

MODULAR POWER-GENERATING DEVICE FOR A VEHICLE

The present invention relates to a modular power-generating device for a vehicle, said device comprising
5 guide means designed to be able to collaborate with complementary guide means that a vehicle comprises.

The present invention falls within the field of land vehicles, notably the field of high-power motorized
10 machinery such as transport vehicles of the harbor vehicle or abnormal load type, site equipment, and all-terrain military vehicles. More particularly, it relates to the field of the maintenance of the drive means of such equipment.

15 In harbor installations it is known practice for goods in transit, particularly when these goods are containers, to be transported by trains of trailers or semitrailers coupled to a tractor unit.

20 Operators wish to limit their investment to the strict minimum required and therefore expect their handling equipment to exhibit true multifunctionality. Handling vehicle downtime for reconditioning and maintenance has
25 also to be as short as possible.

Document FR 2 919 545 by the same applicant discloses a harbor vehicle comprising several means of accepting functional modules. These functional modules relate to
30 various parts of the vehicle, particularly replacement modules or substitute modules for a power component such as a combustion engine or electric motor, an axle or even running means.

35 One of the problems associated with operating a fleet of self-propelled equipment is connected with the length of downtime. The problem of adapting the motive characteristics to suit the load being transported and

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the type of envisioned mission also arises. The operator cannot afford to overspecify the power of the powering means of his fleet, firstly because of the high cost of investment and also because of the obvious
5 additional cost in energy consumption if overspecified powering means are used.

Hence, the invention has set itself the task of pursuing the conceptual idea begun in document
10 FR 2 919 545, which proposes a practical design for carrying out interventions on such vehicles. It therefore involves finding suitable, and very easy-to-implement, solutions for quickly changing, for example, a powering unit, so that its power and torque can be
15 adapted to suit the load that it is to transport.

In addition, during maintenance operations it is necessary to be able quickly to remove this power unit so that vehicle downtime is reduced as far as possible.
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Also known, from document WO 00/27662, is a hydraulic power module which, through through various suitable connections allows a hydraulic motor to power a vehicle by being attached to the front face thereof. Such a
25 module, although practical, does not allow the power required in the running gear to be tailored correctly to suit the load transported by said vehicle and this leads to a not-insignificant additional cost in fuel and in wear and tear if the vehicle is run unladen. In
30 addition, siting the power unit on the front face presents the problem of integrating a number of modules equipped with another powering system into the vehicle.

Also, document GB 2 189 754 discloses a vehicle
35 designed to load and unload an airplane comprising a power module which, here again, is set into the front face of the vehicle under the chassis. Such a module likewise presents problems of adaptability to driving

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the running means according to the load. It can also be noted that the design and situation of this module do not allow use of a number of modules that might comprise various alternative power systems. Quite
5 clearly, this vehicle that has a power ill suited to its load leads to additional fuel and maintenance costs.

Elsewhere, to address such problems, document
10 EP 0 244 549 provides a module for powering a passenger transport vehicle. Such a module comprises powering means, but also comprises running means that are incorporated and powered by these powering means. This module is installed on the rear face of the vehicle and
15 incidentally constitutes the rear part of the vehicle. Such a module thus allows the power to be adapted to suit the load. However, such a module is voluminous, very bulky and very heavy, which means that it is not quick and easy to fit/remove. Specifically, because the
20 module constitutes the entire rear part of the vehicle, fitting or removing it entails the use of lifting gear. Hence its adaptability is reduced.

Document EP 1 329 351 provides an electric vehicle of
25 the truck type fitted with a battery to which there is added a module containing a combustion engine. Such a module is positioned on the load bed to supply additional power to the batteries with which said vehicle is equipped. Quite clearly this solution is
30 unsatisfactory because, on the one hand, the module occupies a large part of the available space and, on the other hand, it is not adapted to the running means according to the load. In addition, further additional modules cannot be added without further limiting the
35 load-carrying space, or even using it up entirely.

Finally, document GB 2443 272 discloses a hybrid vehicle comprising detachable charging modules which

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are incorporated into the front face of said vehicle. Such modules are designed to provide hybrid power to this vehicle so that a load can be transported. The modular aspect that this document introduces is used only to make it easier to incorporate this hybrid powering system into the vehicle. Under no circumstance is the power adapted according to the load. Thus, said vehicle has excess fuel consumption when unladen and this may lead to high costs.

It is an object of the invention to alleviate the disadvantages of the prior art by proposing a vehicle comprising a module comprising a power unit that can be removed from and refitted to a vehicle, notably of the harbor transport or similar type, quickly and easily.

Thus, the invention relates to a vehicle comprising ground-running means and a chassis, characterized in that said chassis in its central part comprises a housing intended to accept, vertically, at least one modular interchangeable power-generating device, said device being in the form of a parallelepipedal closed unit constructed around an all-welded structure of a bottom, two lateral panels and two longitudinal panels, and comprising:

- guide means designed to be able to collaborate with complementary guide means that the housing of said vehicle comprises;
- locking means designed to be able to collaborate with complementary locking means that the housing of said vehicle comprises; and
- at least powering means designed to be able to supply all or some of the motive power of said vehicle to drive said running means.

According to yet another feature, the modular device comprises rapid coupling means designed to allow it to

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be connected quickly to at least one element of the drive train.

5 The invention also relates to a train of vehicles comprising at least one vehicle comprising at least one such modular device.

10 The invention affords the operator undisputable advantages. In particular, the invention allows regular vehicle maintenance to be carried out in parallel time thus reducing the down time of each vehicle so as to optimize the fleet of vehicles. In addition, when used in the context of a harbor installation the fact that the availability of this fleet is fully controlled
15 means that a ship can most definitely be loaded and unloaded.

In addition, the invention allows the powering of the transport vehicle to be modified quickly and simply to
20 suit the load it is to transport and/or it is to pull and/or it is to push, on the outbound or return leg of its mission. In particular, a power system tailored to suit the load being transported by the vehicle makes it possible to make significant fuel savings. The correct
25 specification in terms of power and in terms of torque allows the configuration of the vehicle to be adapted to suit its mission, and in particular allows the necessary resources to be available so that the vehicle can start under any hill configuration in its route.
30 This specification is of particular importance when the vehicle is towing a train of trailers, because it needs to be allowed full autonomy against any unforeseen circumstance in the fulfillment of its mission. Certain types of transport using a train of trailers require
35 the use of a brake car, and it then becomes easy to adapt the power system of the latter to suit the load present between a tractor vehicle and the brake car.

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Other features and advantages of the invention will emerge from the detailed description which follows of some nonlimiting embodiments of the invention which are given with reference to the attached figures in which:

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- figure 1 is a functional diagram of the device according to the invention;

- figures 2 to 9 schematically depict various vehicles obtained by combining various devices according to the invention, the makeup of which will be explained in greater detail later on in the description, with various vehicles comprising various means in their drive train;

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- figure 10 is a schematic elevation of a vehicle equipped with devices according to the invention;

- figure 11 is a schematic elevation of a train of vehicles which are equipped with devices according to the invention;

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- figure 12 is a schematic partial perspective depiction of the installation of a modular device according to the invention on a vehicle equipped to receive it;

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- figure 13 is a partial perspective depiction of the modular device of figure 12 in another configuration for being received on a vehicle to which it is fitted.

The invention falls within the field of land vehicles, and particularly the field of high-power motorized machinery.

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It relates more specifically to a vehicle comprising removable replacement or substitute modules of a power or torque element of a transport vehicle of the harbor vehicle or abnormal load type.

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It is an object of the invention to provide a vehicle comprising a removable power-generation modular

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device 1 which, on the one hand, allows quick and easy interchangeability of at least one power unit of a transport vehicle 100 of the harbor or similar type and, on the other hand, makes access to the various elements that this modular device 1 comprises easier, for scheduled maintenance.

The device 1 collaborates with, or is incorporated into, a drive train for driving a vehicle 100 along the ground, this at least comprising:

- . powering means 7 and/or
- . drive means 12, and/or
- . ground-running means 13.

According to an alternative, the drive means 12 may be incorporated into the powering means 7.

The drive train may comprise, amongst other things, the powering means 7 and the drive means 12, as well as conversion means 8.

Advantageously, all or some of the means that make up the drive train are designed to be able to be connected to energy storage means 14 and/or to control means 16 and/or to management means 18 in the vehicle 100. In all the scenarios depicted in the figures, the ground-running means 13 are incorporated into the vehicle 100, but the modular power-generation device according to the invention could also, in an alternative, comprise at least one driven axle and therefore incorporate such ground-running means 13.

For preference, the modular device 1 further comprises the powering means 7 and preferably the conversion means 8.

As visible in figure 13, the modular device 1 preferably, but nonlimitingly, takes the form of a

closed unit, such as a prism or the like comprising guide means 2.

For preference, these guide means 2 are arranged on at least one face of this prism and more particularly consist of at least one rail. An embodiment involving a fairing, closed in by panels made of sheets, gratings or the like, offers advantages in terms of safety when inserting or extracting a modular device 1 in relation to a vehicle 100, insofar as there is no housing or re-entrant corner in which an operator could become trapped during the maneuver.

According to one preferred embodiment of the invention, the modular device 1 comprises positioning and/or indexing means 4 allowing the latter to be positioned accurately on a vehicle 100. Advantageously, the positioning and/or indexing means 4 are situated in the region of the guide means 2, particularly of the guide rail.

Moreover, advantageously coupled to these positioning means, the modular device 1 may further comprise end-of-travel or limit stop means 5 so that the modular device 1 can be fitted correctly and quickly onto the vehicle 100 by bringing these to bear against complementary limit stop means 500 this vehicle comprises.

The guide means 2 are designed to be able to collaborate with complementary guide means 200, of the slide rail or similar type, that a vehicle 100 comprises.

Advantageously, interaction between the guide means 2 belonging to the modular device 1 and the complementary guide means 200 belonging to the vehicle 100, such as a slide, allows the modular device 1 to be quickly

installed on or removed from a vehicle 100 in a direction of insertion.

More specifically, this modular power generation device
5 1 further comprises locking means 6, for example of the catch or bolt type, which are designed to be able to collaborate with complementary locking means 600 that a vehicle 100 comprises. These complementary locking means 600 firstly perform a retaining function and
10 secondly, and if necessary, perform an additional function of positioning the modular device 1 by constituting additional positioning and/or indexing means 400 designed to be able to collaborate with positioning and/or indexing means 4 that the latter
15 comprises, particularly in the region of its guide means 2.

Indeed it is advantageous to know precisely the position of the modular device 1 in order to allow ease
20 of connection of the services and allow connection of the fluids and control circuits especially if the vehicle 100 has connections of set geometry, for example rigid pipes, and/or mechanical and/or hydraulic and/or pneumatic and/or electrical components or the
25 like.

For preference, such a modular device 1 comprises at least powering means 7 designed to be able to supply all or some of the motive power of a vehicle 100. It
30 will notably be appreciated that one and the same vehicle 100 may, in certain embodiments, be fitted with a number of modular devices 1 according to the invention. These powering means 7 comprise at least one combustion engine 11 specified in terms of power and in
35 terms of torque according to the load that the vehicle 100 is to transport and the mission profile thereof.

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According to a preferred alternative form of the invention, the powering means comprise at least one combustion engine 11, designed to be able to drive conversion means 8 so that power is available on the vehicle 100 in fluid, notably electrical or hydraulic, form. In such a case, the conversion means 8 comprise, or are designed to be able to drive, either an electric generator 9 consisting for example of an alternator or alternatively a hydraulic motor or unit 10, or a compressor, or the like.

Quite obviously, the modular device 1 is designed to be able to be equipped with suitable cooling and power and energy supply means for each powering means that it comprises, incorporated into its structure.

Advantageously, this modular device 1 comprises, preferably on at least one of its faces, quick connection means to allow the modular device 1 to be connected quickly to at least one part of the drive train specific to the vehicle 100 on which the modular device 1 is installed.

According to a preferred embodiment of the invention in which the modular device 1 is produced in a faired and prismatic form, the prism developing in the direction of insertion, these connection means may project, or alternatively be set back, from the face of the prism so as to allow a practical interfacing between the powering means 7 of the modular device 1 and the elements external thereto, consisting of the vehicle or of external auxiliaries, for example means for filling with fuel.

More particularly, these connection means may be of electrical, hydraulic, pneumatic or even mechanical type.

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According to one preferred embodiment of the invention, the modular device 1 comprises energy conversion means 8. These conversion means advantageously and nonlimitingly allow the mechanical power produced by the combustion power to be converted:

- from mechanical power into electrical power, and/or
- from mechanical power into pneumatic power, and/or
- from mechanical power into hydraulic power, and/or
- 10 - from hydraulic power into electrical power, and/or
- from hydraulic power into pneumatic power.

Advantageously, the modular device 1 further comprises drive means 12 designed to drive the ground-running means 13 which consist of wheels or tracks that a vehicle 100 comprises.

The conversion means 8 have the purpose of converting the mechanical rotation power supplied by a combustion engine 11 into power that can be used directly by these drive means 12. It will be appreciated that the conversion means may comprise various elements, gearboxes or mechanical axle assemblies, converters, compressors, alternators or the like.

25 According to one particular embodiment of the invention, the drive means 12 may be sited remotely near or in said wheels or tracks of the vehicle, in the form of driven wheels, which are driven either hydraulically or electrically in the models that are the most commonplace.

This shifting of the drive means 12 into the ground-running means 13, notably wheels, advantageously saves space and simplifies the connection between the modular device 1 and the vehicle 100.

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In substance, these drive means 12 may be, on the one hand, powered directly by the thermal 11 or hydraulic 10 powering means and, on the other hand, powered by the conversion means 8 which then supply either
5 hydrostatic or electric or pneumatic power.

Advantageously, the modular device 1 comprises energy storage means 14 for powering the powering means 7, and for the conversion means 8 if the modular device 1 has
10 such a means. These energy storage means 14 may notably consist of a fuel tank which mainly powers the combustion engine means 11, of batteries that store and/or supply electrical power, of hydraulic accumulators or alternatively of pneumatic
15 accumulators. These energy storage means 14 can, advantageously also, be used for vehicle 100 functions other than the drive functions, notably for the braking, assisted steering, shock-absorbing, coupling, lighting functions, or for powering control means,
20 cabin air-conditioning, or similar functions.

These energy storage means 14 are, once again, designed to supply alternative power at least to the powering means 7.

25 These energy storage means 14 also, by being coupled to the powering means 7, allow the use of an "engine stop-start" technology developed by the same applicant and covered by patent application FR 09 03098 and which
30 allows the powering means that have previously been stopped to be restarted under the effect of the expansion of a previously compressed fluid that allows the powering means that consume the most amount of energy to be stopped notably during vehicle loading and
35 unloading operations, thus saving on the amount of fuel used during a loading/unloading cycle.

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Advantageously, the modular device 1 comprises, for the powering means 7, conversion means 8, the drive means 12 and the energy storage means 14, regulating means 15 which are centralized, or preferably specific to each
5 of these means, for measuring the operating parameters and regulating the operation of these various means. These regulating means 15 are also capable of storing information regarding said means.

10 For preference, the modular device 1 further comprises control means 16 designed to be able to act on the various regulating means 15 of the powering means 7, of the conversion means 8, of the drive means 12 and of the energy storage means 14. Specifically, these
15 control means 16 more particularly send control signals to these regulating means 15 which then carry out the requested operations.

According to a preferred embodiment of the invention,
20 the modular device 1 comprises, incorporated into it, an intelligent submodule 17 comprising a management means 18 which, via the control means 16, instruct the regulating means 15 that regulate the various technical means.

25 Advantageously, these management means 18 comprise a programmable controller or the like, designed to be able to act on the control means 16. This controller can also monitor the various levels and statuses of the
30 vehicle, such as the fuel levels, the battery charge level, the fluid, oil, water or the like pressure level. In addition, this controller is designed to calculate the potential length of service of the modular device 1 and generate warnings such as a
35 maintenance or engine fault warning or the like.

According to an embodiment that can be seen in figure 2, the modular device 1 comprises only the

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powering means 7 while the conversion means 8, the drive means 12, the storage means 14 and the ground-running means 13 are on the vehicle 100.

5 According to an embodiment that can be seen in figure 3, the modular device 1 comprises the powering means 7 and the conversion means 8, while the drive means 12, the storage means 14 and the ground-running means 13 are on the vehicle 100.

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According to an embodiment that can be seen in figure 4, the modular device 1 comprises the powering means 7 and the drive means 12, while the conversion means 8, the storage means 14 and the ground-running means 13 are on the vehicle 100.

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According to an embodiment that can be seen in figure 5, the modular device 1 comprises the powering means 7 and the storage means 14, while the conversion means 8, the drive means 12 and the ground-running means 13 are on the vehicle 100.

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According to an embodiment that can be seen in figure 6, the modular device 1 comprises the powering means 7, the conversion means 8 and the drive means 12, while the storage means 14 and the ground-running means 13 are on the vehicle 100.

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According to an embodiment that can be seen in figure 7, the modular device 1 comprises the powering means 7 and the conversion means 8 and the storage means 14, while the drive means 12 and the ground-running means 13 are on the vehicle 100.

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35 According to an embodiment that can be seen in figure 8 the modular device 1 comprises the powering means 7, the drive means 12 and the storage means 14 while the

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conversion means 8 and the ground-running means 13 are on the vehicle 100.

According to an embodiment that can be seen in figure 9
5 the modular device 1 comprises the powering means 7, the conversion means 8, the drive means 12 and the storage means 14 while only the ground-running means 13 are on the vehicle 100.

10 Coming back to the drive train 700, the latter is situated between the powering means 7 and the running means 13.

For preference, the modular device 1 comprises at least
15 the upstream part 700A comprising powering means 7 of such a drive train 700. The vehicle 100 itself comprises at least the downstream part 700B comprising ground-running means 13, of such a drive train.

20 As may be seen in figure 10, an equipped vehicle 800 comprises such a vehicle 100 and at least one modular device 1 constituting such an upstream part 700A.

This equipped vehicle 800 may further comprise other
25 modular devices 1, which comprise other elements of such a drive train 700, without necessarily including powering means 7. This equipped vehicle 800 may further comprise other modular devices 1 for functions that are unrelated to driving the vehicle along the ground, such
30 as for maintaining contact with the ground, for lifting, for adjusting shock-absorbing means, for braking or the like.

It will be readily understood that modular devices 1
35 may each comprise all or some of the powering means 7, of the conversion means 8, of the drive means 12, of the storage means 14 and advantageously comprise means of interconnection, notably with a view to establishing

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a drive train 700, using couplings, clutches, couplers, connections or the like.

Once again it will be understood that, in a drive train
5 700 design comprising powering means 7, conversion means 8, drive means 12, storage means 14 and ground-running means 13, these various means need to be joined or coupled together in order to transfer power:
from the powering means 7 or from the storage means 14
10 to the ground-running means 13;
from the ground-running means 13 to the energy storage means 14.

As may be seen in figure 11, the latter configuration
15 may be of particular benefit for equipping vehicles 100B to 100N which are incorporated into a train 900 of vehicles towed by a tractor unit 100A which itself comprises at least one modular device 1 according to the invention.

20 As the train 900 of vehicles runs along, the energy stored in the storage means 14 that one of the vehicles that make up this train 900 comprises can be used, either by this same vehicle if it also comprises drive
25 means 12, or by another vehicle in the same train 900 which itself comprises such drive means 12, and to which the previous vehicle is connected by power connection means 19.

30 Returning to the form of the modular device 1, it is preferably in the form of an enclosed unit of prismatic shape, notably parallelepipedal. This unit comprises, preferably around an all-welded or assembled structure, a bottom, two lateral panels and two longitudinal
35 panels notably comprising closure elements made of aluminum alloy. The entire assembly being assembled by plugging together or the like.

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Advantageously, the longitudinal panels have ventilation openings to encourage the dissipation of heat produced by the powering means 7 of said modular device 1. However, the latter may also incorporate heat transfer means in order, for example, to air-condition the cab of the vehicle, to preheat certain components, to carry out deicing, or the like.

Quite particularly, this unit on its upper face comprises a removable top panel providing easy and quick access to the inside of the modular device 1 so that maintenance can be carried out on the means that the latter comprises.

For preference, this top panel comprises, on its top face, a surface on which people can walk so that an operator can stand on it.

The preferred embodiment of figure 12 relates to a particular vehicle 100 which, in the central part of its chassis, is equipped with a housing which, on at least two lateral parts, comprises complementary guide means 200 to accept a modular device 1 according to the invention.

In this respect, it will be noted that such a chassis is made up of at least two parallel longitudinal members and of crossmembers which are perpendicular to said longitudinal members and join them together. Resting on said longitudinal members is a bed designed to be able to carry loads such as containers generally used in the harbor environment. The part between the longitudinal members forms the central part of the chassis which is the most heavily engineered in order to be able to withstand the stresses, notably bending stresses, caused by the load being carried and the center of gravity of which is situated above this housing.

Thus, this housing is formed in the bed which is arranged on the longitudinal members and which carries the load. More particularly, this housing consists of one or more cutouts, notably of a parallelepipedal shape that complements that of one or more modules, in this bed so that one or more modules 1 can thus be installed. Thus, when a module is inside the housing, this module does not, heightwise, protrude above the cutout, so that it does not take up space that could be used for carrying a load. Such is also the case if a number of modules are fitted.

According to one alternative form of the invention, the housing(s) may be enclosed by a sheet metal plate so as to protect the modular devices 1 that are fitted

As a result, it will be appreciated that the modular device 1 is very easily set down or removed vertically, for example using a lift truck, a crane or the like. The chassis constitutes or comprises complementary end stop means 500, while the modular device 1 comprises at least one limit stop 5, for example in the form of a strong angle section or the like. Modules can thus be exchanged in under five minutes.

In a preferred combustion engine/hydraulic embodiment, the modular device 1 comprises powering means 7 that comprise at least combustion engine means 11 which are coupled to at least one hydraulic motor, the latter and the coupling means constituting conversion means 8 supplying hydraulic power to the drive means 12 which consist of hydrostatic motor-wheels. Using the "engine stop-start" technology developed by the same applicant, covered by patent application FR 09 03098, the modular device 1 comprises a starter device coupled to this hydraulic motor so as to return the accumulated hydraulic energy to the combustion engine means 11,

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through the hydraulic motor. This starter device comprises hydraulic means of accumulating energy by compressing a hydraulic fluid which are provided, on the one hand, with means of connection intended to be
5 coupled to the engine and, on the other hand, with means of controlling the return of the accumulated energy. The latter means comprise means of measuring the accumulated pressure and complementary means of supplying the accumulation means with fluid and keeping
10 it under pressure. The supply means comprise at least one nonreturn valve from the accumulation means. Coupling is via connection means to a crankshaft that one of the combustion engine means 11 comprises so that the return of power turns this crankshaft and restarts
15 the relevant engine.

In a combustion engine/electrical preferred embodiment, the modular device 1 comprises powering means 7 that comprise at least combustion engine means 11 coupled to
20 at least one alternator, the latter and the coupling means constituting conversion means 8 that supply the drive means 12 consisting of electric motor-wheels with electrical power.

25 Maintenance operations are carried out more easily, because the modular device 1 is outside of the vehicle during these operations.

Advantageously, this modular device 1 also allows the
30 storage space needed for spare parts to be optimized because only modular devices 1 are stored in situ, making for rapid replacement.

In substance, the prism comprises, at the corner of the
35 edges, strengthening and stiffening means that make this prism robust and resistant to impacts.

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This device 1 therefore makes it possible to optimize the length of time for which each vehicle 100 is available, and the operations which are performed firstly in parallel time and secondly outside of the vehicle 100. In addition, this device improves the storage of spare parts because only the device 1 rather than a very specific component needs to be changed. This modular device 1 allows this change to be effected quickly and easily according to the load to be carried or during a maintenance operation.

The invention also relates to a vehicle 100 comprising at least one such modular device 1.

15 The invention also relates to a train 900 of vehicles comprising at least one vehicle 100 comprising at least one such modular device 1.

CLAIMS

1. A vehicle (100) comprising ground-running means (13) and a chassis, characterized in that said chassis
5 in its central part comprises a housing intended to accept, vertically, at least one modular interchangeable power-generating device (1), said device being in the form of a parallelepipedal closed unit constructed around an all-welded structure of a
10 bottom, two lateral panels and two longitudinal panels, and comprising:

- guide means (2) designed to be able to collaborate with complementary guide means (200) that the housing of said vehicle (100) comprises;
- 15 - locking means (6) designed to be able to collaborate with complementary locking means (600) that the housing of said vehicle (100) comprises; and
- at least powering means (7) designed to be able to supply all or some of the motive power of said vehicle
20 (100) to drive said running means.

2. The vehicle as claimed in claim 1, characterized in that said modular device (1) is designed to be able to drive the ground-running means (13) that said
25 vehicle (100) comprises.

3. The vehicle as claimed in either one of the preceding claims, characterized in that the powering means (7) comprise at least one combustion engine (11)
30 specified in terms of power and in terms of torque according to the load that said vehicle (100) is to transport and according to the mission profile of said vehicle.

35 4. The vehicle as claimed in any one of the preceding claims, characterized in that said modular device (1) comprises power conversion means (8) designed to be

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able to convert the mechanical power produced by the combustion power:

- from mechanical power into electrical power, and/or

- 5 - from mechanical power into pneumatic power, and/or
- from mechanical power into hydraulic power, and/or
- from hydraulic power into electrical power or alternatively, and/or
- from hydraulic power into pneumatic power.

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5. The vehicle as claimed in any one of the preceding claims, characterized in that said modular device (1) comprises drive means (12) designed to be able to drive ground-running means (13) such as wheels or tracks.

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6. The vehicle as claimed in the preceding claim 3, characterized in that said modular device (1) comprises energy storage means (14) to supply at least said powering means (7) with alternative power.

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7. The vehicle as claimed in any one of the preceding claims, characterized in that said modular device (1) comprises regulating means (15) designed to be able to regulate at least said powering means (7).

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8. The vehicle as claimed in the preceding claim, characterized in that said modular device (1) comprises control means (16) designed to be able to act on said regulating means (15) to control the powering means (7) and/or the conversion means (8), and/or the driving means (12) and/or the energy storage means (14).

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9. The vehicle as claimed in claim 8, characterized in that the modular device (1) comprises management means (18) designed to be able to operate said regulating means (15) and/or the control means (16) for controlling the powering means (7) and/or the

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conversion means (8) and/or the drive means (12) and/or the energy storage means (14).

10. The vehicle as claimed in any one of the preceding
5 claims, characterized in that the modular device (1) comprises the powering means (7), the conversion means (8), the drive means (12) and the energy storage means (14).