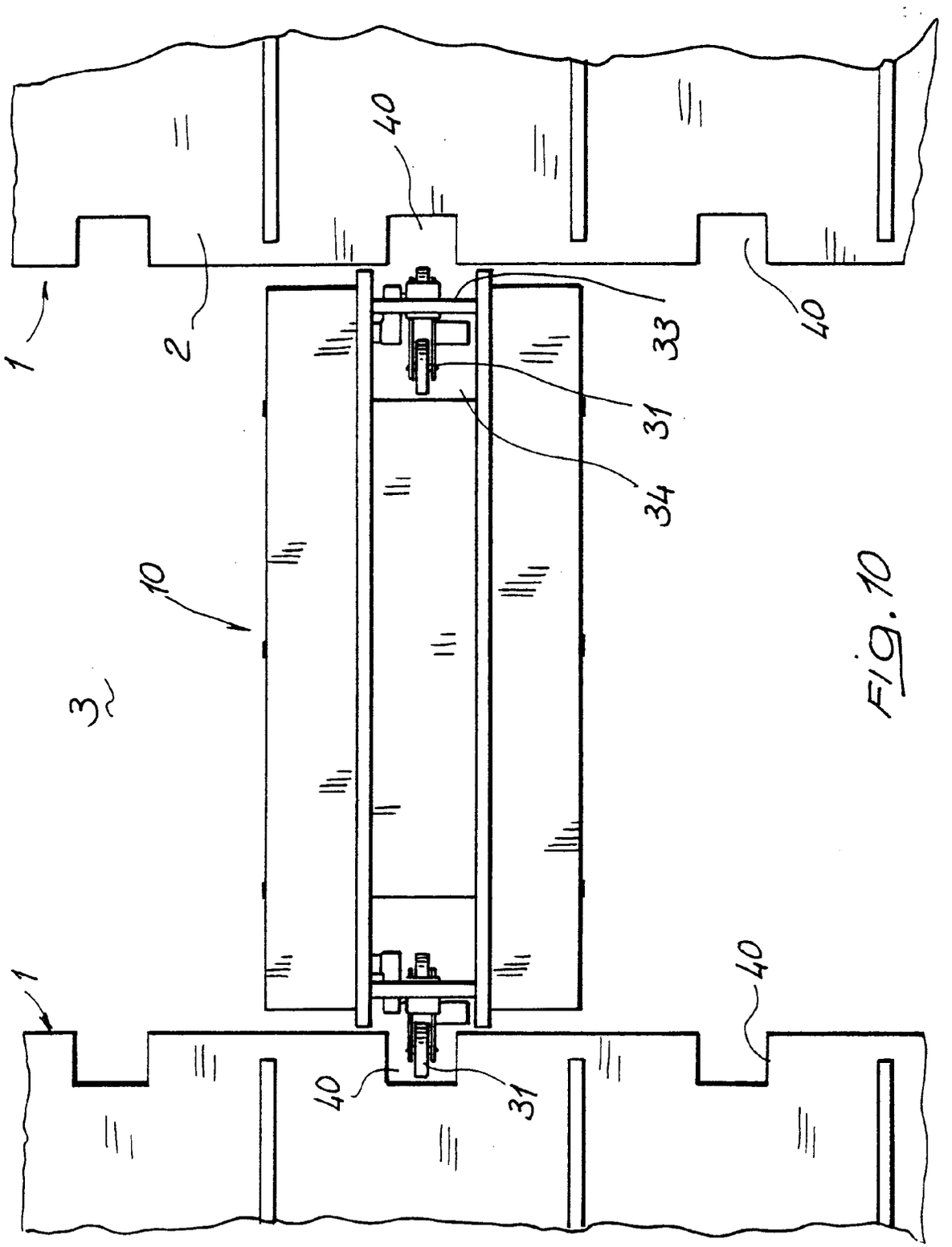


FIG. 10