(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 133 488 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
16.12.2009 Bulletin 2009/51

(51) Int Cl.:
E04H 6/34 *(2006.01)*

(21) Application number: **09007610.0**

(22) Date of filing: **09.06.2009**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR

(30) Priority: **10.06.2008 IT MI20081057**

(71) Applicant: **Locatelli, Alessandro**
24129 Bergamo (IT)

(72) Inventor: **Locatelli, Alessandro**
24129 Bergamo (IT)

(74) Representative: **Cicogna, Franco**
Ufficio Internazionale Brevetti
Dott.Prof. Franco Cicogna
Via Visconti di Modrone, 14/A
20122 Milano (IT)

(54) **Automatic system for parking motor vehicles and motor vehicle handling device therefor**

(57) An automatic system for parking motor vehicles comprises a motor vehicle parking zone including a plurality of motor vehicle sliding tracks, thereon can be driven a plurality of motor vehicle supporting and handling devices, the sliding tracks being arranged perpendicular to one another to define a plurality of spaces each for receiving therein a respective motor vehicle supporting and handling device comprising four sliding skids and two pairs of perpendicular peg racks, therewithin a plurality of driving meshing gear wheels are arranged.

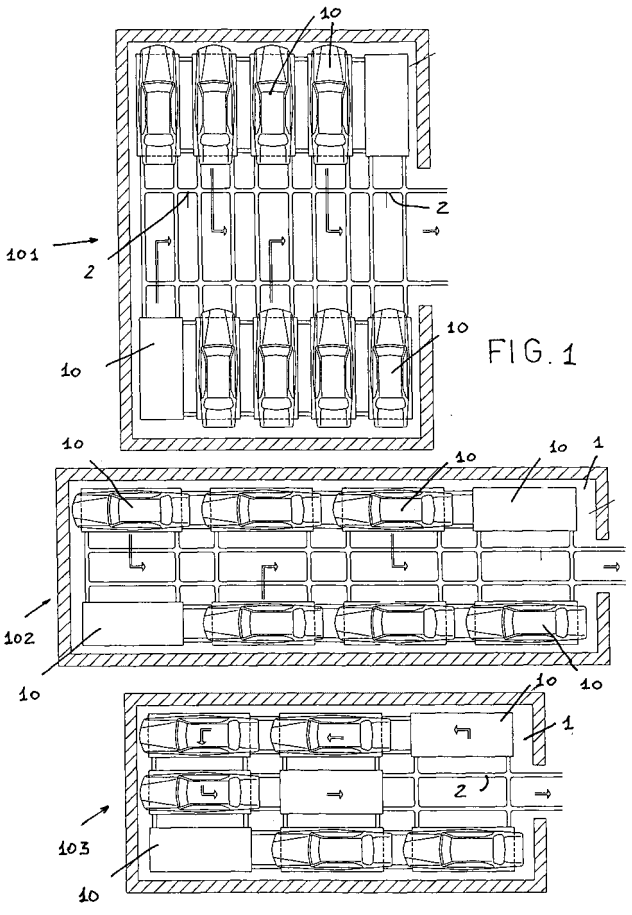


FIG. 1

EP 2 133 488 A2

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an automatic system for parking motor vehicles, and relates moreover to a motor vehicle handling device therefor.

[0002] Automatic systems for parking motor vehicles including a plurality of parking rails thereon motor vehicle supporting carriages or skids are supported are already known.

[0003] The above prior systems, however, are very complex construction-wise, and, moreover, they do not allow the motor vehicles to be easily and quickly handled.

SUMMARY OF THE INVENTION

[0004] Accordingly, the aim of the present invention is to overcome the above mentioned drawbacks of prior automatic motor vehicle parking systems, by providing an improved automatic system for easily and quickly automatically arranging motor vehicles in a covered parking area, which system comprises very simple, inexpensive and quickly operating motor vehicle handling devices.

[0005] Within the scope of the above mentioned aim, a main object of the invention is to provide such an automatic system for parking motor vehicles which is very reliable and safe in operation.

[0006] Another object of the present invention is to provide an automatic system for parking motor vehicles and a motor vehicle handling device therefor, which can be easily made starting from easily available elements and materials.

[0007] According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by an automatic system for parking motor vehicles, **characterized in that** said automatic system comprises a motor vehicle parking zone including a plurality of sliding tracks thereon a plurality of motor vehicle supporting and handling devices are operatively driven, each said device supporting and handling a single respective motor vehicle, said sliding tracks being arranged perpendicular to one another so as to define a plurality of spaces for housing therein each said supporting and handling device.

[0008] According to a further aspect of the invention, said motor vehicles supporting and handling device comprises four sliding skids and two pairs of peg racks, said racks being arranged perpendicular to one another, a plurality of gear wheels operatively meshing with said racks.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Further characteristics and advantages of the present invention will become more apparent hereinafter from the following detailed disclosure of a preferred, though not exclusive, embodiment thereof, which is illustrated, by way of an indicative, but not limitative, example in the accompanying drawings, where:

Figure 1 is a top plan view schematically showing three exemplary embodiments of respective automatic systems and the driving paths of a plurality of motor vehicle supporting and handling devices;

Figure 2 is a top plan view showing a single motor vehicle supporting and handling device;

Figure 3 is a bottom view showing that same motor vehicle supporting and handling device;

Figure 4 is an elevation view showing a motor vehicle supporting and handling device, supporting a car thereon;

Figure 5 shows, on an enlarged scale, a detail of a sliding skid included in the automatic system according to the present invention;

Figure 6 shows, on an enlarged scale, a detail of a peg element rack;

Figure 7 shows a driving gear wheel meshing with said rack of the motor vehicle supporting and handling device;

Figure 8 shows the gear wheel separated from the rack;

Figure 9 is a top plan view showing a gear wheel driving assembly;

Figure 10 is a schematic top plan view showing a transmission mechanism for coupling a single driving motor to all the gear wheels; and

Figure 11 is a further top plan view, on an enlarged scale with respect to figure 10, showing a detail of a driving unit.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0010] With reference to the number references of the above mentioned figures, the automatic system for parking motor vehicles according to the present invention comprises a motor vehicle covered parking zone shown in figure 1 by the reference number 1, in which are provided a plurality of sliding tracks 2, which extends parallel and perpendicular to one another, thereby providing an operating sliding grid defining a plurality of spaces or cells for housing respective motor vehicle supporting and handling devices 10.

[0011] Each said motor vehicle supporting and handling devices 10 comprises a platform 11 supporting a respective motor vehicle or car and including at a top thereof a plurality of top guides 12, in which the wheels 13 of a motor vehicle 14 are can be engaged.

[0012] As shown, said platform 11 further comprises, at the motor vehicle wheel housing, four sliding skids 3, which are supported by a threaded ring nut 4, allowing to adjust the height position of said platform 11, and two pairs of peg racks 5 arranged perpendicular to one another.

[0013] The crossing between the two pairs of peg racks 5 is achieved by four crossing elements 6.

[0014] The motor vehicle handling devices 10 are not "motorized", but are driven by respective gear wheels 7 meshing with the peg racks 5.

[0015] Four gear wheels 7 form a driving unit, 8 and 9, therein the gear wheels 7 can be either engaged or not with said peg racks 5, by means of an actuator 15 and a lever system 16.

[0016] Thus, depending on the movement to be performed by the motor vehicle handling devices 10, either in a longitudinal or in a cross direction, said gear wheels 7 of the driving unit 8 or 9 will be correspondingly engaged.

[0017] As is shown, all said driving units 8 and 9 are driven by a single driving assembly 17, which, for example, may comprise an AC current motor and a respective frequency changing assembly, or a DC servomotor, a brushless motor, a pneumatic or a hydraulic motor or any other desired type of motors either coupled or not to a geared unit, said driving assembly 17 and driving units being coupled by driveshafts 18 and transmission assemblies 19, and, in each single driving unit 8 and 9, the driveshaft 18 is coupled to the gear wheels 7 by a coupling or transmission assembly 20, which may comprise a coupling trapezoidal belt, a toothed belt, a chain, a gear train or any other transmission means for engaging and disengaging said gear wheels 7.

[0018] Thus, the driving units 8 and 9, together with the transmission unit 19, allow, owing to their modular construction, to fit the kinematic chain to any desired configuration of the system, while holding the basic feature that the system comprises a single driving assembly 17.

[0019] The above mentioned platforms allow to park a plurality of motor vehicles, even if the system comprises a small number of vehicle places, as is known in figure 1, with respect to the exemplary systems generally indicated by 101 and 102.

[0020] In such a case it would be advantageous to arrange the motor vehicles on two rows, while leaving free a central lane for handling the skids and the motor vehicles supported thereby.

[0021] Each motor vehicle-place comprises a dedicated platform which can be driven along the guide tracks to the motor vehicle loading/unloading input of the parking system, and then again to the starting position on the same displacement path.

[0022] This arrangement allows to greatly simplify the motor vehicle handling control system, so as to compensate for, with a small cost and quick operation, even a small available parking space.

[0023] A central control unit will control and drive the individual platforms, and the presence of said platforms at respective platform stations, or at any motor vehicle loading/unloading position being detected by electromagnetic or electromechanic detecting elements, the fixed driving path of each said platform being programmed in designing the system.

[0024] Moreover, to better exploit the available parking space, it is provided to use system zones including several vehicle parking places, as shown for the system 103 in figure 1.

[0025] Thus, with the above arrangement, it is possible to leave free either one or two parking places, to allow the platforms to be properly handled.

[0026] In particular, said platforms are not arranged at a fixed place and are driven to their loading/unloading positions on an optimized path, by performing a gradual displacement of the platforms leaving that path.

[0027] In the return stroke, each platform is not recovered to its starting position, but to one of the places adjoining the system inlet, all under the control of said central control unit storing therein the positions of the individual platforms and their combined driving patterns.

[0028] Each platform, in addition to providing a confirmation of an occupied position, transmitting in turn to the central control unit a signal indicative of the platform identity, to be also sent to the driver on board of the vehicle by electromagnetic or electromechanic detecting elements, and the time necessary for displacing a motor vehicle at a standby condition at the inlet of the parking system depending on the distance of the vehicle from said place.

[0029] In all the above disclosed solutions, moreover, it is also be possible to handle vehicles on different levels, by including in the system a vehicle lifter to bring the skids to different system floors.

[0030] From the above disclosure it should be apparent that the invention fully achieves the intended aim and objects.

[0031] In fact, the invention has provided a very efficient and simple automatic parking system which is very flexible from an operation standpoint, since it comprises a mechanical transmission with a single driving motor driving all the motor vehicle handling devices.

[0032] The invention, as disclosed, is susceptible to several modifications and variations, all of which will come within the scope of the invention.

[0033] Moreover, all the details can be replaced by technically equivalent elements.

[0034] In practicing the invention, the used materials, as well as the contingent size and shapes, can be any, depending on requirements.

Claims

1. An automatic system for parking motor vehicles, **characterized in that** said system comprises a motor vehicle parking zone including a plurality of sliding tracks thereon are driven a plurality of motor vehicle supporting and handling devices, each of said device being adapted to support and handle a respective motor vehicle, said sliding tracks being arranged perpendicular to one another to define a plurality of spaces each for receiving therein a respective motor

vehicle supporting and handling device, said motor vehicle supporting and handling device comprising four sliding skids and two pairs of peg racks arranged perpendicular to one another, and a plurality of gear wheels operatively meshing with said racks.

2. An automatic system, according to claim 1, **characterized in that** said parking zone is a covered parking zone and that said sliding tracks define a grid track pattern including a plurality of spaces for allowing said supporting and handling devices to pass therethrough and to be held in a stationary condition therein.

3. An automatic system, according to claim 1, **characterized in that** each said supporting and handling device comprises a platform supporting a respective motor vehicle, said platform including a plurality of top guides for housing therein the wheels of a said motor vehicle, said platform further including, at said motor vehicle wheel guides, four sliding skids supported by a threaded ring nut for adjusting the height level of said platforms and two pairs of perpendicular peg racks which are controlled by four rack crossing elements

4. An automatic system, according to claim 1, **characterized in that** said supporting and handling devices are not driven by motors but are driven by gear wheels meshing with said racks.

5. An automatic system, according to claim 1, **characterized in that** four of said gear wheels form a driving unit for meshing said wheels with said racks, said driving unit including actuator means and a lever system, for causing said wheels to mesh with said racks.

6. An automatic system, according to claim 1, **characterized in that** all said driving units are driven by a single driving assembly including, for example, an AC current motor and a related frequency changing device, a DC current motor, a brushless motor, a pneumatic motor, or a hydraulic motor or any other type of motor coupled to a geared unit.

7. An automatic system, according to claim 1, **characterized in that** said driving units are coupled to said driving assembly by driveshafts and transmission assemblies, each said driveshaft being coupled to said gear wheels by a coupling transmission including a trapezoidal belt, a toothed belt, a chain, a gear train or any other types of transmission allowing the engagement and disengagement of the gear wheels.

8. An automatic system, according to claim 1, **characterized in that** said driving units, with said transmission units, owing to their modularity, allows the kinematic chain to be fitted to the system geometry, thereby said units are all driven by a single driving assembly.

9. An automatic system, according to claim 1, **characterized in that** said platforms are designed to arrange the motor vehicles on two motor vehicle rows while leaving a central lane free for handling the motor vehicle supporting input and output skids.

10. An automatic system, according to claim 1, **characterized in that that** said system comprises a plurality of motor vehicle parking places, each including a dedicated platform which is operatively driven on said guide track to a motor vehicle loading/unloading position, at the inlet of the system and is recovered to its starting position on the same guide track.

11. An automatic system, according to claim 1, **characterized in that** said system further comprises a central control unit arranged for sending calls to the individual platforms; the presence of the platforms in their stations or in the loading/unloading position being confirmed by platform electromagnetic or electromechanic detecting elements; the fixed path of the individual platforms being programmed as the system is designed; for using the available space it is possible to provide regions with more than one vehicle place so that it is possible to simply leave one or two places free to allow the platforms to be handled; the latter do not have a fixed position but, starting from the occupied position, will arrive at the loading/unloading position by following an optimized path, which involves a gradual displacement of the platforms which must leave this path free; in its return movement the platform does not return to its starting position but will occupy one of the position nearest to the input, by causing a displacement of other platforms so as to occupy the position which has been left free.

12. An automatic system, according to claim 1, **characterized in that** said central control unit comprises storing means to store a preset platform position and a combined displacement series pattern to accelerate the operations of said platforms, each platform including signal transmitting means for transmitting to said central control unit a signal indicative of the platform identity, to be remotely recalled by a motor vehicle on-board driver through electromagnetic or electromechanic detecting elements.

13. An automatic system, according to claim 1, **characterized in that** said central control unit is a programmable unit including reservation programs for recovering the motor vehicles.

14. An automatic system, according to claim 1, **characterized in that** said central control unit comprises a

program for handling said motor vehicles on different floor of said system, by using a hoisting system which, from the inlet of said system, drives the skids to different floors of said system.

15. A motor vehicle supporting and handling device, for use in an automatic system for parking motor vehicles, **characterized in that** said device comprises four sliding skids and two pair of peg racks perpendicular to one another and a plurality of gear wheels operatively engaging with said racks.

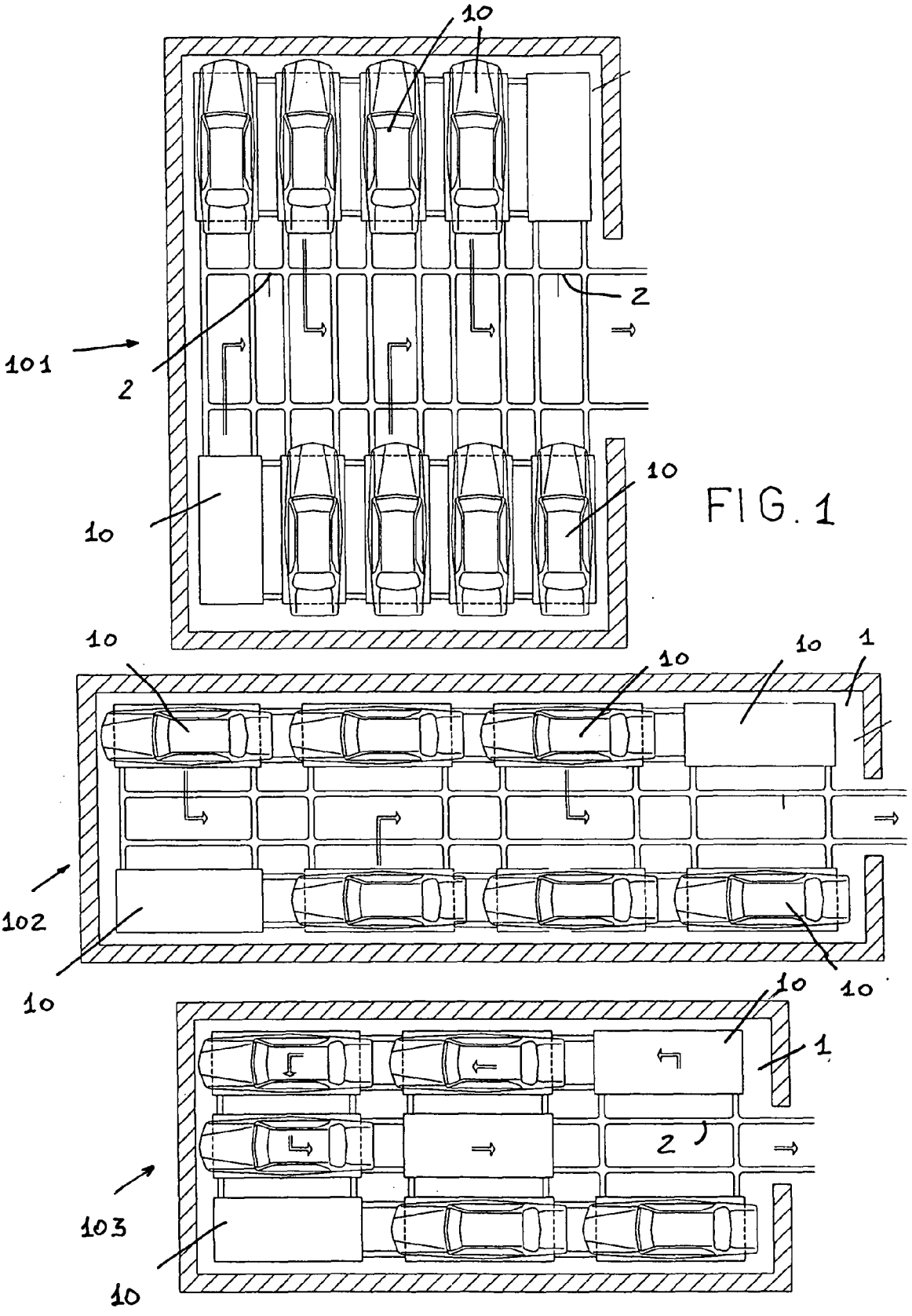


FIG. 1

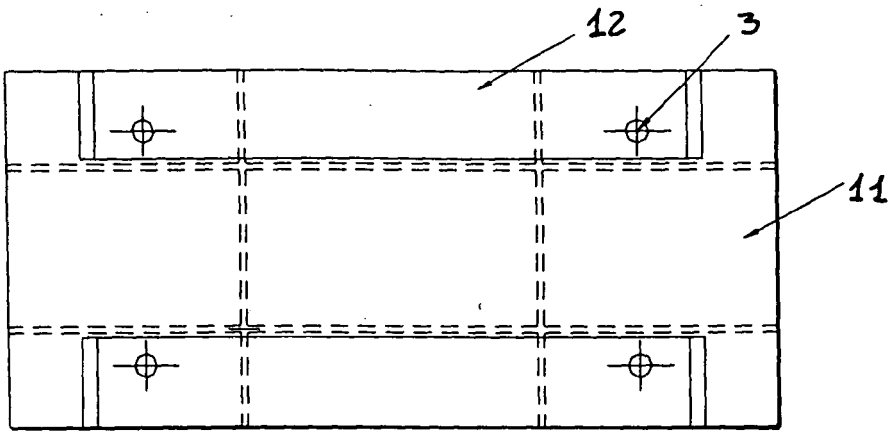


FIG. 2

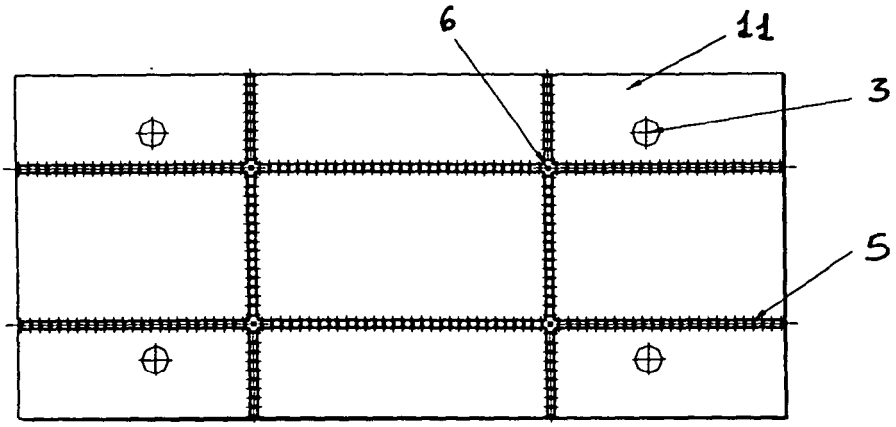


FIG. 3

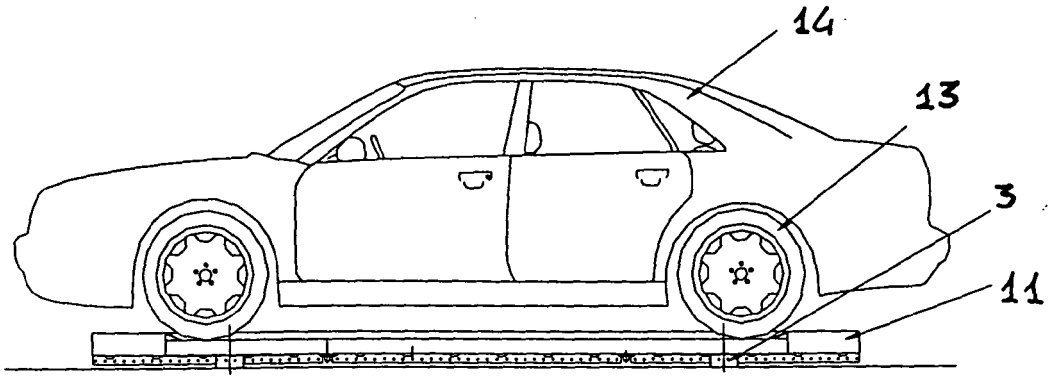


FIG. 4

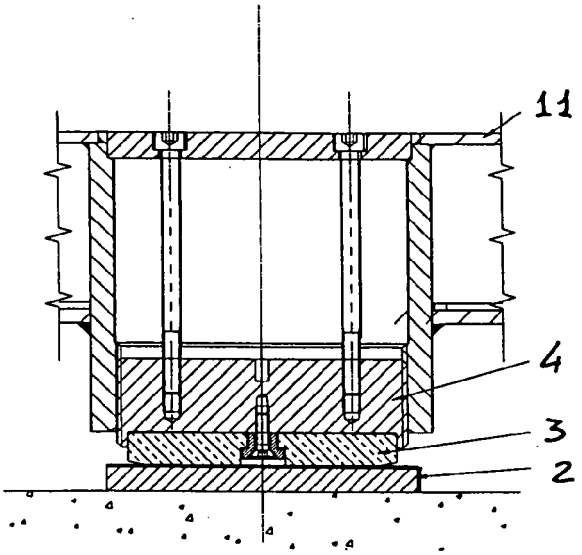


FIG. 5

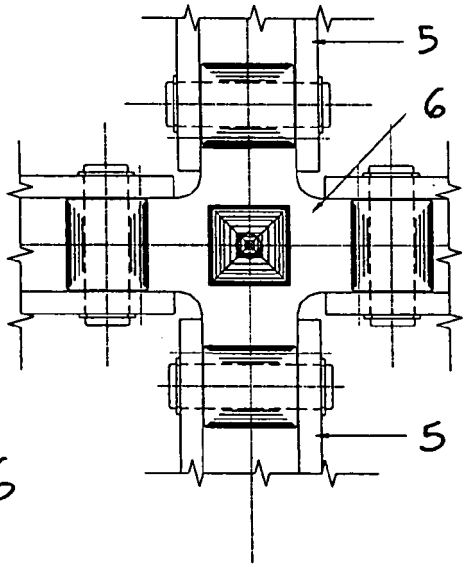
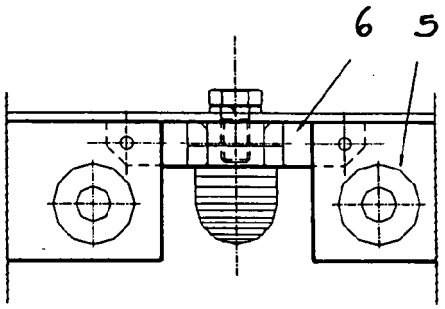


FIG. 6



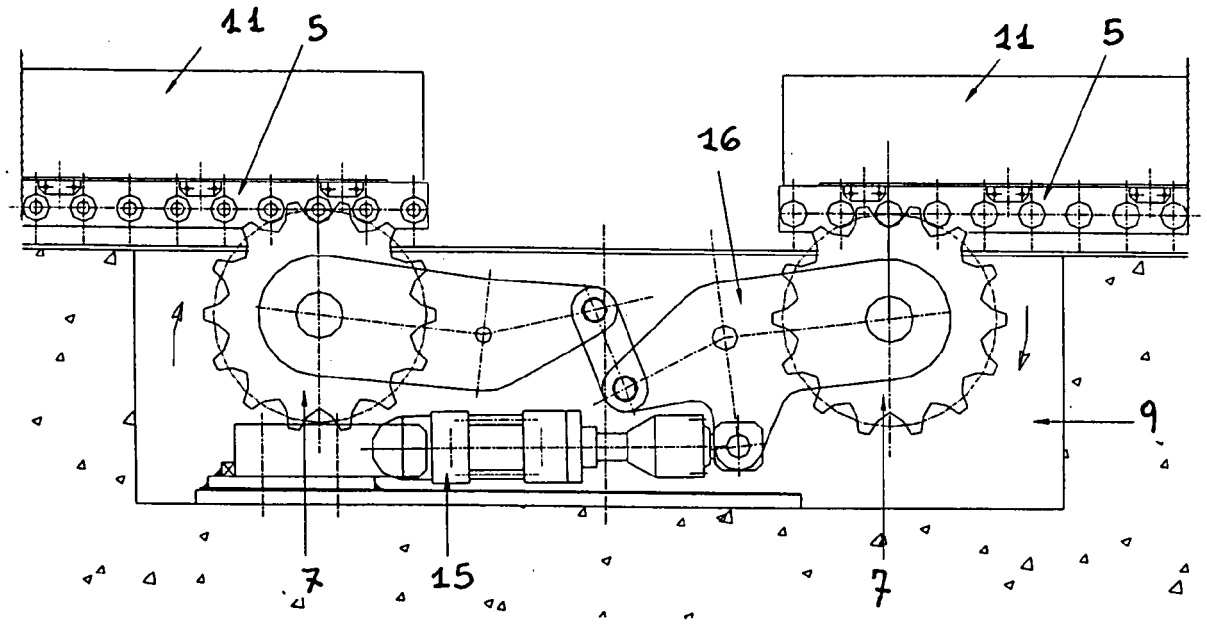


FIG. 7

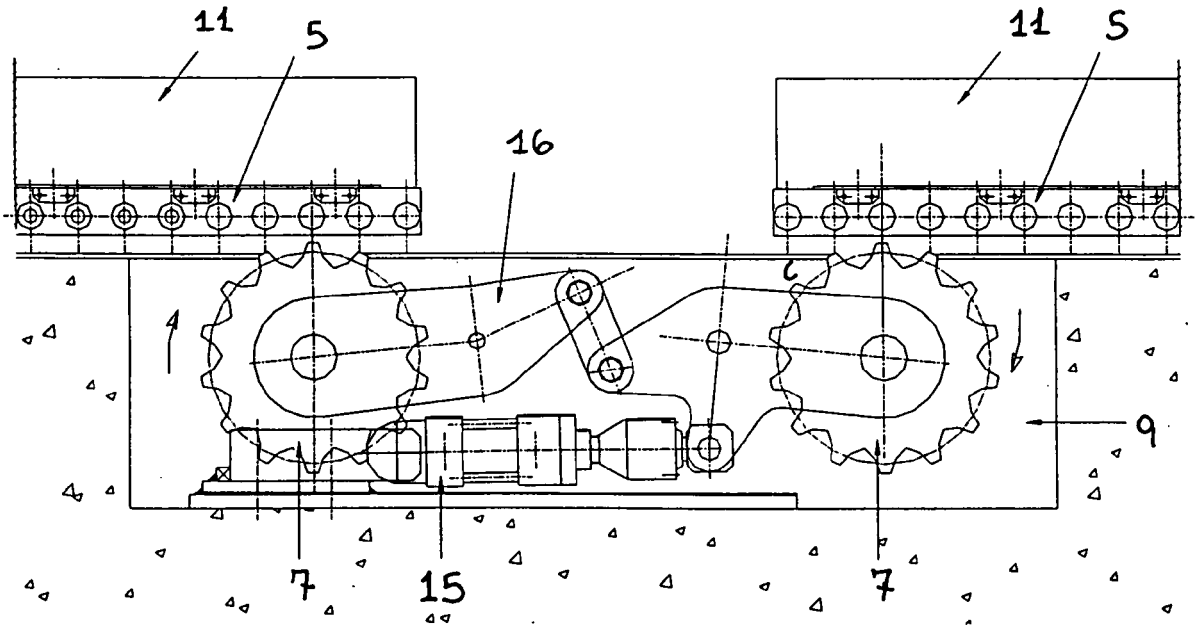


FIG. 8

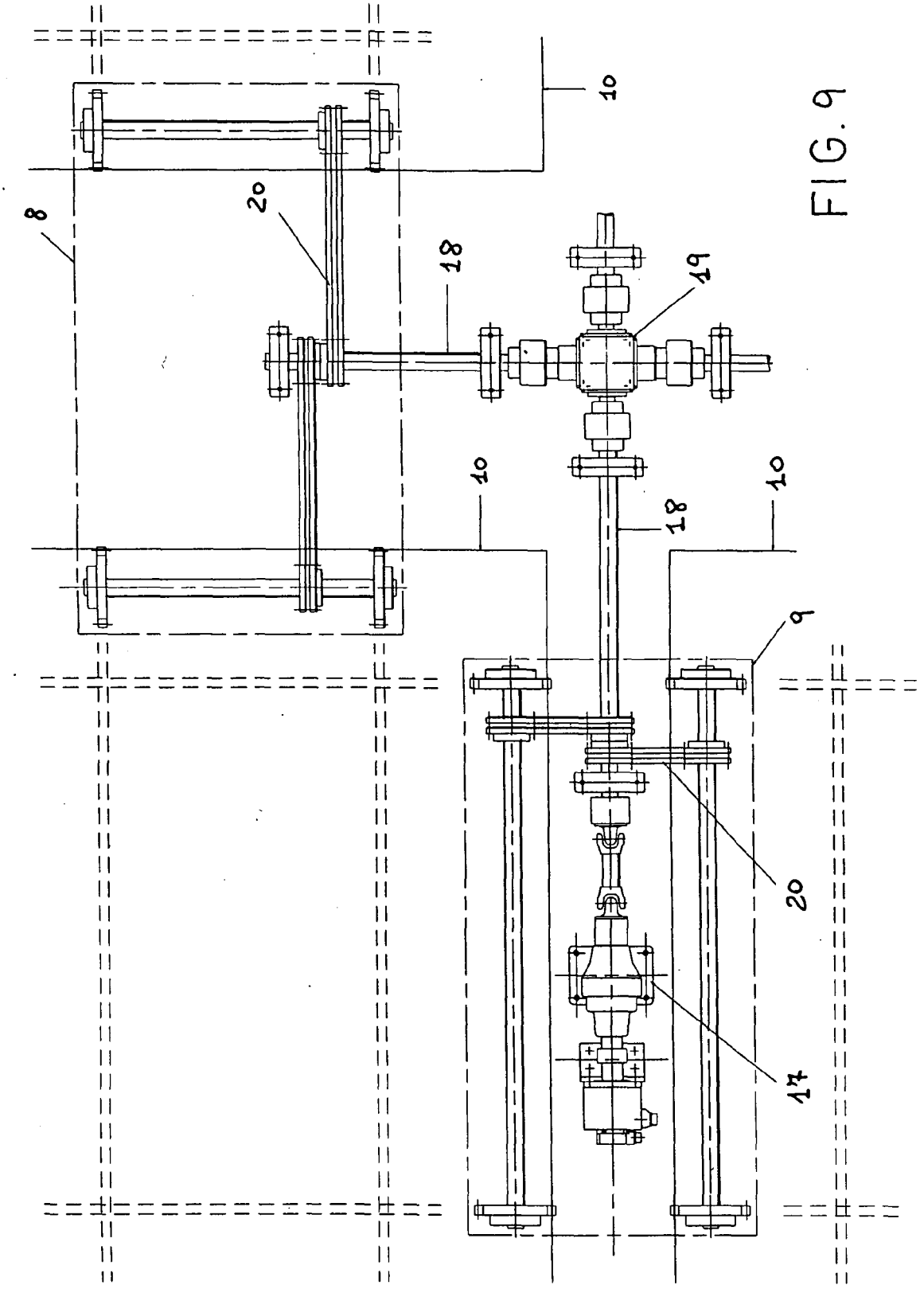


FIG. 9

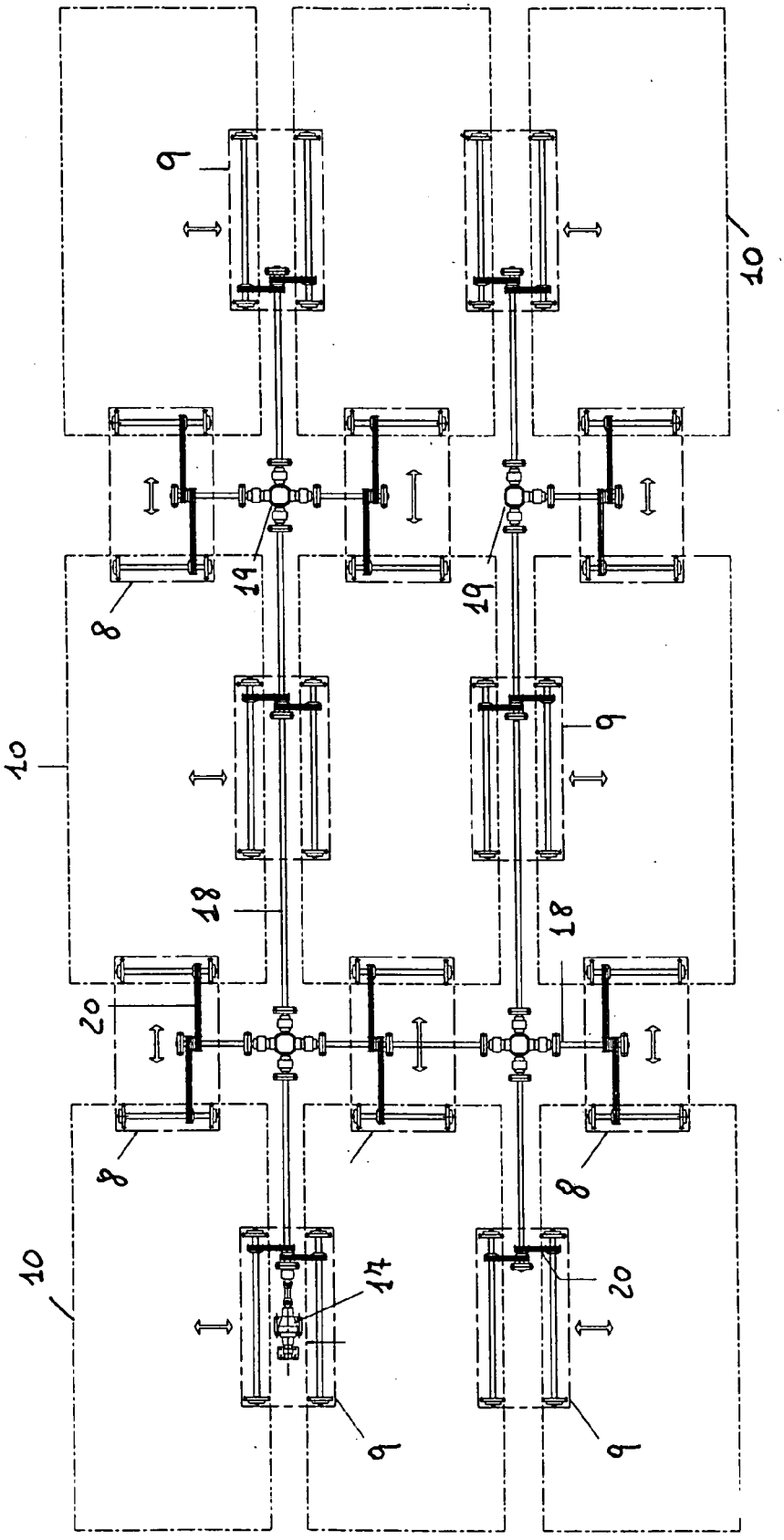


FIG. 10

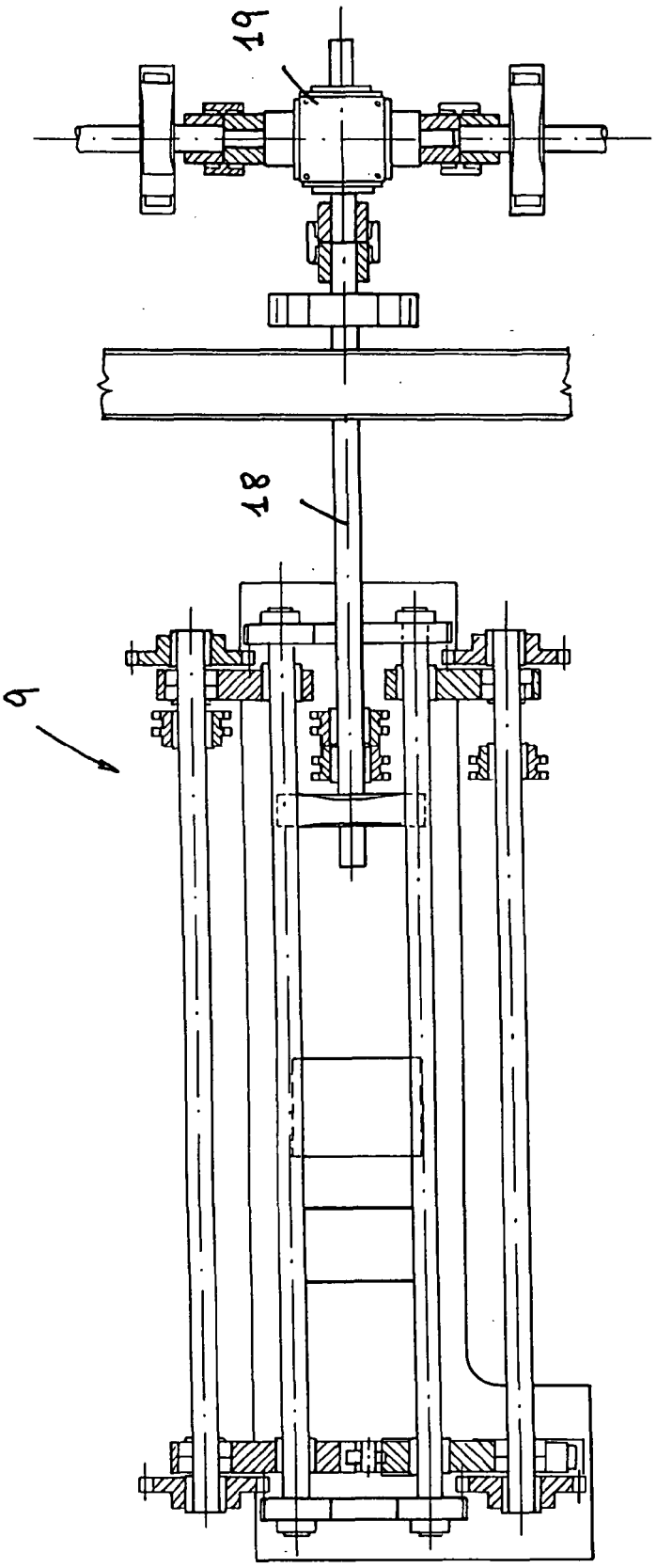


FIG. 11