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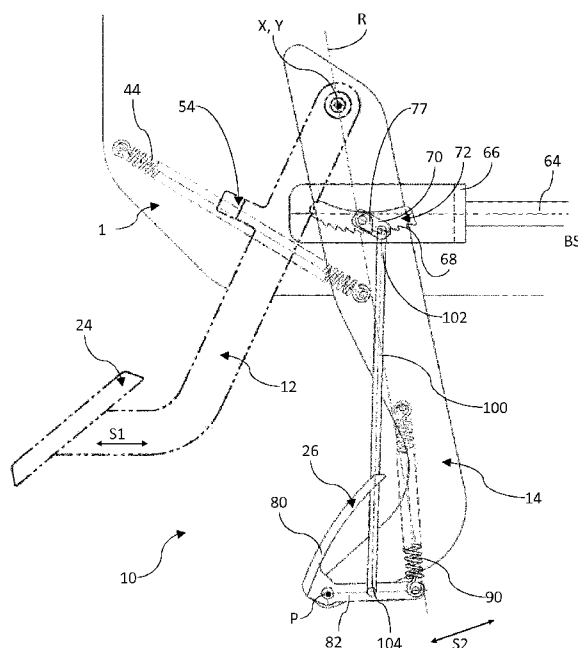


Fig. 4

(57) Abstract: The present invention relates to a pedal assembly (10) for a motorized vehicle comprising an accelerator (12) that regulates the power of the engine and a brake (14) for the activation of a braking system (BS) of the vehicle, wherein the accelerator (12) and the brake (14) each comprise a respective arm (16, 18), hinged to a support body (1) of the vehicle, and a respective pedal (24, 26) on a free end (28, 30) of the respective arm (16, 18), each of said accelerator (12) and brake (14) being activatable by applying pressure on the respective pedal (24, 26) such as to rotate the arm (16, 18) of the accelerator (12) or of the brake (14), respectively, from a rest position to a more advanced operating position, characterized in that the accelerator (12) comprises a connecting member (54) to the brake (14) adapted to draw in rotation the arm (18) of the brake (14) when the accelerator (12) is activated so that, when the accelerator (12) is activated, the brake (14) pedal and the accelerator (12) pedal are alongside each other, and the pedal assembly (10) comprises a mechanical coupling (62) between the brake (14) and the braking system (BS) of the vehicle, said mechanical coupling (62) being adapted to couple the brake (14) to the braking system (BS) of the vehicle only when the pedal (26) itself of the brake (14) is activated.

A pedal assembly for a motorized vehicle

* * * * *

The present invention relates to the field of motorized vehicles and refers in particular to a pedal assembly for a motorized vehicle having an improved
5 pedal configuration, which allows optimizing the braking time.

By "motorized vehicle" or simply "vehicle" it is meant, in the present description and in the appended claims, any mechanical means driven by a human and used for transporting people, animals or objects, whether it is travelling on the road or in closed environments, in particular a motor vehicle
10 (i.e. car, bus, truck), for example a high-performance car.

As is well known, the movement of motorized vehicles is allowed by a propulsion system, in the form of an engine of any type (internal combustion, electrical, etc.) associated with a suitable braking system, which allows it to be stopped from a movement condition and also it being of various possible types
15 (hydraulic, mechanical, electrical, etc.), in addition to a steering system that provides direction to the vehicle.

The power of the engine is regulated, in a well-known way, by means of a throttle command or accelerator which commands the delivery of engine power in different modes, also depending on the type of engine.

20 In many cases, for example when the engine is of the internal combustion type, the vehicle is also equipped with a gearbox which allows different transmission ratios to be selected according to the speed of the vehicle, in order to keep the engine within a speed range of optimal operation in terms of efficiency, driving torque or power.

25 Typically, in motorized vehicles in which the driver assumes a sitting position not straddling the vehicle, the control members of the braking system and of the regulation system of the engine power, brake and accelerator respectively, are made in the form of pedal members, which can be activated by the driver in the driving position with one foot or both feet. The assembly of
30 the pedal control members of the vehicle is conventionally defined as pedal assembly.

If a gearbox is provided, the vehicle further comprises a clutch which allows the temporary disconnection of the driving torque produced by the engine to allow changing the transmission ratio. As is known, when present, the clutch is commanded by a further pedal member which, for simplicity, will
5 still be indicated hereinafter as a clutch.

The conventional configuration of a pedal assembly for a motorized vehicle provides for the brake to be alongside to the accelerator, in particular on its left, so that the brake and the accelerator can be activated by the driver in an alternative manner by using the same foot, in particular the right foot. The
10 driver's other foot, in this case the left one, remains at rest or, if the vehicle is equipped with a gearbox, activates the clutch which is in turn placed, conventionally, to the left of the brake.

In the present description and in the appended claims, the terms "right" and "left", as well as "in front", "behind", "front", "back" and similar or derived
15 expressions are used with reference to a driver in the driving position on board the vehicle.

The pedal control members are typically made in the form of levers having a free end carrying a pedal and an end hinged to the vehicle. In the case of a mechanical command, the pressure exerted on the pedal by the
20 driver's foot is transferred to the commanded system through a further system of mechanical levers and/or gears, while in the case of an electro-mechanical command, the pressure on the pedal activates one or more electrical switches, as known to those skilled in the art.

It should be noted that the term "pedal" is used, in the present description and in the appended claims, to designate only the element - typically plate-
25 shaped - of the control member on which pressure is applied with the foot.

A constant objective of the designers is to optimize the braking time of the vehicle, an objective all the more coveted if aimed for example at increasing the safety of the passengers of a car, but of interest even if, for
30 example, aimed at increasing the manoeuvring accuracy of industrial vehicles for handling goods.

The braking time, that is the time between the moment in which the driver has the need to brake and the effective moment of the vehicle stop or of reaching the desired speed, can be broken down into a reaction time, a transition time, an activation time and a vehicle response time.

5 The reaction time is the time required for the driver to realize the need to decelerate, for example the time between the detection of a front obstacle and the decision to brake.

10 The transition time is the time it takes the driver to shift his foot from his current position, normally on the accelerator, to the brake pedal, before starting the effective braking.

15 The activation time is the time required for the driver to fully depress the brake in order to activate it; in fact, to activate the brake it is necessary for the pedal to be pressed down up to a certain depth and to apply an adequate pressure, based on the characteristics of the vehicle's braking system. For example, in the case of a braking system comprising disc brakes, it will be necessary to apply sufficient force on the brake so that the brake pads are pressed onto the discs with a sufficient force so as to obtain the desired vehicle deceleration.

20 Finally, the response time of the vehicle is the time required, following the pressure applied by the driver on the brake, for the vehicle to decelerate until its complete stop or until the desired speed is reached.

25 The reaction time depends entirely on the driver; the activation time depends partly on the driver and partly on the characteristics of the braking system (for example the brake hardness); the response time of the vehicle again depends on the braking system, as well as on various external factors such as for example vehicle speed, road conditions, etc.

30 **KR20040020266 A** discloses a system for reducing the transition time of the foot from accelerator to brake, which provides for a brake pedal with a relatively large surface on which an accelerator pedal is mounted, which moves integrally to the brake when it is pressed and is configured to be activated by a lateral "sliding" movement along the surface of the brake pedal.

In this way, the driver's foot is always already resting on the brake pedal, with consequent zeroing of the transition time between the two pedals for activating a brake. The activation of the accelerator commands the opening of a throttle valve that regulates the engine power, while the brake activation also
5 commands the closure of the aforesaid valve, interrupting the acceleration.

This solution is not entirely satisfactory, since the configuration of the pedal assembly is remarkably complex and the activation of the accelerator seems rather inconvenient, since in order to accelerate the driver must not apply pressure with the sole of the foot - otherwise he would activate the brake
10 - but rather with the inner side of the foot, letting the accelerator slide along the brake pedal.

Furthermore, the pedal assembly of this document lends itself to possible involuntary brake activations, since the driver, while travelling, always keeps the foot already resting on the brake and for accelerating he must be careful
15 and push only in the lateral direction without applying pressure also on the brake, which would cause, among other things, a closure of the throttle valve with consequent interruption of the vehicle's acceleration.

Faced with a similar technical problem, **FR2708113 A3** discloses an accelerator pedal configured in such a way as to be always in a position which
20 is more raised than the brake pedal, even when activated to its maximum depth. In this way, in order to shift the foot from the accelerator to the brake it is not necessary to raise and shift the foot laterally, but it is sufficient to slide the foot laterally and then lower it again on the brake.

However, also this document does not provide an optimal solution, since
25 if it is considered that the accelerator can have a more or less wide travel depending on the vehicle, the lowering movement of the foot to reach the brake could still require a not negligible time and therefore, the configuration shown by the document may not be sufficient to consistently reduce the braking time.

The problem at the basis of the invention is therefore that of obviating the
30 drawbacks mentioned above, in particular by providing a pedal assembly having an improved pedal configuration, which allows optimizing the braking

time.

In its first aspect, the invention relates to a pedal assembly for a motorized vehicle comprising an accelerator that regulates the power of an engine of the vehicle and a brake for the activation of a braking system of the vehicle, wherein the accelerator and the brake each comprise a respective
5 arm, hinged to a support body of the vehicle, and a respective pedal on a free end of the respective arm,

each of said accelerator and brake being activatable by applying pressure on the respective pedal such as to rotate the arm of the accelerator or of the brake, respectively, from a rest position to a more advanced operating
10 position,

characterized in that

the accelerator comprises a connecting member to the brake adapted to draw in rotation the brake arm when the accelerator is activated so that, when
15 the accelerator is activated, the brake pedal and the accelerator pedal are alongside each other, and

the pedal assembly comprises a mechanical coupling between the brake and the braking system of the vehicle, said mechanical coupling being adapted to couple the brake to the braking system of the vehicle only when the brake
20 pedal itself is activated.

Thanks to the invention, in order to reduce the braking time it is therefore advantageously possible to act on the transition time from accelerator to brake instead of on the remaining braking time components, since these latter, as described above, are mainly governed by external factors or linked to the
25 driver, therefore little controllable, or by characteristics of the braking system that can be changed only within certain limits due to standard or safety issues. In fact, in a conventional pedal assembly, before starting braking the driver must first raise his foot from the accelerator, releasing it, then shift it to the left, towards the brake, and finally lower it again until contacting the brake pedal,
30 having to perform a series of displacements in various directions which undoubtedly increase the braking time.

In the configuration of the present document, instead, the brake and the accelerator are advantageously always side by side as long as the driver is pressing on the accelerator. The activation time is therefore reduced only to the time necessary to "slide" the foot laterally from the accelerator, without
5 having to raise it, until contacting the supporting surface of the brake pedal which is aligned with that of the accelerator, without having to lower the foot. This is allowed by the presence of the mechanical coupling which, keeping the brake decoupled from the braking system until a direct pressure is applied on the brake pedal, makes it possible that the brake movement, when drawn
10 passively by the accelerator through the connecting member, does not cause a braking. On the other hand, this configuration also prevents the inadvertent activation of the accelerator when the brake is activated because, once the foot is shifted on the brake pedal, it loses contact with the accelerator which is therefore free to return to its rest position, interrupting the acceleration.

15 This constructive embodiment of the pedal assembly according to the invention can be further improved through the following additional characteristics.

Preferably, the accelerator arm and the brake arm are angularly movable with respect to the support body of the vehicle about respective axes of rotation
20 X, Y, said axes of rotation X and Y being parallel to each other, preferably coinciding.

This allows the brake arm to move parallel or at least substantially parallel to the accelerator arm when it is passively drawn by the latter through the connecting member.

25 Preferably, the connecting member is a bar that is integral to the accelerator arm and laterally projecting therefrom, having a length such as to intercept the brake arm for drawing it during the activation of the accelerator.

The connecting member is thus simple to make and acts only in the activation direction, i.e. in advancement.

Preferably, the braking system of the vehicle comprises, at the interface with the brake, a push rod whose advancement causes the activation of said braking system.

In this case, preferably the mechanical coupling comprises:

5 - a rack, formed in a slot provided in an end portion of the push rod of the braking system.

- a pawl hinged, at a first end thereof, to the brake arm, and movable angularly between a first position in which it does not engage the rack and can slide freely in the slot, and a second position in which it engages the rack,

10 the coupling between the brake pedal and the braking system of the vehicle occurring when the pawl is in the second position.

The coupling/decoupling between the brake and the braking system of the vehicle is carried out by means of mechanical components only and is therefore particularly robust and reliable, not being subject to the problems that
15 for example an electric type system could have.

Preferably, the slot extends along an arc of a circle, the centre of such circle falling on the axis of rotation Y of the brake arm.

In this way the slot extends in the movement direction of the brake arm and therefore the correct movement of the pawl is facilitated.

20 Preferably, the brake pedal is hinged to the brake arm and is angularly movable about an axis of rotation P between a rest position and an operating position.

Preferably, the brake pedal is hinged to a free end of the brake arm.

The movable brake pedal can therefore be used as a locking/unlocking
25 member of the coupling.

Preferably, for this purpose the brake pedal comprises a supporting portion, on which pressure is applied for activating the brake, and a rotation transmission portion, each of said portions extending from a hinging region of

the brake pedal, and comprising respective radially projecting ends with respect to said hinging region of the brake pedal.

The rotation transmission portion is in fact used for the purpose of locking/unlocking the coupling, without interfering with the supporting portion
5 which is instead the one interfacing with the driver.

Furthermore, preferably the supporting portion and the rotation transmission portion are angularly offset between them.

Preferably, the rotation of the brake pedal is transmitted to the pawl through a tie rod having an upper end hinged at a movable end of the pawl,
10 and a lower end hinged to the brake pedal, so that the first position of the pawl corresponds to the rest position of the brake pedal, and the second position of the pawl corresponds to the operating position of the brake pedal.

This direct mechanical command ensures high speed and operational safety, particularly important for the activation of a braking system.

15 Preferably, the tie rod is hinged to the rotation transmission portion of the brake pedal, at a distance d from the axis of rotation P of the brake pedal.

Preferably, the pedal assembly further comprises a first elastic element that forces the brake to the rest position, said first elastic element connecting the brake arm to the support body of the vehicle.

20 Preferably, the mechanical coupling also comprises a second elastic element that forces the brake pedal to the rest position thereof.

Preferably, the second elastic element is a spring and connects the transmission portion of the brake pedal to the brake arm.

Further characteristics and advantages of the present invention will be
25 more evident from the following description of some preferred embodiments thereof made with reference to the appended drawings. The different characteristics in the individual configurations can be combined together as desired. In such drawings,

- Fig. 1 is a side view of a pedal assembly according to the present

invention, in a first operating condition in which an accelerator and a brake are both in the rest position;

- Fig. 2 is a view similar to that of Fig. 1 of the pedal assembly of the invention, in a second operating condition in which the accelerator is
5 activated;

- Fig. 3 is a view similar to the preceding ones of the pedal assembly of the invention, in a third operating condition in which the brake activation starts and the accelerator has just been released; and

- Fig. 4 is a view similar to the preceding ones of the pedal
10 assembly of the invention, in a fourth operating condition in which the brake is fully depressed and the accelerator has returned to the rest position.

With reference to the figures, a pedal assembly is shown for a motorized vehicle, indicated as a whole with reference 10.

The pedal assembly 10 comprises an accelerator 12 which regulates the
15 power of the vehicle engine and a brake 14 which activates the braking system of the vehicle, indicated generically by BS.

The accelerator 12 and the brake 14 each comprise a respective arm 16,
18 hinged, at one of its first ends 20, 22, to a support body 1 of the vehicle,
and a respective pedal 24, 26 on a free end 28, 30 of the respective arm 16,
20 18.

In Fig. 1 the pedal assembly 10 is seen from its right side. According to a
widespread convention for vehicle pedal assemblies, the brake 14 is
positioned to the left of the accelerator 12, therefore the latter is in the
foreground in Figs. 1-4, closer to the observer, while the brake 14 is in the
25 background.

The free ends 28, 30 of the arms 16, 18 are located lower than the first
ends 20, 22 of the arms 16, 18, and the pedals 24, 26 are therefore suspended
from above.

The arm 16 of the accelerator 12 and the arm 18 of the brake 14 are angularly movable with respect to the support body 1 of the vehicle about respective axes of rotation X, Y.

In the specific embodiment shown, the axes of rotation X and Y are
5 parallel to each other and in particular coincide.

The arm 16 of the brake 12 and the arm 18 of the accelerator 14 each comprise a longitudinal portion 32, 34, which extends from the respective axes of rotation X, Y substantially along a radial direction indicated by R, and a generically curved portion 36, 38 which deviates from this radial direction and
10 ends up at the free end 28, 30 supporting the respective pedal 24, 26. The generally curved portion 36 of the arm 16 of the accelerator 12 extends along a direction indicated by S1 in Fig. 1, and the generally curved portion 38 of the brake 14 arm 18 extends along a direction indicated by S2 in Fig. 1.

The arm 16 of the accelerator 12 and the arm 18 of the brake 14 can
15 have different shapes and/or sizes between them. In the case of the pedal assembly 10, the longitudinal portion 34 of the arm 18 of the brake 14 has a greater length and width than the longitudinal portion of the arm 16 of the accelerator 12. Furthermore, the arm 16 of the accelerator 12 has an almost constant width along its entire length, in both longitudinal portion 32 and curved
20 portion 36 thereof, while the width of the arm 18 of the brake 14 is variable.

In the present description and in the appended claims, by length it is meant to indicate an extension in the radial direction R for the longitudinal portions 32, 34, and an extension in the directions S1 and S2 for the curved portions 36, 38, respectively.

25 In the present description and in the appended claims, by width it is meant to indicate an extension in a direction perpendicular to the radial direction R for the longitudinal portions 32, 34, and an extension in a direction perpendicular to the directions S1 and S2 for the curved portions 36, 38, respectively.

30 In the operating condition of Fig. 1, accelerator 12 and brake 14 are both in the rest position, in which they are not activated by the driver of the vehicle.

In the rest position, the pedal 24 of the accelerator 12 and the pedal 26 of the brake 14 are alongside each other and their supporting surfaces 40, 42, adapted to be contacted by the driver's foot, are in particular substantially coplanar.

5 In the present description and in the appended claims, by "substantially coplanar" it is meant to indicate in a broad sense surfaces lying substantially on the same plane if they are both planar or, if they are not exactly planar in shape, substantially tangent to a same plane.

In the specific embodiment of Figs. 1-4, in fact, it can be noted that the
10 pedal 24 of the accelerator 12 has a flat supporting surface 40, while the pedal 26 of the brake 14 has a slightly curved supporting surface 42. In the rest position (Fig. 1), the two pedals 24, 26 are side by side and the supporting surface 42 of the pedal 26 of the brake 14 is substantially tangent to a plane (not shown) in which the planar supporting surface 40 of the pedal 24 of the
15 accelerator 12 lies, achieving the advantages of the invention outlined in the introduction.

The rest position of the brake 14 is forced by a first elastic element 44. In particular, the first elastic element 44 is made in the form of a return spring, having a first end 46 hooked to a peg 48 on the support body 1 of the vehicle,
20 and a second end 50 hooked to a peg 52 provided in a suitable position along the arm 18 of the brake 14. The first elastic element 44 works by extension when the brake 14 is activated and returns the brake 14 to the rest position when the latter is released.

Also the accelerator 12 is provided with suitable return elements, which
25 however are not visible in Figs. 1-4 as they are normally located further downstream, in the vehicle acceleration system.

The accelerator 12 and the brake 14 can be activated by applying a pressure on the respective pedal 24, 26, such as to rotate the arm 16 of the accelerator 12 or the arm 18 of the brake 14 about the respective axis X from
30 the rest position to an operating position, which is more advanced than the rest position.

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Advantageously, according to the invention the accelerator 12 comprises a connecting member 54 to the brake 14, provided for drawing the arm 18 of the brake 14 in rotation when the accelerator 12 is activated.

This connecting member 54 is in particular made in the form of a bar integral to the arm 16 of the accelerator 12 and projecting therefrom
5 towards the arm 18 of the brake 14, with a length such as to intercept said arm 18 of the brake 14.

The connecting member 54 can be formed in one piece with the arm 16 of the accelerator 12, or it can be made separately from the accelerator 12 and
10 subsequently fixedly connected to the arm 16 of the accelerator 12, for example by welding, bonding, etc.

In order to take into account the different widths of the arm 16 of the accelerator 12 and the arm 18 of the brake 14, the connecting member 54 has a "hook" shape and comprises a first raised portion 56, which extends in
15 cantilevered fashion in a direction substantially perpendicular to the arm 18 of the accelerator 14, and a supporting portion 58, transverse to the raised portion 56 and extending laterally towards the brake 14, which is effectively the one abutting on the arm 18 of the brake 14, in particular on a rear surface 60 thereof, to draw it in rotation.

20 With this shape of the connecting member 54, the supporting portion 58 abuts on the arm 18 of the brake 14 in the rest position, at the same time allowing the alignment between the pedals 24, 26.

Therefore, advantageously, upon activation of the accelerator 12, also the brake 14 is drawn in rotation by means of the connecting member 54. The
25 pedal 26 of the brake 14 shifts forward together with the pedal 24 of the accelerator 12 and remains alongside to it throughout the entire rotation movement (see Fig. 2).

The supporting surfaces 40, 42 of the pedal 24 of the accelerator 12 and the pedal 26 of the brake 14 are therefore always substantially coplanar - in
30 the above-mentioned meaning - and this advantageously allows, according to

the invention, a rapid transition of the driver's foot from the accelerator 12 to the brake 14 in case of need, through a lateral sliding movement of the foot.

Obviously, it is necessary to ensure that a simultaneous activation of accelerator 12 and brake 14 never occurs.

5 For this purpose, according to the invention, the pedal assembly 10 further comprises a mechanical coupling 62 arranged between the brake 14 and the braking system BS of the vehicle.

This mechanical coupling 62 is configured to couple the brake 14 to the braking system BS of the vehicle only when the driver activates the pedal 26
10 of the brake 14, that is when he applies pressure with his own foot on the pedal 26 of the brake 14 and not when it is passively drawn by the accelerator 12 by means of the connecting member 54.

It should be noted that the braking system BS of the vehicle comprises, at the interface with the pedal assembly 10, a push rod 64, of which in Figs. 1-
15 4 in particular an end portion 66 is visible. The braking system BS is activated following the advancement of the push rod 64.

The mechanical coupling 62 between the brake 14 and the braking system BS is in particular made at the end portion 66 of the push rod 64. This end portion 66 is alongside to the arm 18 of the brake 14 and is coupled thereto
20 and decoupled therefrom by means of the mechanical coupling 62.

When the mechanical coupling 62 is active, that is when the brake 14 is coupled to the end portion 66 of the push rod 64, the rotation of the brake 14 is transmitted to the push rod 64, causing it to advance and thus activating the braking system BS. Conversely, when the mechanical coupling 62 is not active
25 and the brake 14 is therefore decoupled from the end portion 66 of the push rod 64, the rotation of the brake 14 is not transmitted to the push rod 64, which therefore remains stationary and does not activate the braking system BS.

The mechanical coupling 62 comprises in particular a rack 68 and a pawl 70 adapted to engage/disengage with/from said rack 68.

The rack 68 is formed in a slot 72 provided in the end portion 66 of the aforesaid push rod 64 of the braking system BS.

The pawl 70 is hinged, at a first end 74 thereof, to the arm 18 of the brake 14, is inserted inside the slot 72 and is movable angularly, at a first movable
5 end thereof 76, between a first position in which it does not engage the rack 68 and can slide freely in the slot 72 (the position shown in Figs. 1, 2) and a second position in which it engages the rack 68 (the position shown in Figs. 3, 4) by means of a tooth 77 integral to the pawl 70.

The mechanical coupling 62 is active, in other words there is a coupling
10 between the brake 14 and the braking system BS, when the pawl 70 is in the second position in engagement with the rack 68.

Otherwise, when the pawl 70 is in the first position not in engagement with the rack 68, it can slide freely in the slot 72.

Since the pawl 70 is hinged to the arm 18 of the brake 14, it is constrained
15 to follow its rotary movement when the arm 18 of the brake 14 is set in rotation. Therefore, to allow the movement of the pawl 70 inside it, the slot 72 extends along an arc of a circle, the centre of which falls on the axis of rotation Y of the brake arm.

The dimensions of the slot 72 are appropriately chosen to ensure the
20 correct travel of the pawl 70 inside it, based on the travel of the brake 14 and the dimensions of the pawl 70.

A rear end 78 of the slot 72 can also be used as a stop abutment for the brake 14 travel in the rear direction, when this is forced by the first elastic element 44. As visible in Fig. 1, in fact, the rest position is reached when the
25 pawl 70 abuts on this rear end 78 of the slot 72.

While the pedal 24 of the accelerator 12 is fixed with respect to the arm 16 of the accelerator 12, the pedal 26 of the brake 14 is movable angularly with respect to the arm 18 of the brake 14 about an axis of rotation P between a rest position and an operating position.

The pedal 26 of the brake 14 is in particular hinged to the free end 30 of the arm 18 of the brake 14 and comprises a supporting portion 80, comprising the aforesaid supporting surface 42 on which the pressure is applied by the driver to activate the brake 14, and a rotation transmission portion 82.

5 Said supporting portions 80 and rotation transmission portions 82 extend substantially radially from a hinging region 84 of the pedal 26 of the brake 14, and comprise respective radially projecting ends 86, 88 with respect to said hinging region 84 of the pedal 26 of the brake 14.

10 The portions 80, 82 project from the hinging region 84 along substantially radial directions which are different between them.

The portions 80, 82 of the pedal 26 of the brake 14 are made in one piece, but if otherwise they are made in distinct pieces it is sufficient for them to be fixed to each other and to the hinging region 84 so as to maintain a mutual fixed position.

15 The pedal 26 of the brake 14 is forced to its rest position by a second elastic element 90. Like the first elastic element 44, the second elastic element 90 is made in the form of a return spring which also acts by extension, having a first end 92 hooked to a peg 94 on the radially projecting end 88 of the rotation transmission portion 82, and a second end 96 hooked to a peg 98
20 provided in a suitable position along the arm 18 of the brake 14.

The rotation of the pedal 26 of the brake 14 is used to command the mechanical coupling 62 for activation/deactivation, in particular by shifting the pawl 70 respectively to the second position, in engagement with the rack 68, and to the first position, not in engagement with the rack 68.

25 This rotation is transmitted to the mechanical coupling 62, in particular to the pawl 70, by means of a tie rod 100 comprising an upper end 102 hinged at the movable end 76 of the pawl, and a lower end 104 hinged to the pedal 26 of the brake 14, through suitable elements for the rotary fixing (not shown).

30 The tie rod 100 rigidly transmits the rotation of the pedal 26 of the brake 14 so that the first position of the pawl 70 corresponds to the rest position of

the pedal 26 of the brake 14, in which it does not engage the rack 68 and the second position of the pawl 70 corresponds to the operating position of the pedal 26 of the brake 14, in which it engages the rack 68.

5 The first position of the pawl 70, in which it does not engage the rack 68 and is in lateral abutment against an upper edge 73 of the slot 72 (Figs. 1 and 2), in fact establishes the maximum rotation travel of the pedal 26 of the brake 14 anti-clockwise when forced by the second elastic element 90, thus determining its rest position.

10 Similarly, the second position of the pawl 70, in which it engages the rack 68 (Figs. 3 and 4), establishes the maximum rotation travel of the pedal 26 of the brake 14 clockwise when it is pressed by the driver's foot.

The tie rod 100 is in particular hinged to the rotation transmission portion 82 of the pedal 26 of the brake 14, at a suitable distance d from the axis of rotation P of the pedal 26 of the brake 14.

15 As the person skilled in the art will understand, the distance d is suitably chosen so as to correctly and precisely transfer the rotary movement of the pedal 26 of the brake 14 to the pawl 70 through the tie rod 100, and so that the supporting portion 80 of the pedal 26 of the brake 14 does not interfere with the movement of the tie rod 100.

20 Starting from the condition of Fig. 2 in which the accelerator 12 is activated, to perform a braking the driver shifts his foot laterally and starts applying pressure on the pedal 26 of the brake 14.

25 For the sole purpose of a better understanding, Fig. 3 shows an intermediate, instantaneous condition, in which the driver has just released the accelerator 12 (which has not returned to the rest position yet) and applies pressure on the pedal 26 of the brake 14 whose rotation is transmitted to the pawl 70 and causes the rotation in the second position, in engagement with the rack 68.

30 At this point, the mechanical coupling 62 is active and the brake 14 is coupled to the braking system. By continuing to apply pressure on the pedal

26 of the brake 14 (Fig. 4), the arm 18 of the brake 14 starts rotating forward, making the push rod 64 to which it is coupled to advance and causing the activation of the braking system BS. The released accelerator 12 returns to the rest position forced by its return elements (not shown).

5 The foregoing is a description of various embodiments of inventive aspects, and further modifications may be made without departing from the scope of the present invention as defined by the following claims. The shape and/or size and/or position and/or orientation of the various components can be changed. The functions of an element can be performed by two or more
10 components and vice versa. The components shown which are directly connected or in contact with each other can have intermediate structures arranged between them. Not all the details shown in a figure or described in the same context must necessarily be present in the same embodiment. Characteristics or aspects that are innovative with respect to the known
15 technique, alone or in combination with other characteristics, are to be considered described per se, independently of what is explicitly described as innovative.

CLAIMS

1. A pedal assembly (10) for a motorized vehicle comprising an accelerator (12) that regulates the power of an engine of the vehicle and a brake (14) for the activation of a braking system (BS) of the vehicle, wherein
5 the accelerator (12) and the brake (14) each comprise a respective arm (16, 18), hinged to a support body (1) of the vehicle, and a respective pedal (24, 26) on a free end (28, 30) of the respective arm (16, 18),

each of said accelerator (12) and brake (14) being activatable by applying pressure on the respective pedal (24, 26) such as to rotate the arm (16, 18) of
10 the accelerator (12) or of the brake (14), respectively, from a rest position to a more advanced operating position,

characterized in that

the accelerator (12) comprises a connecting member (54) to the brake (14) adapted to draw in rotation the arm (18) of the brake (14) when the
15 accelerator (12) is activated so that, when the accelerator (12) is activated, the pedal of the brake (14) and the pedal of the accelerator (12) are alongside each other, and

the pedal assembly (10) comprises a mechanical coupling (62) between the brake (14) and the braking system (BS) of the vehicle, said mechanical
20 coupling (62) being adapted to couple the brake (14) to the braking system (BS) of the vehicle only when the pedal (26) of the brake (14) itself is activated.

2. The pedal assembly (10) according to claim 1, wherein the accelerator (12) arm and the brake (14) arm are angularly movable with respect to the support body (1) of the vehicle about respective axes of rotation X, Y, said
25 axes of rotation X and Y being parallel to each other, preferably coinciding.

3. The pedal assembly (10) according to claim 1 or 2, wherein the connecting member (54) is a bar that is integral to the accelerator (12) arm (16) and laterally projecting therefrom, having a length such as to intercept the arm (18) of the brake (14) for drawing it during the activation of the accelerator
30 (12).

4. The pedal assembly (10) according to any of the preceding claims, wherein the braking system (BS) of the vehicle comprises, at the interface with the brake (14), a push rod (64), whose advancement causes the activation of said braking system (BS) and wherein the mechanical coupling (62) comprises:

- a rack (68), formed in a slot (72) provided in an end portion (66) of the push rod (64) of the braking system (BS).

- a pawl (70) hinged, at a first end (74) thereof, to the brake (14) arm, and movable angularly between a first position in which it does not engage the rack (68) and can slide freely in the slot (72), and a second position in which it engages the rack (68),

the coupling between the brake (14) pedal and the braking system (BS) of the vehicle occurring when the pawl (70) is in the second position.

5. The pedal assembly (10) according to claim 4, wherein the slot (72) extends along an arc of a circle, the centre of such circle falling on the axis of rotation Y of the arm (18) of the brake (14).

6. The pedal assembly (10) according to claim 4 or 5, wherein the pedal (26) of the brake (14) is hinged to the arm (18) of the brake (14) and is angularly movable about an axis of rotation (P) between a rest position and an operating position.

7. The pedal assembly (10) according to claim 6, wherein the pedal (26) of the brake (14) is hinged to a free end (30) of the arm (18) of the brake (14).

8. The pedal assembly (10) according to any of claims 6-7, wherein the pedal (26) of the brake (14) comprises a supporting portion (80), on which pressure is applied for activating the brake (14), and a rotation transmission portion (82), each of said portions (80, 82) extending from a hinging region (84) of the pedal (26) of the brake (14), and comprising respective radially projecting ends (86, 88) with respect to said hinging region (84) of the pedal (26) of the brake (14).

9. The pedal assembly (10) according to any of claims 4-8, wherein the rotation of the pedal (26) of the brake (14) is transmitted to the pawl (70) through a tie rod (100) having an upper end (102) hinged at a movable end (76) of the pawl (70), and a lower end (104) hinged to the pedal (26) of the
5 brake (14), so that the first position of the pawl (70) corresponds to the rest position of the pedal (26) of the brake (14), and the second position of the pawl (70) corresponds to the operating position of the pedal (26) of the brake (14).

10. The pedal assembly (10) according to claim 9, wherein the tie rod (100) is hinged to the rotation transmission portion (82) of the pedal (26) of the
10 brake (14), at a distance (d) from the axis of rotation P of the pedal (26) of the brake (14).

11. The pedal assembly (10) according to any of the preceding claims, further comprising a first elastic element (44) that forces the brake (14) to the rest position, said first elastic element (44) connecting the arm (18) of the brake
15 (14) to the support body (1) of the vehicle.

12. The pedal assembly (10) according to any of claims 6-11, wherein the mechanical coupling (62) also comprises a second elastic element (90) that forces the pedal (26) of the brake (14) to the rest position thereof.

13. The pedal assembly (10) according to claim 12, wherein the second
20 elastic element (90) is a spring and connects the rotation transmission portion (82) of the pedal (26) of the brake (14) to the arm (18) of the brake (14).

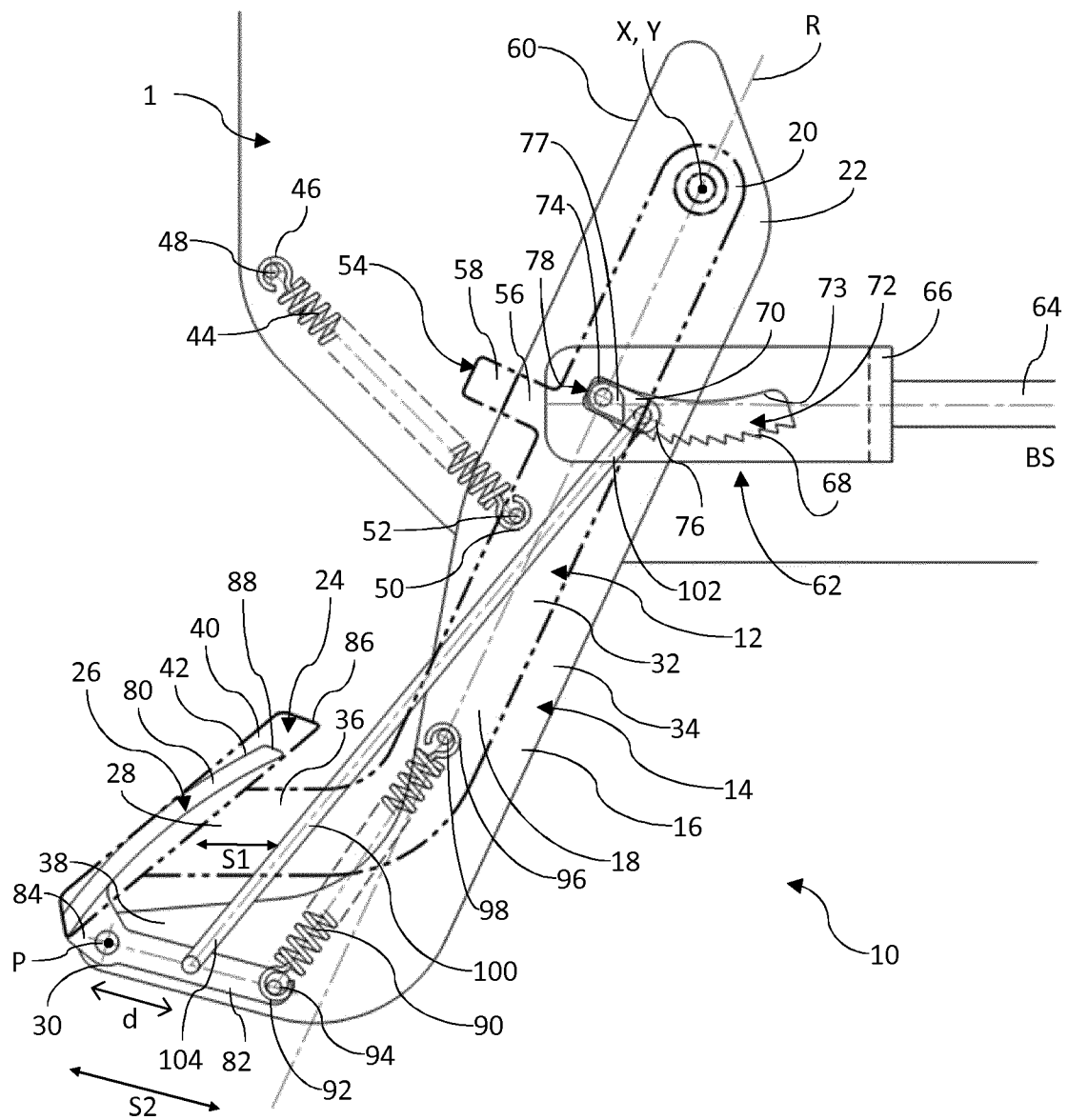
$1/4$ 

Fig. 1

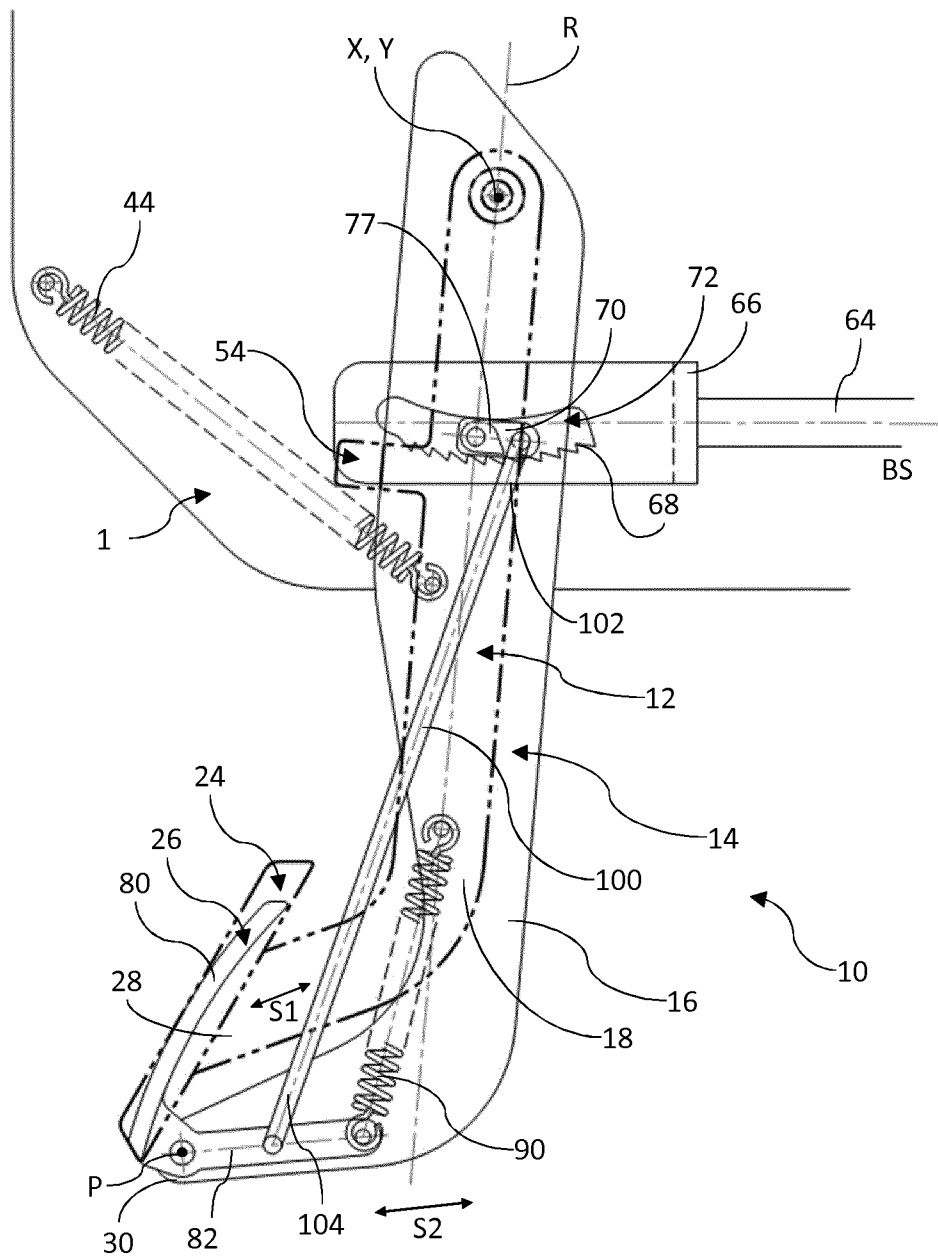


Fig. 2

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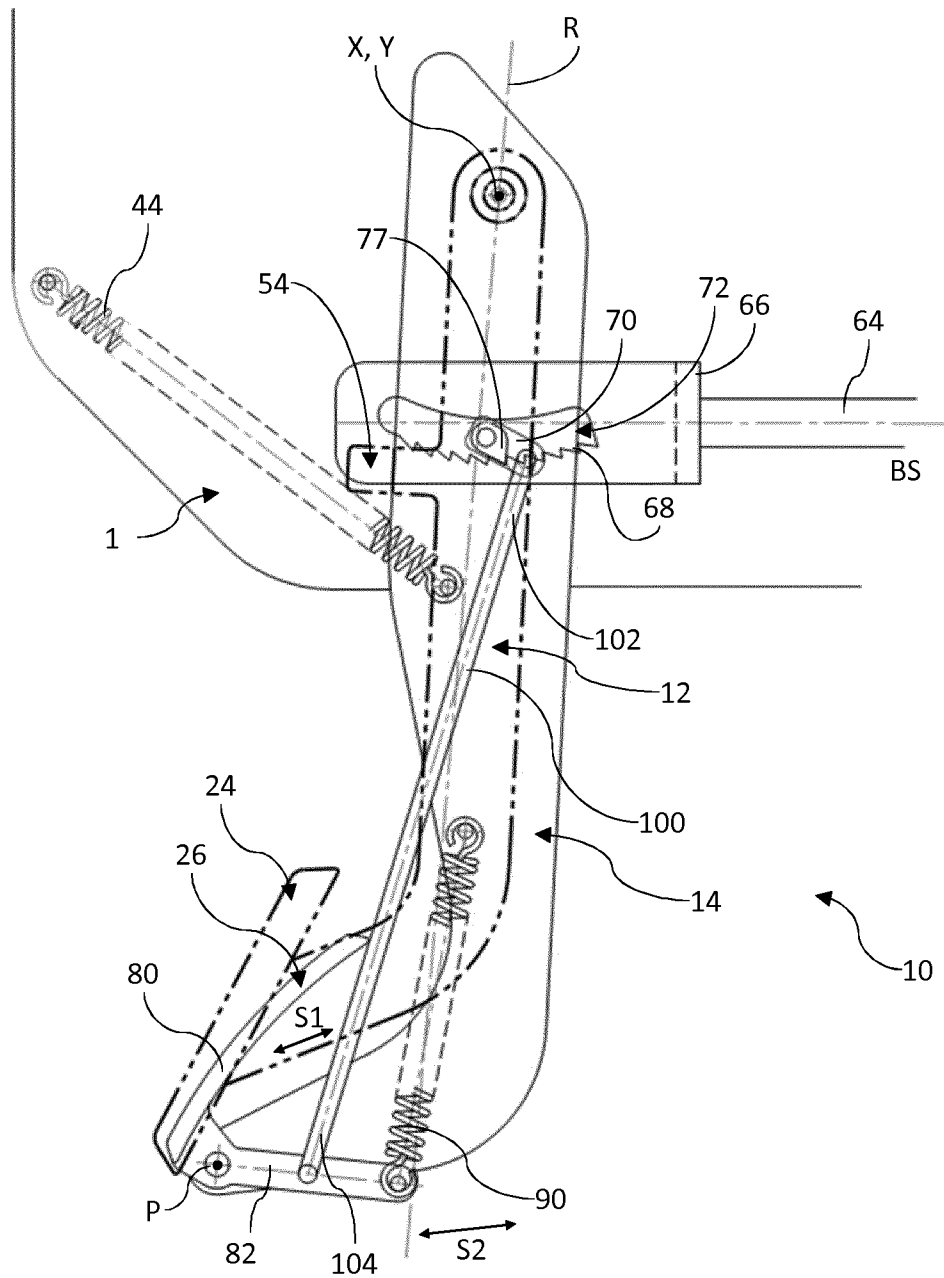


Fig. 3

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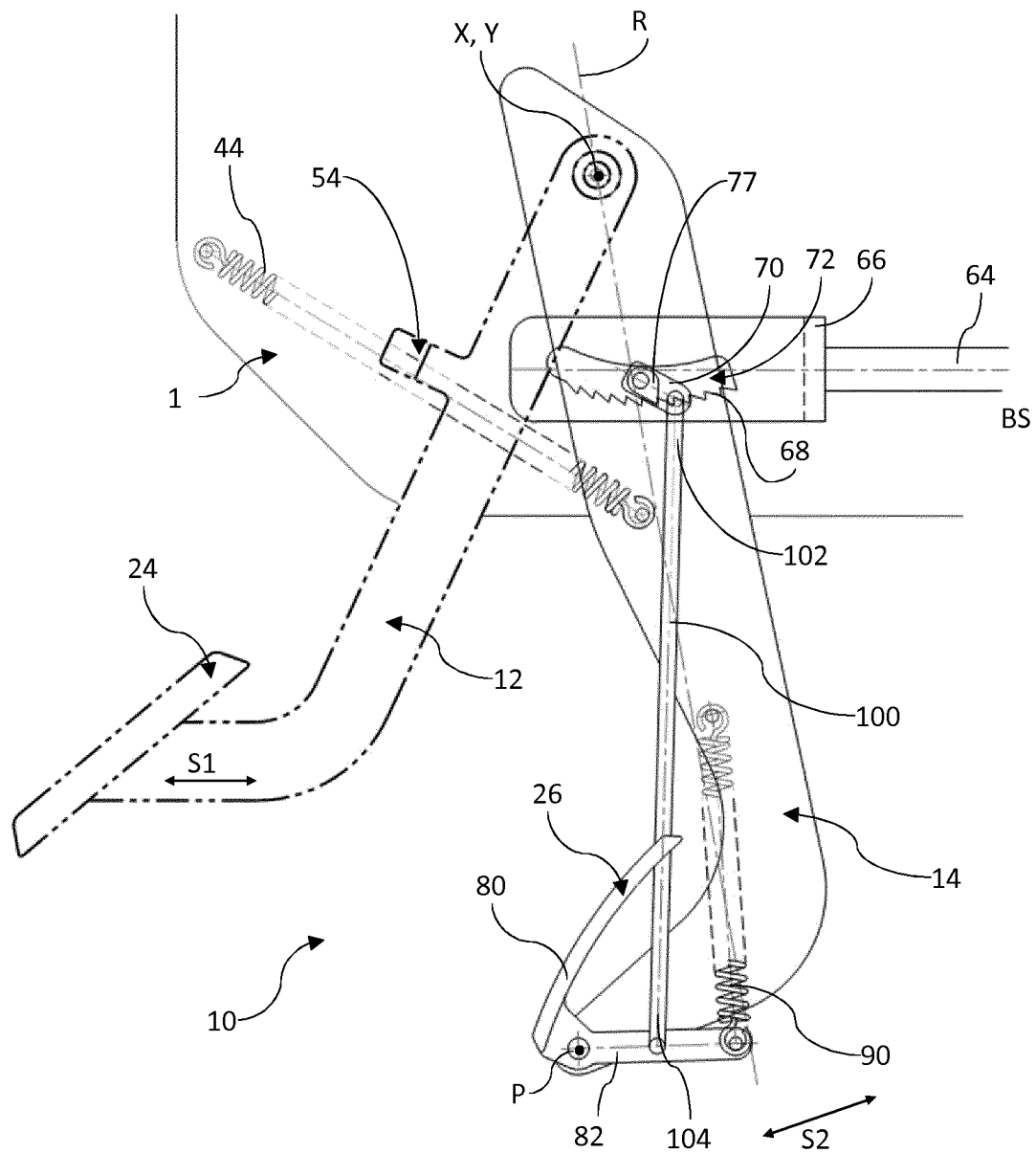


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/077766

A. CLASSIFICATION OF SUBJECT MATTER		
INV.	G05G1/36 G05G1/30	G05G1/44 G05G1/46 B60K26/02 B60T7/06
ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) G05G B60K B60T		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	NL 8 801 328 A (HENDRIKUS GERRIT VAN DEN BRINK) 18 December 1989 (1989-12-18) figures 1, 4	1-3,11
A	-----	4-10,12, 13
Y	US 6 155 385 A (BASNETT MICHAEL NEIL [GB]) 5 December 2000 (2000-12-05) figures 1, 2 column 1, line 38 - line 49	1-3,11
A	-----	4-10,12, 13
A	DE 19 52 813 A1 (CARL LUDWIG) 29 April 1971 (1971-04-29) figures 1, 2	1-13
A	-----	1-13
	EP 1 139 195 A1 (FIAT AUTO SPA [IT]) 4 October 2001 (2001-10-04) figure 2 ----- -/-	
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 5 December 2019		Date of mailing of the international search report 16/12/2019
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Rossatto, Cédric

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2019/077766

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2015/027793 A1 (DENG ZHI [CN]) 5 March 2015 (2015-03-05) figure 1 -----	1-13

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Information on patent family members

International application No

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