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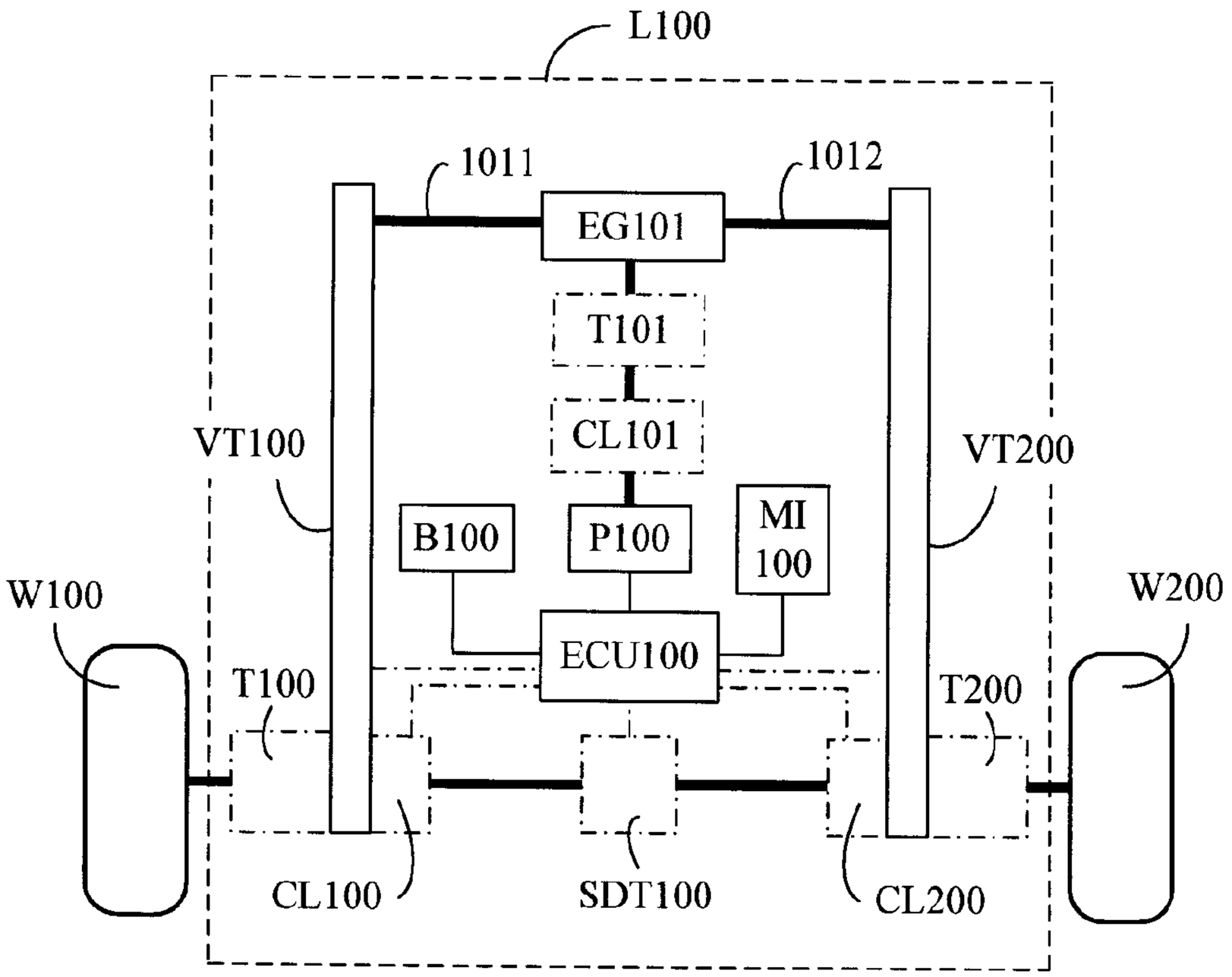
(54) Titre : SYSTEME D'ENTRAINEMENT AVEC JEUX D'ENGRENAGES EPICYCLOIDAUX ET EXTREMITES DOUBLE SORTIE, EQUIPE D'UN DISPOSITIF DE RAPPORT DE VITESSE MULTIPLE COMMANDE INDIVIDUELLEMENT

(54) Title: DRIVING SYSTEM HAVING EPICYCLE GEAR SETS WITH DUAL OUTPUT ENDS EQUIPPED WITH INDIVIDUALLY-CONTROLLED MULTIPLE SPEED-RATIO DEVICE



(57) Abrégé/Abstract:
The present invention utilizes the rotary kinetic power of a rotary kinetic power source to directly drive the epicyclic gear set, or to drive the epicyclic gear set through a transmission device, then a controllable multiple speed-ratio device is individually installed

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(57) Abrégé(suite)/Abstract(continued):
between two output shafts of the epicyclic gear set and the load driven thereby, so the wheel set of the driven load is enabled to perform variation of the driving speed ratio and the driving torque, so as to drive the combined common load; between the output ends of the two controllable multiple speed-ratio devices, a limited slip differential or a stabilize device composed of a dual shaft connecting device having slip coupling torque can be further installed according to actual needs.

ABSTRACT

The present invention utilizes the rotary kinetic power of a rotary kinetic power source to directly drive the epicyclic gear set, or to drive the epicyclic gear set through a transmission device, then a controllable multiple speed-ratio device is individually installed between two output shafts of the epicyclic gear set and the load driven thereby, so the wheel set of the driven load is enabled to perform variation of the driving speed ratio and the driving torque, so as to drive the combined common load; between the output ends of the two controllable multiple speed-ratio devices, a limited slip differential or a stabilize device composed of a dual shaft connecting device having slip coupling torque can be further installed according to actual needs.

TITLE : DRIVING SYSTEM HAVING EPICYCLE GEAR SETS WITH DUAL OUTPUT ENDS EQUIPPED WITH INDIVIDUALLY-CONTROLLED MULTIPLE SPEED-RATIO DEVICE

BACKGROUND OF THE INVENTION

(a) Field of the invention

The present invention provides a driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, which utilizes the rotary kinetic power of a rotary kinetic power source to directly drive the epicyclic gear set, or to drive the epicyclic gear set through a transmission device, then a controllable multiple speed-ratio device is individually installed between two output shafts of the epicyclic gear set and the load driven thereby, so the wheel set of the driven load is enabled to perform variation of the driving speed ratio and the driving torque, so as to drive the combined common load; between the output ends of the mentioned two controllable multiple speed-ratio devices, a limited slip differential or a stabilize device composed of a dual shaft connecting device having slip coupling torque can be further installed according to actual needs, so when differential operation is performed between the two loads, the stabilize device can be served to stable the operation of the drive system.

(b) Description of the Prior Art

When a conventional single power performs differential driving to two or more than two of individual loads of a common load body, a differential wheel set is often used for achieving the function of differential speed, the mentioned means has a shortage of not being able to generate the torque differential between the two loads.

SUMMARY OF THE INVENTION

The present invention provides a driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, which utilizes the rotary kinetic power of a rotary kinetic power source to directly drive the epicyclic gear set, or to drive the epicyclic gear set through a transmission device, then a controllable multiple speed-ratio device is individually installed between two output shafts of the epicyclic gear set and the load driven thereby, so the wheel set of the driven load is enabled to perform variation of the driving speed ratio and the driving torque, so as to drive the combined common load; between the output ends of the mentioned two controllable multiple speed-ratio devices, a limited slip differential or a stabilize device composed of a dual shaft connecting device having slip coupling torque can be further installed according to actual needs, so when differential operation is performed between the two loads, the stabilize device can be served to stable the operation of the drive system.

According to the present invention, the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device can be applied in a vehicle or an industry-used, agriculture-used or specially-designed carrier with front wheel drive, or rear wheel drive, or four wheel drive, or multiple wheel drive or driven by belts installed at two sides.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view illustrating the common load body (L100) being installed with a first epicyclic gear set (EG101) driven by the rotary kinetic power of a rotary kinetic power source (P100), a controllable multiple speed-ratio device (VT100) being installed between a left end output shaft (1011) of the first epicyclic gear set (EG101) and a wheel set (W100) at the left side of the loading end, and a controllable multiple

speed-ratio device (VT200) being installed between a right end output shaft (1012) and a wheel set (W200) at the right side, according to one embodiment of the present invention.

FIG. 2 is schematic view illustrating a controllable multiple speed-ratio device (VT100) and a controllable multiple speed-ratio device (VT300) being individually installed between the left end output shaft (1011) of the first epicyclic gear set (EG101) of FIG. 1 and the wheel set (W100) at the rear left side and the wheel set (W300) at the front left side of the loading end, and a controllable multiple speed-ratio device (VT200) and a controllable multiple speed-ratio device (VT400) being individually installed between the right end output shaft (1012) and the wheel set (W200) at the rear right side and the wheel set (W400) at the front right side of the loading end, according to one embodiment of the present invention.

FIG. 3 is a schematic view illustrating FIG. 2 being further installed with a first epicyclic gear seat (EG101) and a second epicyclic gear set (EG102) driven by the rotary kinetic power of the rotary kinetic power source (P100), and a controllable multiple speed-ratio device (VT100) being installed between the left end output shaft (1011) of the first epicyclic gear set (EG101) and the wheel set (W100) at the rear left side of the loading end, a controllable multiple speed-ratio device (VT200) being installed between the right end output shaft (1012) and the wheel (W200) at the rear right side, and a controllable multiple speed-ratio device (VT300) being installed between the left end output shaft (1021) of the second epicyclic gear set (EG102) and the wheel set (W300) at the front left side, and a controllable multiple speed-ratio device (VT400) being installed between the right end output shaft (1022) and the wheel set (W400) at the front right side, according to one embodiment of the present invention.

FIG. 4 is a schematic view illustrating FIG. 1 being installed with a direction changing signal sensor (S100) to send a signal to the control unit (ECU100) for controlling the relative speed ratio switching of the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200), according to one embodiment of the present invention.

FIG. 5 is a block diagram illustrating the structure in which the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200), the output end clutch devices (CL100), (CL200), and the transmission devices (T100), (T200) being combined at two output sides of the first epicyclic gear set (EG101), according to one embodiment of the present invention.

FIG. 6 is a schematic view illustrating FIG. 5 being installed with a direction changing signal sensor (S100) to send a signal to the control unit (ECU100) for controlling the relative speed ratio switching of the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200), according to one preferred embodiment of the present invention.

DESCRIPTION OF MAIN COMPONENT SYMBOLS

B100：Electric power source

CL101：Input end clutch device

CL100、CL200、CL300、CL400：Output end clutch device

VT100、VT200、VT300、VT400：Controllable multiple speed-ratio device

EG101：First epicyclic gear set

EG102：Second epicyclic gear set

ECU100：Control unit

1011、1021：Left end output shaft

1012、1022：Right end output shaft

L100：Common load body

MI100：Operation interface

P100：Rotary kinetic power source

S100：Direction changing signal sensor

SDT100、SDT200：stabilize device

T100、T101、T200、T300、T400：Transmission device

W100、W200、W300、W400：Wheel set

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

When a conventional single power performs differential driving to two or more than two of individual loads of a common load body, a differential wheel set is often used for achieving the function of differential speed, the mentioned means has a shortage of not being able to generate the torque differential between the two loads.

The present invention provides a driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, which mainly consists of:

-- a rotary kinetic power source (P100);

-- an epicyclic gear set;

-- a controllable multiple speed-ratio device; wherein

the rotary kinetic power of a rotary kinetic power source is served to drive the epicyclic gear set, then a controllable multiple speed-ratio device is individually installed between two output shafts of the epicyclic gear set and the load driven thereby, so the wheel set of the driven load is enabled to perform variation of the driving speed ratio and the driving torque, so as to drive the combined common load;

the mentioned common load body (L100) is mainly defined as the frame body of a vehicle, and is served to be installed with a rotary kinetic power source, related operation and transmission interface devices, and installed with loading wheel sets driven by the rotary kinetic power source and installed with non-powered wheels not being driven by the rotary

kinetic power source (P100) according to actual needs, thereby jointly carrying the common load body (L100).

According to the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, a limited slip differential or a stabilize device composed of a dual shaft connecting device having slip coupling torque can be installed at opposite locations horizontally and coaxially defined at two sides along the driving direction of the common load body (L100) and between the same transmission operation sets, and when the differential operation is performed between two loads, the stabilize device is served to stabilize the operation of the drive system; the stabilize device includes a limited slip differential, or a coupling torque dual shaft connecting device composed of a coupling device having slip damp, e.g. a dual shaft structure configured by fluid viscous effect, hydrodynamic damp effect, mechanical friction effect, electromagnetic vortex effect or power generation reverse torque effect, and two rotating ends of the stabilize device are respectively connected to: one or more than one location of the opposite locations horizontally and coaxially defined on the following transmission operation sets, including:

(1) installed between wheel set rotating parts oppositely at the left side and the right side;

(2) installed between opposite output ends of the controlled multiple speed-ratio devices at the left side and the right side;

(3) installed between opposite output ends of clutch devices at the left side and the right side;

(4) installed between the input end or the output end oppositely at the left side and the right side of the transmission device;

(5) installed between the wheel set rotating part at the left side and the wheel set rotating part at the right side;

By installing the mentioned stabilize device for the driving operation,

when the load varying at individual loading end, or the control required by the operation state of the opposite controlled multiple speed-ratio devices, or the unstable state during operation, the stabilize device can be served to stabilize the system; the stabilize device can be optionally installed according to actual needs.

According to the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, between the input end of individual controllable multiple speed-ratio device to the wheel set of the loading end, a stepped or continuous variable transmission having fixed speed ratio for acceleration or deceleration or changing direction can be further installed at one or more than one of following locations, including:

(1) installed at the input end of the controllable multiple speed-ratio device;

(2) installed at the output end of the controllable multiple speed-ratio device;

(3) installed at the input end of the clutch device;

(4) installed at the output end of the clutch device;

(5) installed at the input end of the wheel set at the loading end;

The mentioned transmission device is consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets, and composed of a transmission device having fixed speed ratio for acceleration or deceleration or changing direction, or a manually-operated or automatic or semi-automatic speed ratio varying or belt type continuous variable transmission, or a hydraulic torque converter; the transmission device can be optionally installed according to actual needs.

According to the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, between the input end of individual controllable multiple speed-ratio device to the wheel set of the loading end, a clutch device can

be further installed at one or more than one of following locations, including:

(1) installed at the input end of the controllable multiple speed-ratio device;

(2) installed at the output end of the controllable multiple speed-ratio device;

(3) installed at the input end of the transmission device;

(4) installed at the output end of the transmission device;

(5) installed at the input end of the wheel set at the loading end;

The mentioned clutch device is controlled by manual force or centrifugal force, or controlled by the operation interface, and can be served as a clutch device or structure having function of performing transmission engaging or releasing while being driven by electric force and/or magnetic force and/ or mechanical force and/or pressure and/or hydraulic force, and has a rotary input end and a rotary output end; the output end clutch device further includes a function of being driven by electric force and/or magnetic force and/or mechanical force and/or pressure and/or hydraulic force for controlling the coupling torque between engaging and releasing, e.g. an electromagnetic wet type multi-plate clutch device controlling coupling torque through exciting current, or a wet type multi-plate clutch device driven by mechanical force and/or pressure and/or hydraulic force;

The structure of the output end clutch device includes:

(1) a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing;

(2) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for linearly controlling the continuous coupling torque between

transmission engaging and releasing;

(3) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having torque limited coupling function smaller than the engaging torque, after being released;

(4) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being increased while the rotation differential being increased, after being released;

(5) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being reduced while the rotation differential being increased, after being released;

(6) (1) to (5) including a radial clutch device;

(7) (1) to (5) including an axial clutch device;

The clutch device can be optionally installed according to actual needs.

According to the present invention, the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device can be applied in a vehicle or an industry-used, agriculture-used or specially-designed carrier with front wheel drive, or rear wheel drive, or four wheel drive, or multiple wheel drive or driven by belts installed at two sides.

Embodiments according to the present invention are illustrated as followings:

FIG. 1 is a schematic view illustrating the common load body (L100) being installed with a first epicyclic gear set (EG101) driven by the rotary kinetic power of a rotary kinetic power source (P100), a controllable multiple speed-ratio device (VT100) being installed between a left end output shaft (1011) of the first epicyclic gear set (EG101) and a wheel set (W100) at the left side of the loading end, and a controllable multiple speed-ratio device (VT200) being installed between a right end output shaft (1012) and a wheel set (W200) at the right side, according to one embodiment of the present invention.

As shown in FIG. 1, the present invention utilizes the rotary output end of the rotary kinetic power source (P100) of the common load body (L100) to directly or through the transmission device (T101) to drive the first epicyclic gear set (EG101), and the controllable multiple speed-ratio device (VT100) is installed between the left end output shaft (1011) of the two output ends of the first epicyclic gear set (EG101) and the wheel set (W100) at the left side of the loading end of the common load body (L100), and the controllable multiple speed-ratio device (VT200) is installed between the right end output shaft (1012) of the two output ends of the first epicyclic gear set (EG101) and the wheel set (W200) at the right side, thereby forming the drive system capable of being operated in the differential speed and variable speed state, which mainly consists of:

--rotary kinetic power source (P100): constituted by a power source outputting kinetic power through rotation, e.g. an internal combustion engine, external combustion engine, spring power source, hydraulic power source, pressure power source, flywheel power source or manual force, or animal force, wind power source, and/or composed of a AC or DC, brush or brushless, synchronous or non-synchronous, internal rotating or external rotating type rotary motor installed with relative control devices and electrically driven by power supply and/or storage device; the output end thereof includes outputting directly or outputting through a clutch

device;

--input end clutch device (CL101): installed between the output end of the rotary kinetic power source (P100) and the input end of the first transmission device (T101), capable of controlling the rotary kinetic power source (P100) to control the transmission or termination of the rotary kinetic power of the first transmission device (T101), the input end clutch device (CL101) includes being controlled by manual force or centrifugal force, or being controlled through the operation interface (MI100), and formed as a clutch device or structure driven by electric force and/or magnetic force and/or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end; the input end clutch device (CL101) can be optionally installed according to actual needs;

--transmission device (T101): constituted by a transmission device having fixed speed ratio or variable speed ratio or continuous variable speed and consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets, and installed between the rotary kinetic power source (P100) and the first epicyclic gear set (EG101); the transmission device (T101) can be optionally adopted according to actual needs;

--first epicyclic gear set (EG101): constituted by an epicyclic gear set having an input shaft and two output shafts capable of differentially operating, directly driven by the rotary kinetic power provided by an engine, or driven by the engine through the transmission device (T101); the left end output shaft (1011) of the two output shafts capable of differentially operating is served to drive the input end of the controllable multiple speed-ratio device (VT100), and the right end output shaft (1012) is served to drive the input end of the controllable multiple speed-ratio device (VT200);

--controllable multiple speed-ratio device (VT100), (VT200): the output

end of the controllable multiple speed-ratio device (VT100) is served to drive the wheel set (W100) at the left side of the loading end, and the input end of the controllable multiple speed-ratio device (VT100) is driven by the rotary kinetic power from the left end output shaft (1011) at the output end of the first epicyclic gear set (EG101); the output end of the controllable multiple speed-ratio device (VT200) is served to drive the wheel set (W200) at the right side, and the input end of the controllable multiple speed-ratio device (VT200) is driven by the rotary kinetic power from the right end output shaft (1012) at the output end of the first epicyclic gear set (EG101); the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200) are consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets, and structured as a multiple-step transmission device for acceleration or deceleration or changing direction, e.g. an automatic type, automated manual type or manumatic type, or mechanic clutch switching type, or electric clutch switching type, or pressure switching type, or oil pressure switching type controllable multiple speed-ratio device controlled by manual force or by the control unit (ECU100);

--operation interface (MI100): constituted by a mechanical operation device control by manual force or system, and structured by a linear analog type or digital type or hybrid type electromechanical device and/or solid state electric circuit, and provided for directly controlling the rotary kinetic power source (P100), and/or the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/or the controllable multiple speed-ratio device (VT200), or for controlling the control unit (ECU100) so as to further control the operation state of the rotary kinetic power source (P100), and/or control the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/ or the controllable multiple speed-ratio device (VT200);

--control unit (ECU100): constituted by electromechanical devices and/or

electric circuit components and/or power semiconductors and/or microprocessors and software, for being connected to an electric power source (B100) and controlled by the operation interface (MI100) or operated through the signal of controlling system operation state, for controlling the operation state of the rotary kinetic power source (P100), and/or controlling the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/or the controllable multiple speed-ratio device (VT200);

--stabilize device (SDT100): constituted by a limited slip differential, or a dual shaft connecting device composed of a coupling device having slip damp coupling torque, including a stabilize device with the dual shaft structure configured through fluid viscous effect, hydrodynamic damp effect, mechanical friction effect, electromagnetic vortex effect or power generation reverse torque effect; wherein two rotating ends thereof are respectively connected between the wheel set (W100) at the left side and the wheel set (W200) at the right side of the loading end; during the driving operation, if the load varying at the individual two sides of the loading end causes the unstable operation, with the slip damp coupling torque of the stabilize device (SDT100) installed between the wheel sets at the left and right sides, the operation of the system can be stabilized; the stabilize device (SDT100) can be optionally installed according to actual needs;

According to the embodiment disclosed in FIG. 1, the input end or the output end of the controllable multiple speed-ratio device or the input end of the wheel set can be further installed with a transmission device, wherein:

--transmission device (T100), (T200): the output end of the transmission device (T100) is served to drive the wheel set (W100) at the left side of the loading end, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device

(VT100); the output end of the transmission device (T200) is served to drive the wheel set (W200) at the right side, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT200); the transmission device (T100) and the transmission device (T200) are consisted of mechanical gear sets, or chain sets, pulley sets or linkage rod sets, and structured as a multiple-step transmission device for acceleration or deceleration or changing direction, e.g. an automatic type, automated manual type or manumatic type, or mechanic clutch switching type, or electric clutch switching type, or pressure switching type, or oil pressure switching type controllable multiple speed-ratio device controlled by manual force or by the control unit (ECU100), or a structural configuration capable of automatically changing speed ratio through being passively driven by the driving rotational speed and/or the loading torque, or a continuous variable transmission capable of automatically changing speed ratio through being externally controlled, e.g. a rubber belt type, metal belt type, chain type continuous variable transmission, or Eddy current type continuous variable transmission, or torque converter, or electric continuous variable transmission (ECVT), or friction disk type, or conventional uncoaxial continuous variable transmission; the transmission device (T100), (T200) can be optionally installed according to actual needs;

According to the embodiment disclosed in FIG. 1, between the output end of the controllable d multiple speed-ratio device individually installed on individual wheel set and the loading end, a clutch device can be further installed between the output end of the controllable multiple speed-ratio device to the transmission chain of the input end of the wheel set used for distal driving, wherein:

--output end clutch device (CL100), (CL200): the output end clutch device (CL100) is installed between the output end of the controllable multiple speed-ratio device (VT100) and the wheel set (W100) for

controlling the controllable multiple speed-ratio device (VT100) to output the rotary kinetic power to the wheel set (W100), and the output end clutch device (CL200) is installed between the output end of the controllable multiple speed-ratio device (VT200) and the wheel set (W200) for controlling the controllable multiple speed-ratio device (VT200) to output the rotary kinetic power to the wheel set (W200); the output end clutch device (CL100) and the output end clutch device (CL200) include being controlled by manual force or centrifugal force, or controlled through the operation interface (MI100) and the control unit (ECU100), and formed as a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end; the output end clutch device can further includes being driven by electric force and/or magnetic force and/or mechanical force and/or air pressure and/or hydraulic force for controlling the coupling torque between engaging and releasing, e.g. an electromagnetic wet type multi-plate clutch controlling coupling torque through magnetic exciting current, or a wet type multi-plate clutch driven by mechanical force and/or air pressure and/or hydraulic force;

The structure of the output end clutch device (CL100), (CL200) includes:

(1) a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing;

(2) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for linearly controlling the continuous coupling torque between transmission engaging and releasing;

(3) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having torque limited coupling function smaller than the engaging torque, after being released;

(4) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being increased while the rotation differential being increased, after being released;

(5) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being reduced while the rotation differential being increased, after being released;

(6) (1) to (5) including a radial clutch device;

(7) (1) to (5) including an axial clutch device;

The output end clutch device (CL100), (CL200) can be optionally installed according to actual needs;

--common load body (L100) can be provided with one or more than one non-powered wheels according to actual needs;

With the operation of the mentioned devices, when the common load body (L100) is driven to operate by the rotary kinetic power source (P100), and the wheel set (W100) at the left side and the wheel set (W200) at the right side of the loading end are operated in differential speeds, the speed ratios of the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200) are individually adjusted along with the load varying of the wheel set (W100) and the

wheel set (W200) of the loading end, and the two output ends of the first epicyclic gear set (EG101) perform differential operation for adjustment, so as to drive in differential speed between the input end of the controllable multiple speed-ratio device (VT100) and the input end of the controllable multiple speed-ratio device (VT200), or the operation interface (MI100) is used to control the control unit (ECU100) so as to control the individual speed ratio adjustment between the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200).

FIG. 2 is schematic view illustrating a controllable multiple speed-ratio device (VT100) and a controllable multiple speed-ratio device (VT300) being individually installed between the left end output shaft (1011) of the first epicyclic gear set (EG101) of FIG. 1 and the wheel set (W100) at the rear left side and the wheel set (W300) at the front left side of the loading end, and a controllable multiple speed-ratio device (VT200) and a controllable multiple speed-ratio device (VT400) being individually installed between the right end output shaft (1012) and the wheel set (W200) at the rear right side and the wheel set (W400) at the front right side of the loading end, according to one embodiment of the present invention.

As shown in FIG. 2, the present invention utilizes the rotary output end of the rotary kinetic power source (P100) of the common load body (L100) to directly or through the transmission device (T101) to drive the first epicyclic gear set (EG101), and the controllable d multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT300) are respectively installed between the left end output shaft (1011) of the two output ends of the first epicyclic gear set (EG101) and the wheel set (W100) at the rear left side and the wheel set (W300) at the front left side of the loading end at the left side of the common load body (L100), and the controllable multiple speed-ratio device (VT200)

and the controllable multiple speed-ratio device (VT400) are installed between the right end output shaft (1012) and the wheel set (W200) at the rear right side and the wheel set (W400) at the front right side of the loading end at the right side of the common load body (L100), thereby forming the drive system capable of being operated in the speed differential state, which mainly consists of:

--rotary kinetic power source (P100): constituted by a power source outputting kinetic power through rotary, e.g. an internal combustion engine, external combustion engine, spring power source, hydraulic power source, pressure power source, flywheel power source or manual force, or animal force, wind power source, and/or composed of a AC or DC, brush or brushless, synchronous or non-synchronous, internal rotating or external rotating type rotary motor installed with relative control devices and electrically driven by power supply and/or storage device; the output end thereof includes outputting directly or outputting through a clutch device;

--input end clutch device (CL101): installed between the output end of the rotary kinetic power source (P100) and the input end of the first transmission device (T101), capable of controlling the rotary kinetic power source (P100) to control the transmission or termination of the rotary kinetic power to the first transmission device (T101); the input end clutch device (CL101) includes being controlled by manual force or centrifugal force, or being controlled through the operation interface (MI100), and formed as a clutch device or structure driven by electric force and/or magnetic force and/or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end; the input end clutch device (CL101) can be optionally installed according to actual needs;

--transmission device (T101): constituted by a transmission device having

fixed speed ratio or variable speed ratio or continuous variable speed and consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets, and installed between the rotary kinetic power source (P100) and the first epicyclic gear set (EG101); the transmission device (T101) can be optionally adopted according to actual needs;

--first epicyclic gear set (EG101): constituted by an epicyclic gear set having an input shaft and two output shafts capable of differentially operating, directly driven by the rotary kinetic power provided by an engine, or driven by the engine through the transmission device (T101); the left end output shaft (1011) of the two output shafts capable of differentially operating is served to drive the input ends of the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT300), and the right end output shaft (1012) is served to drive the input ends of the controllable multiple speed-ratio device (VT200) and the controllable multiple speed-ratio device (VT400);

-- controllable multiple speed-ratio device (VT100), (VT200), (VT300), (VT400): the output end of the controllable multiple speed-ratio device (VT100) is served to drive the wheel set (W100) at the left side of the loading end, and the input end of the controllable multiple speed-ratio device (VT100) is driven by the rotary kinetic power from the left end output shaft (1011) at the output end of the first epicyclic gear set (EG101); the output end of the controllable multiple speed-ratio device (VT200) is served to drive the wheel set (W200) at the right side, and the input end of the controllable multiple speed-ratio device (VT200) is driven by the rotary kinetic power from the right end output shaft (1012) at the output end of the first epicyclic gear set (EG101); the output end of the controllable multiple speed-ratio device (VT300) is served to drive the wheel set (W300) at the left side of the loading end, and the input end of the controllable multiple speed-ratio device (VT300) is driven by the rotary kinetic power from the left end output shaft (1011) at the output

end of the first epicyclic gear set (EG101); the output end of the controllable multiple speed-ratio device (VT400) is served to drive the wheel set (W400) at the right side, and the input end of the controllable multiple speed-ratio device (VT400) is driven by the rotary kinetic power from the right end output shaft (1012) at the output end of the first epicyclic gear set (EG101); the controllable multiple speed-ratio device (VT100), the controllable multiple speed-ratio device (VT200), the controllable multiple speed-ratio device (VT300) and the controllable multiple speed-ratio device (VT400) are consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets, and structured as a multiple-step transmission device for acceleration or deceleration or changing direction, e.g. an automatic type, automated manual type or manumatic type, or mechanic clutch switching type, or electric clutch switching type, or air pressure switching type, or oil pressure switching type controllable multiple speed-ratio device controlled by manual force or by the control unit (ECU100);

--operation interface (MI100): constituted by a mechanical operation device control by manual force or system, and structured by a linear analog type or digital type or hybrid type electromechanical device and/or solid state electric circuit, and provided for directly controlling the rotary kinetic power source (P100), and/or the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/or the controllable multiple speed-ratio device (VT200) and/or the controllable multiple speed-ratio device (VT300) and/or the controllable multiple speed-ratio device (VT400), or for controlling the control unit (ECU100) so as to control the operation state of the rotary kinetic power source (P100), and/or control the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/ or the controllable multiple speed-ratio device (VT200), and/or the controllable multiple speed-ratio device (VT300) and/or the controllable multiple speed-ratio device (VT400) ;

--control unit (ECU100): constituted by electromechanical devices and/or electric circuit components and/or power semiconductors and/or microprocessors and software, for being connected to an electric power source (B100) and controlled by the operation interface (MI100) or operated through the signal of controlling system operation state, for controlling the operation state of the rotary kinetic power source (P100), and/or controlling the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/or the controllable multiple speed-ratio device (VT200), and/or the controllable multiple speed-ratio device (VT300) and/or the controllable multiple speed-ratio device (VT400);

--stabilize device (SDT100), (STD200): constituted by a limited slip differential, or a dual shaft connecting device composed of a coupling device having slip damp coupling torque, including a stabilize device with the dual shaft structure configured through fluid viscous effect, hydrodynamic damp effect, mechanical friction effect, electromagnetic vortex effect or power generation reverse torque effect; wherein two rotating ends of the stabilize device (SDT100) are respectively connected between the wheel set (W100) at the rear left side and the wheel set (W200) at the rear right side of the loading end, and two rotating ends of the stabilize device (SDT200) are respectively connected between the wheel set (W300) at the front left side and the wheel set (W400) at the front right side of the loading end; during the driving operation, if the load varying at the individual two sides of the loading end causes the unstable operation, with the slip damp coupling torque of the stabilize device (SDT100) and/or the stabilize device (SDT200) installed between the two opposite wheel sets at the left and right sides, the operation of the system can be stabilized; the stabilize device (SDT100) and/or the stabilize device (SDT200) can be optionally installed according to actual needs;

According to the embodiment disclosed in FIG. 2, the input end or the output end of the controllable multiple speed-ratio device or the input

end of the wheel set can be further installed with a transmission device, wherein:

--transmission device (T100), (T200), (T300), (T400): the output end of the transmission device (T100) is served to drive the wheel set (W100) at the rear left side of the loading end, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT100); the output end of the transmission device (T200) is served to drive the wheel set (W200) at the rear right side, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT200); the output end of (T300) is served to drive the wheel set (W300) at the front left side of the loading end, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT300); the output end of the transmission device (T400) is served to drive the wheel set (W400) at the front right side, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT400); the transmission devices (T100), (T200), (T300), (T400) are consisted of mechanical gear sets, or chain sets, pulley sets or linkage rod sets, and structured as a multiple-step transmission device for acceleration or deceleration or changing direction, e.g. an automatic type, automated manual type or manumatic type, or mechanic clutch switching type, or electric clutch switching type, or pressure switching type, or oil pressure switching type controllable multiple speed-ratio device controlled by manual force or by the control unit (ECU100), or a structural configuration capable of automatically changing speed ratio through being passively driven by the driving rotational speed and/or the loading torque, or a continuous variable transmission capable of automatically changing speed ratio through being externally controlled, e.g. a rubber belt type, metal belt type, chain type continuous variable transmission, or Eddy current type

continuous variable transmission, or torque converter, or electric continuous variable transmission (ECVT), or friction disk type, or conventional uncoaxial continuous variable transmission; the transmission device (T100), (T200) and/or (T300), (T400) can be optionally installed according to actual needs;

According to the embodiment disclosed in FIG. 2, between the output end of the controllable multiple speed-ratio device individually installed on individual wheel set and the loading end, a clutch device can be further installed between the output end of the controllable multiple speed-ratio device to the transmission chain of the input end of the wheel set used for distal driving, wherein:

--output end clutch device (CL100), (CL200), (CL300), (CL400): the output end clutch device (CL100) is installed between the output end of the controllable multiple speed-ratio device (VT100) and the wheel set (W100) for controlling the controllable multiple speed-ratio device (VT100) to output the rotary kinetic power to the wheel set (W100), the output end clutch device (CL200) is installed between the output end of the controllable multiple speed-ratio device (VT200) and the wheel set (W200) for controlling the controllable multiple speed-ratio device (VT200) to output the rotary kinetic power to the wheel set (W200), the output end clutch device (CL300) is installed between the output end of the controllable multiple speed-ratio device (VT300) and the wheel set (W300) for controlling the controllable multiple speed-ratio device (VT300) to output the rotary kinetic energy to the wheel set (W300), and the output end clutch device (CL400) is installed between the output end of the controllable multiple speed-ratio device (VT400) and the wheel set (W400) for controlling the controllable multiple speed-ratio device (VT400) to output the rotary kinetic energy to the wheel set (W400); the output end clutch devices (CL100), (CL200), (CL300), (CL400) include being controlled by manual force or centrifugal force, or controlled

through the operation interface (MI100) and the control unit (ECU100), and formed as a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end; the output end clutch device can further includes being driven by electric force and/or magnetic force and/or mechanical force and/or air pressure and/or hydraulic force for controlling the coupling torque between engaging and releasing, e.g. an electromagnetic wet type multi-plate clutch controlling coupling torque through magnetic exciting current, or a wet type multi-plate clutch driven by mechanical force and/or pressure and/or hydraulic force;

The structure of the output end clutch device (CL100), (CL200), (CL300), (CL400) includes:

(1) a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing;

(2) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for linearly controlling the continuous coupling torque between transmission engaging and releasing;

(3) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having torque limited coupling function smaller than the engaging torque, after being released;

(4) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a

linear damp function smaller than the engaging torque and being increased while the rotation differential being increased, after being released;

(5) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being reduced while the rotation differential being increased, after being released;

(6) (1) to (5) including a radial clutch device;

(7) (1) to (5) including an axial clutch device;

The output end clutch devices (CL100), (CL200), (CL300), (CL400) can be optionally installed according to actual needs;

--common load body (L100) can be provided with one or more than one non-powered wheels according to actual needs;

With the operation of the mentioned devices, when the common load body (L100) is driven to operate by the rotary kinetic power source (P100), and the wheel set (W100) at the rear left side and the wheel set (W200) at the rear right side of the loading end are operated in differential speeds, the speed ratios of the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200) are individually adjusted along with the load varying of the wheel set (W100) and the wheel set (W200) of the loading end, and the two output ends of the first epicyclic gear set (EG101) perform differential operation for adjustment, so as to drive in differential speed between the input end of the controllable multiple speed-ratio device (VT100) and the input end of the controllable multiple speed-ratio device (VT200); when the wheel set (W300) at the front left side and the wheel set (W400) at the front right side of the loading end are operated in differential speeds, the speed ratios of the controllable multiple speed-ratio device (VT300) and the

controllable multiple speed-ratio device (VT400) are individually adjusted along with the load varying of the wheel set (W300) and the wheel set (W400) of the loading end, and the left end output shaft (1011) and the right end output shaft (1012) of the two output ends of the first epicyclic gear set (EG101) perform differential operation for adjustment so as to drive in differential speed between the input end of the controllable multiple speed-ratio device (VT300) and the input end of the controllable multiple speed-ratio device (VT400); if the operation in differential speed are performed between the wheel set (W100) and the wheel set (W200) and between the wheel set (W300) and the wheel set (W400) at the same time, the interactive differential operation is jointly formed between the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200) and between the controllable multiple speed-ratio device (VT300) and the controllable multiple speed-ratio device (VT400), and between the left end output shaft (1011) and the right end output shaft (1012) of the two output ends of the first epicyclic gear set (EG101), or the operation interface (MI100) is used to control the control unit (ECU100) so as to control the individual speed ratio adjustment between the controllable multiple speed-ratio device (VT100), the controllable multiple speed-ratio device (VT200), the controllable multiple speed-ratio device (VT300) and the controllable multiple speed-ratio device (VT400).

According to the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device illustrated in previous embodiment accompanied with FIG. 1 and FIG. 2, when more wheel sets sharing the same epicyclic gear set and having individual controlled multiple speed-ratio device at the loading end, the structured system can be formed with the same means disclosed above, wherein the limited slip differential or the stabilize device composed of the dual shaft connecting device having slip coupling torque installed at

opposite locations horizontally and coaxially defined at two sides along the driving direction of the common load body (L100) and between the same transmission operation sets, and the transmission device installed between the individual controlled multiple speed-ratio device to the wheel set, and the clutch device can be all or partially installed or none of the above is installed.

FIG. 3 is a schematic view illustrating FIG. 2 being further installed with a first epicyclic gear seat (EG101) and a second epicyclic gear set (EG102) driven by the rotary kinetic power of the rotary kinetic power source (P100), and a controllable multiple speed-ratio device (VT100) being installed between the left end output shaft (1011) of the first epicyclic gear set (EG101) and the wheel set (W100) at the rear left side of the loading end, a controllable multiple speed-ratio device (VT200) being installed between the right end output shaft (1012) and the wheel (W200) at the rear right side, and a controllable multiple speed-ratio device (VT300) being installed between the left end output shaft (1021) of the second epicyclic gear set (EG102) and the wheel set (W300) at the front left side, and a controllable multiple speed-ratio device (VT400) being installed between the right end output shaft (1022) and the wheel set (W400) at the front right side, according to one embodiment of the present invention.

As shown in FIG. 3, the present invention utilizes the rotary output end of the rotary kinetic power source (P100) of the common load body (L100) to directly or through the transmission device (T101) to drive the first epicyclic gear set (EG101), and the controllable multiple speed-ratio device (VT100) is individually installed between the left end output shaft (1011) of the two output ends of the first epicyclic gear set (EG101) and the wheel set (W100) at the rear left side of the loading end at the left side of the common load body (L100), and the controllable multiple speed-ratio device (VT200) is individually installed between the right end

output shaft (1012) of the two output ends of the first epicyclic gear set (EG101) and the wheel set (W200) at the rear right side of the loading end at the right side of the common load body (L100); and the rotary output end of the rotary kinetic power source (P100) to directly or through the transmission device (T101) to drive the second epicyclic gear set (EG102), and the controllable multiple speed-ratio device (VT300) is individually installed between the left end output shaft (1021) of the two output ends of the second epicyclic gear set (EG102) and the wheel set (W300) at the front left side of the loading end at the left side of the common load body (L100), and the controllable multiple speed-ratio device (VT400) is individually installed between the right end output shaft (1022) and the wheel set (W400) at the front right side of the loading end at the right side of the common load body (L100), thereby forming the drive system capable of being operated in the differential speed state, which mainly consists of:

--rotary kinetic power source (P100): constituted by a power source outputting kinetic power through rotary, e.g. an internal combustion engine, external combustion engine, spring power source, hydraulic power source, pressure power source, flywheel power source or manual force, or animal force, wind power source, and/or composed of a AC or DC, brush or brushless, synchronous or non-synchronous, internal rotating or external rotating type rotary motor installed with relative control devices and electrically driven by power supply and/or storage device; the output end thereof includes outputting directly or outputting through a clutch device;

--input end clutch device (CL101): installed between the output end of the rotary kinetic power source (P100) and the input end of the first transmission device (T101), capable of controlling the rotary kinetic power source (P100) to control the transmission or termination of the rotary kinetic power to the first transmission device (T101); the input end

clutch device (CL101) includes being controlled by manual force or centrifugal force, or being controlled through the operation interface (MI100), and formed as a clutch device or structure driven by electric force and/or magnetic force and/or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end; the input end clutch device (CL101) can be optionally installed according to actual needs;

--transmission device (T101): constituted by a transmission device having fixed speed ratio or variable speed ratio or continuous variable speed and consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets, and installed between the rotary kinetic power source (P100) and the first epicyclic gear set (EG101) and the second epicyclic gear set (EG102); the transmission device (T101) can be optionally adopted according to actual needs;

--first epicyclic gear set (EG101): constituted by an epicyclic gear set having an input shaft and two output shafts capable of differentially operating, directly driven by the rotary kinetic power provided by an engine, or driven by the engine through the transmission device (T101); the left end output shaft (1011) of the two output shafts capable of differentially operating is served to drive the input end of the controllable multiple speed-ratio device (VT100), and the right end output shaft (1012) is served to drive the input end of the controllable multiple speed-ratio device (VT200);

--second epicyclic gear set (EG102): constituted by an epicyclic gear set having an input shaft and two output shafts capable of differentially operating, directly driven by the rotary kinetic power provided by an engine, or driven by the engine through the transmission device (T101); the left end output shaft (1021) of the two output shafts capable of differentially operating is served to drive the input end of the controllable

multiple speed-ratio device (VT300), and the right end output shaft (1022) is served to drive the input end of the controllable multiple speed-ratio device (VT400);

-- controllable multiple speed-ratio device (VT100), (VT200), (VT300), (VT400): the output end of the controllable multiple speed-ratio device (VT100) is served to drive the wheel set (W100) at the left side of the loading end, and the input end of the controllable multiple speed-ratio device (VT100) is driven by the rotary kinetic power from the left end output shaft (1011) at the output end of the first epicyclic gear set (EG101); the output end of the controllable multiple speed-ratio device (VT200) is served to drive the wheel set (W200) at the right side, and the input end of the controllable multiple speed-ratio device (VT200) is driven by the rotary kinetic power from the right end output shaft (1012) at the output end of the first epicyclic gear set (EG101); the output end of the controllable multiple speed-ratio device (VT300) is served to drive the wheel set (W300) at the left side of the loading end, and the input end of the controllable multiple speed-ratio device (VT300) is driven by the rotary kinetic power from the left end output shaft (1021) at the output end of the second epicyclic gear set (EG102); the output end of the controllable multiple speed-ratio device (VT400) is served to drive the wheel set (W400) at the right side, and the input end of the controllable multiple speed-ratio device (VT400) is driven by the rotary kinetic power from the right end output shaft (1022) at the output end of the second epicyclic gear set (EG102); the controllable multiple speed-ratio device (VT100), the controllable multiple speed-ratio device (VT200), the controllable multiple speed-ratio device (VT300) and the controllable multiple speed-ratio device (VT400) are consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets, and structured as a multiple-step transmission device for acceleration or deceleration or changing direction, e.g. an automatic type, automated manual type or

manumatic type, or mechanic clutch switching type, or electric clutch switching type, or pressure switching type, or oil pressure switching type controllable multiple speed-ratio device controlled by manual force or by the control unit (ECU100);

--operation interface (MI100): constituted by a mechanical operation device control by manual force or system, and structured by a linear analog type or digital type or hybrid type electromechanical device and/or solid state electric circuit, and provided for directly controlling the rotary kinetic power source (P100), and/or the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/or the controllable multiple speed-ratio device (VT200) and/or the controllable multiple speed-ratio device (VT300), and/or the controllable multiple speed-ratio device (VT400), or for controlling the control unit (ECU100) so as to control the operation state of the rotary kinetic power source (P100), and/or control the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/ or the controllable multiple speed-ratio device (VT200), and/or the controllable multiple speed-ratio device (VT300), and/or the controllable multiple speed-ratio device (VT400) ;

--control unit (ECU100): constituted by electromechanical devices and/or electric circuit components and/or power semiconductors and/or microprocessors and software, for being connected to an electric power source (B100) and controlled by the operation interface (MI100) or operated through the signal of controlling system operation state, for controlling the operation state of the rotary kinetic power source (P100), and/or controlling the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/or the controllable multiple speed-ratio device (VT200), and/or the controllable multiple speed-ratio device (VT300), and/or the controllable multiple speed-ratio device (VT400);

--stabilize device (SDT100), (STD200): constituted by a limited slip differential, or a dual shaft connecting device composed of a coupling

device having slip damp coupling torque, including a stabilize device with the dual shaft structure configured through fluid viscous effect, hydrodynamic damp effect, mechanical friction effect, electromagnetic vortex effect or power generation reverse torque effect; wherein two rotating ends of the stabilize device (SDT100) are respectively connected between the wheel set (W100) at the rear left side and the wheel set (W200) at the rear right side of the loading end, and two rotating ends of the stabilize device (SDT200) are respectively connected between the wheel set (W300) at the front left side and the wheel set (W400) at the front right side of the loading end; during the driving operation, if the load varying at the individual two sides of the loading end causes the unstable operation, with the slip damp coupling torque of the stabilize device (SDT100) and/or the stabilize device (SDT200) installed between the two opposite wheel sets at the left and right sides, the operation of the system can be stabilized; the stabilize device (SDT100) and/or the stabilize device (SDT200) can be optionally installed according to actual needs;

According to the embodiment disclosed in FIG. 3, the input end or the output end of the controllable multiple speed-ratio device or the input end of the wheel set can be further installed with a transmission device, wherein:

--transmission device (T100), (T200), (T300), (T400): the output end of the transmission device (T100) is served to drive the wheel set (W100) at the rear left side of the loading end, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT100); the output end of the transmission device (T200) is served to drive the wheel set (W200) at the rear right side, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT200); the output end of (T300) is served to drive the wheel set (W300) at the front left side of the loading end, and the input end thereof is driven by the rotary kinetic

power from the output end of the controllable multiple speed-ratio device (VT300); the output end of the transmission device (T400) is served to drive the wheel set (W400) at the front right side, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT400); the transmission devices (T100), (T200), (T300), (T400) are consisted of mechanical gear sets, or chain sets, pulley sets or linkage rod sets, and structured as a multiple-step transmission device for acceleration or deceleration or changing direction, e.g. an automatic type, automated manual type or manumatic type, or mechanic clutch switching type, or electric clutch switching type, or pressure switching type, or oil pressure switching type controllable multiple speed-ratio device controlled by manual force or by the control unit (ECU100), or a structural configuration capable of automatically changing speed ratio through being passively driven by the driving rotational speed and/or the loading torque, or a continuous variable transmission capable of automatically changing speed ratio through being externally controlled, e.g. a rubber belt type, metal belt type, chain type continuous variable transmission, or Eddy current type continuous variable transmission, or torque converter, or electric continuous variable transmission (ECVT), or friction disk type, or conventional uncoaxial continuous variable transmission; the transmission device (T100), (T200) and/or (T300), (T400) can be optionally installed according to actual needs;

According to the embodiment disclosed in FIG. 3, between the output end of the controllable multiple speed-ratio device individually installed on individual wheel set and the loading end, a clutch device can be further installed between the output end of the controllable multiple speed-ratio device to the transmission chain of the input end of the wheel set used for distal driving, wherein:

--output end clutch device (CL100), (CL200), (CL300), (CL400): the

output end clutch device (CL100) is installed between the output end of the controllable multiple speed-ratio device (VT100) and the wheel set (W100) for controlling the controllable multiple speed-ratio device (VT100) to output the rotary kinetic power to the wheel set (W100), the output end clutch device (CL200) is installed between the output end of the controllable multiple speed-ratio device (VT200) and the wheel set (W200) for controlling the controllable multiple speed-ratio device (VT200) to output the rotary kinetic power to the wheel set (W200), the output end clutch device (CL300) is installed between the output end of the controllable multiple speed-ratio device (VT300) and the wheel set (W300) for controlling the controllable multiple speed-ratio device (VT300) to output the rotary kinetic energy to the wheel set (W300), and the output end clutch device (CL400) is installed between the output end of the controllable multiple speed-ratio device (VT400) and the wheel set (W400) for controlling the controllable multiple speed-ratio device (VT400) to output the rotary kinetic energy to the wheel set (W400); the output end clutch devices (CL100), (CL200), (CL300), (CL400) include being controlled by manual force or centrifugal force, or controlled through the operation interface (MI100) and the control unit (ECU100), and formed as a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end; the output end clutch device can further includes being driven by electric force and/or magnetic force and/or mechanical force and/or air pressure and/or hydraulic force for controlling the coupling torque between engaging and releasing, e.g. an electromagnetic wet type multi-plate clutch controlling coupling torque through magnetic exciting current, or a wet type multi-plate clutch driven by mechanical force and/or pressure and/or hydraulic force;

The structure of the output end clutch device (CL100), (CL200), (CL300), (CL400) includes:

(1) a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing;

(2) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for linearly controlling the continuous coupling torque between transmission engaging and releasing;

(3) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having torque limited coupling function smaller than the engaging torque, after being released;

(4) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being increased while the rotation differential being increased, after being released;

(5) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being reduced while the rotation differential being increased, after being released;

(6) (1) to (5) including a radial clutch device;

(7) (1) to (5) including an axial clutch device;

The output end clutch devices (CL100), (CL200), (CL300), (CL400)

can be optionally installed according to actual needs;

--common load body (L100) can be provided with one or more than one non-powered wheels according to actual needs;

With the operation of the mentioned devices, when the common load body (L100) is driven to operate by the rotary kinetic power source (P100), and the wheel set (W100) at the rear left side and the wheel set (W200) at the rear right side of the loading end are operated in differential speeds, the speed ratios of the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200) are individually adjusted along with the load varying of the wheel set (W100) and the wheel set (W200) of the loading end, and the two output ends of the first epicyclic gear set (EG101) perform differential operation for adjustment, so as to drive in differential speed between the input end of the controllable multiple speed-ratio device (VT100) and the input end of the controllable multiple speed-ratio device (VT200); when the wheel set (W300) at the front left side and the wheel set (W400) at the front right side of the loading end are operated in differential speeds, the speed ratios of the controllable multiple speed-ratio device (VT300) and the controllable multiple speed-ratio device (VT400) are individually adjusted along with the load varying of the wheel set (W300) and the wheel set (W400) of the loading end, and the left end output shaft (1021) and the right end output shaft (1022) of the two output ends of the second epicyclic gear set (EG102) perform differential operation for adjustment so as to drive in differential speed between the input end of the controllable multiple speed-ratio device (VT300) and the input end of the controllable multiple speed-ratio device (VT400), or the operation interface (MI100) is used to control the control unit (ECU100) so as to control the individual speed ratio adjustment between the controllable multiple speed-ratio device (VT100), the controllable multiple speed-ratio device (VT200), the controllable multiple speed-ratio device (VT300) and

the controllable multiple speed-ratio device (VT400).

What shall be explained is that FIG. 3 is the example of the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, when being applied in a loading end wheel set having more individual epicyclic gear sets and controlled multiple speed-ratio devices, the structured system can be formed with the same means disclosed above, wherein the limited slip differential or the stabilize device composed of the dual shaft connecting device having slip coupling torque installed at opposite locations horizontally and coaxially defined at two sides along the driving direction of the common load body (L100) and between the same transmission operation sets, the transmission device installed between the controllable multiple speed-ratio device to the wheel set, and the clutch device can be all or partially installed or none of the above is installed.

According to the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, a direction changing signal sensor (S100) can be further installed, so when changing directions, the signal of the direction changing signal sensor (S100) can be sent to the control unit (ECU100) for controlling the relative speed ratio switching of the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200), thereby enhancing the performance of the drive for changing direction; taken the embodiment disclosed in FIG. 1 installed with the direction changing signal sensor (S100) as an example, and the embodiments disclosed in FIG. 2 and FIG. 3 can adopt the same;

FIG. 4 is a schematic view illustrating FIG. 1 being installed with a direction changing signal sensor (S100) to send a signal to the control unit (ECU100) for controlling the relative speed ratio switching of the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200), according to one embodiment of the

present invention.

As shown in FIG. 4, the present invention utilizes the rotary output end of the rotary kinetic power source (P100) of the common load body (L100) to directly or through the transmission device (T101) to drive the first epicyclic gear set (EG101), and the controllable multiple speed-ratio device (VT100) is installed between the left end output shaft (1011) of the two output ends of the first epicyclic gear set (EG101) and the wheel set (W100) at the left side of the loading end of the common load body (L100), and the controllable multiple speed-ratio device (VT200) is installed between the right end output shaft (1012) of the two output ends of the first epicyclic gear set (EG101) and the wheel set (W200) at the right side, thereby forming the drive system capable of being operated in the differential speed and variable speed state, which mainly consists of:

--rotary kinetic power source (P100): constituted by a power source outputting kinetic power through rotary, e.g. an internal combustion engine, external combustion engine, spring power source, hydraulic power source, pressure power source, flywheel power source or manual force, or animal force, wind power source, and/or composed of a AC or DC, brush or brushless, synchronous or non-synchronous, internal rotating or external rotating type rotary motor installed with relative control devices and electrically driven by power supply and/or storage device; the output end thereof includes outputting directly or outputting through a clutch device;

--input end clutch device (CL101): installed between the output end of the rotary kinetic power source (P100) and the input end of the first transmission device (T101), capable of controlling the rotary kinetic power source (P100) to control the transmission or termination of the rotary kinetic power to the first transmission device (T101); the input end clutch device (CL101) includes being controlled by manual force or centrifugal force, or being controlled through the operation interface

(MI100), and formed as a clutch device or structure driven by electric force and/or magnetic force and/or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end; the input end clutch device (CL101) can be optionally installed according to actual needs;

--transmission device (T101): constituted by a transmission device having fixed speed ratio or variable speed ratio or continuous variable speed and consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets; and installed between the rotary kinetic power source (P100) and the first epicyclic gear set (EG101); the transmission device (T101) can be optionally adopted according to actual needs;

--first epicyclic gear set (EG101): constituted by an epicyclic gear set having an input shaft and two output shafts capable of differentially operating, directly driven by the rotary kinetic power provided by an engine, or driven by the engine through the transmission device (T101); the left end output shaft (1011) of the two output shafts capable of differentially operating is served to drive the input end of the controllable multiple speed-ratio device (VT100), and the right end output shaft (1012) is served to drive the input end of the controllable multiple speed-ratio device (VT200);

--controllable multiple speed-ratio device (VT100), (VT200): the output end of the controllable multiple speed-ratio device (VT100) is served to drive the wheel set (W100) at the left side of the loading end, and the input end of the controllable multiple speed-ratio device (VT100) is driven by the rotary kinetic power from the left end output shaft (1011) at the output end of the first epicyclic gear set (EG101); the output end of the controllable multiple speed-ratio device (VT200) is served to drive the wheel set (W200) at the right side, and the input end of the controllable multiple speed-ratio device (VT200) is driven by the rotary kinetic power

from the right end output shaft (1012) at the output end of the first epicyclic gear set (EG101); the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200) are consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets, and structured as a multiple-step transmission device for acceleration or deceleration or changing direction, e.g. an automatic type, automated manual type or manumatic type, or mechanic clutch switching type, or electric clutch switching type, or pressure switching type, or oil pressure switching type controlled multiple speed-ratio device controlled by manual force or by the control unit (ECU100);

--operation interface (MI100): constituted by a mechanical operation device control by manual force or system, and structured by a linear analog type or digital type or hybrid type electromechanical device and/or solid state electric circuit, provided for directly controlling the rotary kinetic power source (P100), and/or the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/or the controllable multiple speed-ratio device (VT200), or for controlling the control unit (ECU100) so as to control the operation state of the rotary kinetic power source (P100), and/or control the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/ or the controllable multiple speed-ratio device (VT200);

--control unit (ECU100): constituted by electromechanical devices and/or electric circuit components and/or power semiconductors and/or microprocessors and software, for being connected to an electric power source (B100) and controlled by the operation interface (MI100) or controlled by the direction changing signal sensor (S100), operated through the signal of controlling system operation state, for controlling the operation state of the rotary kinetic power source (P100), and/or controlling the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/or the controllable multiple speed-ratio

device (VT200);

-- direction changing signal sensor (S100): defined as one or more than one physical sensing devices, for sensing detection signals relative to direction changing which includes one or more than one of following signals including: signals of direction changing degree from the steering machine, signals of inclined angle of vehicle body, signals of vehicle idling, signals of upward/downward slope, signals of acceleration or deceleration, and together with the signal of the operation interface (MI100) to be transmitted to the control unit (ECU100);

--stabilize device (SDT100): constituted by a limited slip differential, or a dual shaft connecting device composed of a coupling device having slip damp coupling torque, including a stabilize device with the dual shaft structure configured through fluid viscous effect, hydrodynamic damp effect, mechanical friction effect, electromagnetic vortex effect or power generation reverse torque effect; wherein two rotating ends thereof are respectively connected between the wheel set (W100) at the left side and the wheel set (W200) at the right side of the loading end; during the driving operation, if the load varying at the individual two sides of the loading end causes the unstable operation, with the slip damp coupling torque of the stabilize device (SDT100) installed between the wheel sets at the left and right sides, the operation of the system can be stabilized; the stabilize device (SDT100) can be optionally installed according to actual needs;

According to the embodiment disclosed in FIG. 4, the input end or the output end of the combined multiple speed-ratio device or the input end of the wheel set can be further installed with a transmission device, wherein:

--transmission device (T100), (T200): the output end of the transmission device (T100) is served to drive the wheel set (W100) at the left side of the loading end, and the input end thereof is driven by the rotary kinetic

power from the output end of the controllable multiple speed-ratio device (VT100); the output end of the transmission device (T200) is served to drive the wheel set (W200) at the right side, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT200); the transmission device (T100) and the transmission device (T200) are consisted of mechanical gear sets, or chain sets, pulley sets or linkage rod sets, and structured as a multiple-step transmission device for acceleration or deceleration or changing direction, e.g. an automatic type, automated manual type or manumatic type, or mechanic clutch switching type, or electric clutch switching type, or pressure switching type, or oil pressure switching type controllable multiple speed-ratio device controlled by manual force or by the control unit (ECU100), or a structural configuration capable of automatically changing speed ratio through being passively driven by the driving rotational speed and/or the loading torque, or a continuous variable transmission capable of automatically changing speed ratio through being externally controlled, e.g. a rubber belt type, metal belt type, chain type continuous variable transmission, or Eddy current type continuous variable transmission, or torque converter, or electric continuous variable transmission (ECVT), or friction disk type, or conventional uncoaxial continuous variable transmission; the transmission device (T100), (T200) can be optionally installed according to actual needs;

According to the embodiment disclosed in FIG. 4, between the output end of the controllable multiple speed-ratio device individually installed on individual wheel set and the loading end, a clutch device can be further installed between the output end of the controllable multiple speed-ratio device to the transmission chain of the input end of the wheel set used for distal driving, wherein:

--output end clutch device (CL100), (CL200): the output end clutch device (CL100) is installed between the output end of the controllable

multiple speed-ratio device (VT100) and the wheel set (W100) for controlling the controllable multiple speed-ratio device (VT100) to output the rotary kinetic power to the wheel set (W100), and the output end clutch device (CL200) is installed between the output end of the controllable multiple speed-ratio device (VT200) and the wheel set (W200) for controlling the controllable multiple speed-ratio device (VT200) to output the rotary kinetic power to the wheel set (W200); the output end clutch device (CL100) and the output end clutch device (CL200) include being controlled by manual force or centrifugal force, or controlled through the operation interface (MI100) and the control unit (ECU100), and formed as a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end; the output end clutch device can further includes being driven by electric force and/or magnetic force and/or mechanical force and/or air pressure and/or hydraulic force for controlling the coupling torque between engaging and releasing, e.g. an electromagnetic wet type multi-plate clutch controlling coupling torque through magnetic exciting current, or a wet type multi-plate clutch driven by mechanical force and/or pressure and/or hydraulic force;

The structure of the output end clutch device (CL100), (CL200) includes:

(1) a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing;

(2) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for linearly controlling the continuous coupling torque between

transmission engaging and releasing;

(3) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having torque limited coupling function smaller than the engaging torque, after being released;

(4) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being increased while the rotation differential being increased, after being released;

(5) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being reduced while the rotation differential being increased, after being released;

(6) (1) to (5) including a radial clutch device;

(7) (1) to (5) including an axial clutch device;

The output end clutch devices (CL100), (CL200) can be optionally installed according to actual needs;

--common load body (L100) can be provided with one or more than one non-powered wheels according to actual needs;

With the operation of the mentioned devices, when the common load body (L100) is driven to operate by the rotary kinetic power source (P100), and the wheel set (W100) at the left side and the wheel set (W200) at the right side of the loading end are operated in differential speeds, the speed ratios of the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200) are individually

adjusted along with the load varying of the wheel set (W100) and the wheel set (W200) of the loading end, and the two output ends of the first epicyclic gear set (EG101) perform differential operation for adjustment, so as to drive in differential speed between the input end of the controllable multiple speed-ratio device (VT100) and the input end of the controllable multiple speed-ratio device (VT200), or the operation interface (MI100) is used to control the control unit (ECU100) so as to control the individual speed ratio adjustment between the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200).

According to the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, the drive system can be further configured as a co-structure;

FIG. 5 is a block diagram illustrating the structure in which the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200), the output end clutch devices (CL100), (CL200), and the transmission devices (T100), (T200) being combined at two output sides of the first epicyclic gear set (EG101), according to one embodiment of the present invention;

As shown in FIG. 5, which shows the co-structure in which the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200), the output end clutch devices (CL100), (CL200), the transmission devices (T100), (T200) are combined at the two output ends of the first epicyclic gear set (EG101).

FIG. 6 is a schematic view illustrating FIG. 5 being installed with a direction changing signal sensor (S100) to send a signal to the control unit (ECU100) for controlling the relative speed ratio switching of the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200), according to one preferred embodiment of the present invention.

As shown in FIG. 6, the signal of the direction changing signal sensor (S100) is sent to the control unit (ECU100) for controlling the relative speed ratio switching of the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200), wherein:

-- direction changing signal sensor (S100): defined as one or more than one physical sensing devices, for sensing detection signals relative to direction changing which includes one or more than one of following signals including: signals of direction changing degree from the steering machine, signals of inclined angle of vehicle body, signals of vehicle idling, signals of upward/downward slope, signals of acceleration or deceleration, and together with the signal of the operation interface (MI100) to be transmitted to the control unit (ECU100);

What shall be explained is that FIG. 1 to FIG. 5 and FIG. 6 are examples of the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, when being applied to adopt more loading end wheel sets, the same means disclose above can be applied.

According to the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, an output end transmission device composed of a stepped or continuous transmission device having fixed speed ratio for acceleration or deceleration or changing direction can be further installed between the output end of the first transmission device (T101) and the individual loading end wheel set; the mentioned output end transmission device is composed of mechanical gear sets, or chain sets, pulley sets or linkage rod sets, and structured as a transmission device having fixed speed ratio for acceleration or deceleration or direction changing, or a manually-operated or automatic or semi-automatic speed ratio or belt type continuous variable transmission, or a hydraulic type torque converter.

According to the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, the location where the output end clutch device being individually installed between the output end of the first transmission device (T101) to the individual transmission wheel system of individual loading end wheel set includes one or more than one of followings, including:

(1) installed between the output end of the first transmission device (T101) and the input end of the individual output end transmission device;

(2) installed at the input end of the output end transmission device;

(3) installed at the output end of the output end transmission device;

(4) installed in series between internal power transmission set of the individual output end transmission device;

(5) installed at the input end of the loading end wheel set;

The mentioned output end clutch device include being controlled by manual force or centrifugal force, or controlled through the operation interface, and driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end.

According to the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, a flexible transmission device composed of the limited slip differential or the dual shaft connecting device having slip coupling torque can be further installed at the opposite locations horizontally and coaxially at two sides along the driving direction of the common load body (L100) and between the same transmission operation sets; when the differential operation is performed between the wheel shaft and wheel set at the left side and the wheel shaft and wheel set at the right side combined to the dual shafts of the flexible transmission device, e.g. the differential

operation performed by the flexible transmission device while the common load body (L100) is making a turn, through releasing the output end clutch device between the inner wheel set and the first transmission device (T101), the outer wheel set having high rotational speed performs the flexible transmission with rotary differential to the inner wheel set having low rotational speed through the flexible transmission device, such that the rotary speed of the inner wheel set is lower than that of the outer wheel set but still has the driving power; the flexible transmission device includes the coupling torque dual shaft connecting device composed of the coupling device have slip damp, e.g. a flexible transmission device formed with a dual shaft structure through fluid viscous effect, hydrodynamic damp effect, mechanical friction effect, electromagnetic vortex effect or power generation reverse torque effect, two rotating ends are respectively combined at: one or more than one of opposite locations horizontally and coaxially defined on the following transmission operation sets, including:

(1) installed between the wheel shaft connecting the wheel set at the left side and the wheel set at the right side of the common load body (L100);

(2) installed between the opposite input ends of the output end transmission devices at the left and the right sides of the common load body (L100);

(3) installed between the opposite output ends of the output end clutch devices at the left and the right sides of the common load body (L100);

(4) installed between the transmission components having the same rotational speed while being in the normal straight running state in the transmission wheel system of the output end transmission devices at the left and the right sides of the common load body (L100).

According to the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, the limited slip differential or the flexible transmission device composed of the dual shaft connecting devices having slip coupling torque installed at the opposite locations horizontally and coaxially defined at two sides along the driving direction of the common load body (L100) and between the installed wheel sets and the drive operation sets can be all or partially installed.

CLAIMS

1. A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, which mainly consists of:

-- a rotary kinetic power source (P100);

-- an epicyclic gear set;

-- a controllable multiple speed-ratio device; wherein

the rotary kinetic power of a rotary kinetic power source is served to drive the epicyclic gear set, then a controllable multiple speed-ratio device is individually installed between two output shafts of the epicyclic gear set and the load driven thereby, so the wheel set of the driven load is enabled to perform variation of the driving speed ratio and the driving torque, so as to drive the combined common load;

the mentioned common load body (L100) is mainly defined as the frame body of a vehicle, and is served to be installed with a rotary kinetic power source, related operation and transmission interface devices, and installed with loading wheel sets driven by the rotary kinetic power source and installed with non-powered wheels not being driven by the rotary kinetic power source (P100) according to actual needs, thereby jointly carrying the common load body (L100);

According to the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, a limited slip differential or a stabilize device composed of a dual shaft connecting device having slip coupling torque can be installed at opposite locations horizontally and coaxially defined at two sides along the driving direction of the common load body (L100) and between the same transmission operation sets, and when the differential operation is performed between two loads, the stabilize device is served to stabilize the operation of the drive system; the stabilize device includes a limited slip differential, or a coupling

torque dual shaft connecting device composed of a coupling device having slip damp, e.g. a dual shaft structure configured by fluid viscous effect, hydrodynamic damp effect, mechanical friction effect, electromagnetic vortex effect or power generation reverse torque effect, and two rotating ends of the stabilize device are respectively connected to: one or more than one location of the opposite locations horizontally and coaxially defined on the following transmission operation sets, including:

(1) installed between wheel set rotating parts oppositely at the left side and the right side;

(2) installed between opposite output ends of the controlled multiple speed-ratio devices at the left side and the right side;

(3) installed between opposite output ends of clutch devices at the left side and the right side;

(4) installed between the input end or the output end oppositely at the left side and the right side of the transmission device;

(5) installed between the wheel set rotating part at the left side and the wheel set rotating part at the right side;

By installing the mentioned stabilize device for the driving operation, when the load varying at individual loading end, or the control required by the operation state of the opposite controlled multiple speed-ratio devices, or the unstable state during operation, the stabilize device can be served to stabilize the system; the stabilize device can be optionally installed according to actual needs;

According to the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, between the input end of individual controllable multiple speed-ratio device to the wheel set of the loading end, a stepped or continuous variable transmission having fixed speed ratio for acceleration or deceleration or changing direction can be further

installed at one or more than one of following locations, including:

(1) installed at the input end of the controllable multiple speed-ratio device;

(2) installed at the output end of the controllable multiple speed-ratio device;

(3) installed at the input end of the clutch device;

(4) installed at the output end of the clutch device;

(5) installed at the input end of the wheel set at the loading end;

The mentioned transmission device is consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets, and composed of a transmission device having fixed speed ratio for acceleration or deceleration or changing direction, or a manually-operated or automatic or semi-automatic speed ratio varying or belt type continuous variable transmission, or a hydraulic torque converter; the transmission device can be optionally installed according to actual needs;

According to the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, between the input end of individual controllable multiple speed-ratio device to the wheel set of the loading end, a clutch device can be further installed at one or more than one of following locations, including:

(1) installed at the input end of the controllable multiple speed-ratio device;

(2) installed at the output end of the controllable multiple speed-ratio device;

(3) installed at the input end of the transmission device;

(4) installed at the output end of the transmission device;

(5) installed at the input end of the wheel set at the loading end;

The mentioned clutch device is controlled by manual force or

centrifugal force, or controlled by the operation interface, and can be served as a clutch device or structure having function of performing transmission engaging or releasing while being driven by electric force and/or magnetic force and/ or mechanical force and/or pressure and/or hydraulic force, and has a rotary input end and a rotary output end; the output end clutch device further includes a function of being driven by electric force and/or magnetic force and/or mechanical force and/or pressure and/or hydraulic force for controlling the coupling torque between engaging and releasing, e.g. an electromagnetic wet type multi-plate clutch device controlling coupling torque through exciting current, or a wet type multi-plate clutch device driven by mechanical force and/or pressure and/or hydraulic force;

The structure of the output end clutch device includes:

(1) a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing;

(2) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for linearly controlling the continuous coupling torque between transmission engaging and releasing;

(3) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having torque limited coupling function smaller than the engaging torque, after being released;

(4) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being increased while the rotation differential being increased, after being released;

(5) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being reduced while the rotation differential being increased, after being released;

(6) (1) to (5) including a radial clutch device;

(7) (1) to (5) including an axial clutch device;

The clutch device can be optionally installed according to actual needs;

According to the present invention, the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device can be applied in a vehicle or an industry-used, agriculture-used or specially-designed carrier with front wheel drive, or rear wheel drive, or four wheel drive, or multiple wheel drive or driven by belts installed at two sides.

2. A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 1, wherein the rotary output end of the rotary kinetic power source (P100) installed at the common load body (L100) is utilized to directly or through the transmission device (T101) to drive the first epicyclic gear set (EG101), and the controllable multiple speed-ratio device (VT100) is installed between the left end output shaft (1011) of the two output ends of the first epicyclic gear set (EG101) and the wheel set (W100) at the left side of the loading end of the common load body (L100), and the controllable multiple speed-ratio device (VT200) is installed between the right end output shaft (1012) of the two output ends of the first epicyclic gear set (EG101) and the wheel set (W200) at the right side, thereby forming the drive system capable of being operated in the differential speed and variable speed state, which mainly consists of:

--rotary kinetic power source (P100): constituted by a power source outputting kinetic power through rotation, e.g. an internal combustion engine, external combustion engine, spring power source, hydraulic power source, pressure power source, flywheel power source or manual force, or animal force, wind power source, and/or composed of a AC or DC, brush or brushless, synchronous or non-synchronous, internal rotating or external rotating type rotary motor installed with relative control devices and electrically driven by power supply and/or storage device; the output end thereof includes outputting directly or outputting through a clutch device;

--input end clutch device (CL101): installed between the output end of the rotary kinetic power source (P100) and the input end of the first transmission device (T101), capable of controlling the rotary kinetic power source (P100) to control the transmission or termination of the rotary kinetic power of the first transmission device (T101), the input end clutch device (CL101) includes being controlled by manual force or centrifugal force, or being controlled through the operation interface (MI100), and formed as a clutch device or structure driven by electric force and/or magnetic force and/or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end; the input end clutch device (CL101) can be optionally installed according to actual needs;

--transmission device (T101): constituted by a transmission device having fixed speed ratio or variable speed ratio or continuous variable speed and consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets, and installed between the rotary kinetic power source (P100) and the first epicyclic gear set (EG101); the transmission device (T101) can be optionally adopted according to actual needs;

--first epicyclic gear set (EG101): constituted by an epicyclic gear set having an input shaft and two output shafts capable of differentially operating, directly driven by the rotary kinetic power provided by an engine, or driven by the engine through the transmission device (T101); the left end output shaft (1011) of the two output shafts capable of differentially operating is served to drive the input end of the controllable multiple speed-ratio device (VT100), and the right end output shaft (1012) is served to drive the input end of the controllable multiple speed-ratio device (VT200);

--controllable multiple speed-ratio device (VT100), (VT200): the output end of the controllable multiple speed-ratio device (VT100) is served to drive the wheel set (W100) at the left side of the loading end, and the input end of the controllable multiple speed-ratio device (VT100) is driven by the rotary kinetic power from the left end output shaft (1011) at the output end of the first epicyclic gear set (EG101); the output end of the controllable multiple speed-ratio device (VT200) is served to drive the wheel set (W200) at the right side, and the input end of the controllable multiple speed-ratio device (VT200) is driven by the rotary kinetic power from the right end output shaft (1012) at the output end of the first epicyclic gear set (EG101); the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200) are consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets, and structured as a multiple-step transmission device for acceleration or deceleration or changing direction, e.g. an automatic type, automated manual type or manumatic type, or mechanic clutch switching type, or electric clutch switching type, or pressure switching type, or oil pressure switching type controllable multiple speed-ratio device controlled by manual force or by the control unit (ECU100);

--operation interface (MI100): constituted by a mechanical operation

device control by manual force or system, and structured by a linear analog type or digital type or hybrid type electromechanical device and/or solid state electric circuit, and provided for directly controlling the rotary kinetic power source (P100), and/or the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/or the controllable multiple speed-ratio device (VT200), or for controlling the control unit (ECU100) so as to further control the operation state of the rotary kinetic power source (P100), and/or control the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/ or the controllable multiple speed-ratio device (VT200);

--control unit (ECU100): constituted by electromechanical devices and/or electric circuit components and/or power semiconductors and/or microprocessors and software, for being connected to an electric power source (B100) and controlled by the operation interface (MI100) or operated through the signal of controlling system operation state, for controlling the operation state of the rotary kinetic power source (P100), and/or controlling the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/or the controllable multiple speed-ratio device (VT200);

--stabilize device (SDT100): constituted by a limited slip differential, or a dual shaft connecting device composed of a coupling device having slip damp coupling torque, including a stabilize device with the dual shaft structure configured through fluid viscous effect, hydrodynamic damp effect, mechanical friction effect, electromagnetic vortex effect or power generation reverse torque effect; wherein two rotating ends thereof are respectively connected between the wheel set (W100) at the left side and the wheel set (W200) at the right side of the loading end; during the driving operation, if the load varying at the individual two sides of the loading end causes the unstable operation, with the slip damp coupling torque of the stabilize device (SDT100)

installed between the wheel sets at the left and right sides, the operation of the system can be stabilized; the stabilize device (SDT100) can be optionally installed according to actual needs;

--transmission device (T100), (T200): the output end of the transmission device (T100) is served to drive the wheel set (W100) at the left side of the loading end, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT100); the output end of the transmission device (T200) is served to drive the wheel set (W200) at the right side, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT200); the transmission device (T100) and the transmission device (T200) are consisted of mechanical gear sets, or chain sets, pulley sets or linkage rod sets, and structured as a multiple-step transmission device for acceleration or deceleration or changing direction, e.g. an automatic type, automated manual type or manumatic type, or mechanic clutch switching type, or electric clutch switching type, or pressure switching type, or oil pressure switching type controllable multiple speed-ratio device controlled by manual force or by the control unit (ECU100), or a structural configuration capable of automatically changing speed ratio through being passively driven by the driving rotational speed and/or the loading torque, or a continuous variable transmission capable of automatically changing speed ratio through being externally controlled, e.g. a rubber belt type, metal belt type, chain type continuous variable transmission, or Eddy current type continuous variable transmission, or torque converter, or electric continuous variable transmission (ECVT), or friction disk type, or conventional uncoaxial continuous variable transmission; the transmission device (T100), (T200) can be optionally installed according to actual needs;

--output end clutch device (CL100), (CL200): the output end clutch device (CL100) is installed between the output end of the controllable multiple speed-ratio device (VT100) and the wheel set (W100) for controlling the controllable multiple speed-ratio device (VT100) to output the rotary kinetic power to the wheel set (W100), and the output end clutch device (CL200) is installed between the output end of the controllable multiple speed-ratio device (VT200) and the wheel set (W200) for controlling the controllable multiple speed-ratio device (VT200) to output the rotary kinetic power to the wheel set (W200); the output end clutch device (CL100) and the output end clutch device (CL200) include being controlled by manual force or centrifugal force, or controlled through the operation interface (MI100) and the control unit (ECU100), and formed as a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end; the output end clutch device can further includes being driven by electric force and/or magnetic force and/or mechanical force and/or air pressure and/or hydraulic force for controlling the coupling torque between engaging and releasing, e.g. an electromagnetic wet type multi-plate clutch controlling coupling torque through magnetic exciting current, or a wet type multi-plate clutch driven by mechanical force and/or air pressure and/or hydraulic force;

The structure of the output end clutch device (CL100), (CL200) includes:

(1) a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing;

(2) driven by electric force and/or magnetic force and/ or

mechanical force and/or air pressure and/or hydraulic force for linearly controlling the continuous coupling torque between transmission engaging and releasing;

(3) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having torque limited coupling function smaller than the engaging torque, after being released;

(4) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being increased while the rotation differential being increased, after being released;

(5) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being reduced while the rotation differential being increased, after being released;

(6) (1) to (5) including a radial clutch device;

(7) (1) to (5) including an axial clutch device;

The output end clutch device (CL100), (CL200) can be optionally installed according to actual needs;

--common load body (L100) can be provided with one or more than one non-powered wheels according to actual needs;

With the operation of the mentioned devices, when the common load body (L100) is driven to operate by the rotary kinetic power source (P100), and the wheel set (W100) at the left side and the wheel set (W200) at the right side of the loading end are operated in differential

speeds, the speed ratios of the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200) are individually adjusted along with the load varying of the wheel set (W100) and the wheel set (W200) of the loading end, and the two output ends of the first epicyclic gear set (EG101) perform differential operation for adjustment, so as to drive in differential speed between the input end of the controllable multiple speed-ratio device (VT100) and the input end of the controllable multiple speed-ratio device (VT200), or the operation interface (MI100) is used to control the control unit (ECU100) so as to control the individual speed ratio adjustment between the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200).

3. A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 1, wherein the rotary output end of the rotary kinetic power source (P100) installed at the common load body (L100) is utilized to directly or through the transmission device (T101) to drive the first epicyclic gear set (EG101), and the controllable d multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT300) are respectively installed between the left end output shaft (1011) of the two output ends of the first epicyclic gear set (EG101) and the wheel set (W100) at the rear left side and the wheel set (W300) at the front left side of the loading end at the left side of the common load body (L100), and the controllable multiple speed-ratio device (VT200) and the controllable multiple speed-ratio device (VT400) are installed between the right end output shaft (1012) and the wheel set (W200) at the rear right side and the wheel set (W400) at the front right side of the loading end at the right side of the common load body (L100), thereby forming the drive system capable of being operated in the speed differential state, which mainly consists of:

--rotary kinetic power source (P100): constituted by a power source outputting kinetic power through rotary, e.g. an internal combustion engine, external combustion engine, spring power source, hydraulic power source, pressure power source, flywheel power source or manual force, or animal force, wind power source, and/or composed of a AC or DC, brush or brushless, synchronous or non-synchronous, internal rotating or external rotating type rotary motor installed with relative control devices and electrically driven by power supply and/or storage device; the output end thereof includes outputting directly or outputting through a clutch device;

--input end clutch device (CL101): installed between the output end of the rotary kinetic power source (P100) and the input end of the first transmission device (T101), capable of controlling the rotary kinetic power source (P100) to control the transmission or termination of the rotary kinetic power to the first transmission device (T101); the input end clutch device (CL101) includes being controlled by manual force or centrifugal force, or being controlled through the operation interface (MI100), and formed as a clutch device or structure driven by electric force and/or magnetic force and/or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end; the input end clutch device (CL101) can be optionally installed according to actual needs;

--transmission device (T101): constituted by a transmission device having fixed speed ratio or variable speed ratio or continuous variable speed and consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets, and installed between the rotary kinetic power source (P100) and the first epicyclic gear set (EG101); the transmission device (T101) can be optionally adopted according to actual needs;

--first epicyclic gear set (EG101): constituted by an epicyclic gear set having an input shaft and two output shafts capable of differentially operating, directly driven by the rotary kinetic power provided by an engine, or driven by the engine through the transmission device (T101); the left end output shaft (1011) of the two output shafts capable of differentially operating is served to drive the input ends of the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT300), and the right end output shaft (1012) is served to drive the input ends of the controllable multiple speed-ratio device (VT200) and the controllable multiple speed-ratio device (VT400);

-- controllable multiple speed-ratio device (VT100), (VT200), (VT300), (VT400): the output end of the controllable multiple speed-ratio device (VT100) is served to drive the wheel set (W100) at the left side of the loading end, and the input end of the controllable multiple speed-ratio device (VT100) is driven by the rotary kinetic power from the left end output shaft (1011) at the output end of the first epicyclic gear set (EG101); the output end of the controllable multiple speed-ratio device (VT200) is served to drive the wheel set (W200) at the right side, and the input end of the controllable multiple speed-ratio device (VT200) is driven by the rotary kinetic power from the right end output shaft (1012) at the output end of the first epicyclic gear set (EG101); the output end of the controllable multiple speed-ratio device (VT300) is served to drive the wheel set (W300) at the left side of the loading end, and the input end of the controllable multiple speed-ratio device (VT300) is driven by the rotary kinetic power from the left end output shaft (1011) at the output end of the first epicyclic gear set (EG101); the output end of the controllable multiple speed-ratio device (VT400) is served to drive the wheel set (W400) at the right side, and the input end of the controllable multiple speed-ratio device (VT400) is driven

by the rotary kinetic power from the right end output shaft (1012) at the output end of the first epicyclic gear set (EG101); the controllable multiple speed-ratio device (VT100), the controllable multiple speed-ratio device (VT200), the controllable multiple speed-ratio device (VT300) and the controllable multiple speed-ratio device (VT400) are consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets, and structured as a multiple-step transmission device for acceleration or deceleration or changing direction, e.g. an automatic type, automated manual type or manumatic type, or mechanic clutch switching type, or electric clutch switching type, or air pressure switching type, or oil pressure switching type controllable multiple speed-ratio device controlled by manual force or by the control unit (ECU100);

--operation interface (MI100): constituted by a mechanical operation device control by manual force or system, and structured by a linear analog type or digital type or hybrid type electromechanical device and/or solid state electric circuit, and provided for directly controlling the rotary kinetic power source (P100), and/or the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/or the controllable multiple speed-ratio device (VT200) and/or the controllable multiple speed-ratio device (VT300) and/or the controllable multiple speed-ratio device (VT400), or for controlling the control unit (ECU100) so as to control the operation state of the rotary kinetic power source (P100), and/or control the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/ or the controllable multiple speed-ratio device (VT200), and/or the controllable multiple speed-ratio device (VT300) and/or the controllable multiple speed-ratio device (VT400);

--control unit (ECU100): constituted by electromechanical devices and/or electric circuit components and/or power semiconductors and/or

microprocessors and software, for being connected to an electric power source (B100) and controlled by the operation interface (MI100) or operated through the signal of controlling system operation state, for controlling the operation state of the rotary kinetic power source (P100), and/or controlling the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/or the controllable multiple speed-ratio device (VT200), and/or the controllable multiple speed-ratio device (VT300) and/or the controllable multiple speed-ratio device (VT400);

--stabilize device (SDT100), (STD200): constituted by a limited slip differential, or a dual shaft connecting device composed of a coupling device having slip damp coupling torque, including a stabilize device with the dual shaft structure configured through fluid viscous effect, hydrodynamic damp effect, mechanical friction effect, electromagnetic vortex effect or power generation reverse torque effect; wherein two rotating ends of the stabilize device (SDT100) are respectively connected between the wheel set (W100) at the rear left side and the wheel set (W200) at the rear right side of the loading end, and two rotating ends of the stabilize device (SDT200) are respectively connected between the wheel set (W300) at the front left side and the wheel set (W400) at the front right side of the loading end; during the driving operation, if the load varying at the individual two sides of the loading end causes the unstable operation, with the slip damp coupling torque of the stabilize device (SDT100) and/or the stabilize device (SDT200) installed between the two opposite wheel sets at the left and right sides, the operation of the system can be stabilized; the stabilize device (SDT100) and/or the stabilize device (SDT200) can be optionally installed according to actual needs;

--transmission device (T100), (T200), (T300), (T400): the output end of the transmission device (T100) is served to drive the wheel set

(W100) at the rear left side of the loading end, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT100); the output end of the transmission device (T200) is served to drive the wheel set (W200) at the rear right side, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT200); the output end of (T300) is served to drive the wheel set (W300) at the front left side of the loading end, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT300); the output end of the transmission device (T400) is served to drive the wheel set (W400) at the front right side, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT400); the transmission devices (T100), (T200), (T300), (T400) are consisted of mechanical gear sets, or chain sets, pulley sets or linkage rod sets, and structured as a multiple-step transmission device for acceleration or deceleration or changing direction, e.g. an automatic type, automated manual type or manumatic type, or mechanic clutch switching type, or electric clutch switching type, or pressure switching type, or oil pressure switching type controllable multiple speed-ratio device controlled by manual force or by the control unit (ECU100), or a structural configuration capable of automatically changing speed ratio through being passively driven by the driving rotational speed and/or the loading torque, or a continuous variable transmission capable of automatically changing speed ratio through being externally controlled, e.g. a rubber belt type, metal belt type, chain type continuous variable transmission, or Eddy current type continuous variable transmission, or torque converter, or electric continuous variable transmission (ECVT), or friction disk type, or conventional uncoaxial continuous variable transmission; the

transmission device (T100), (T200) and/or (T300), (T400) can be optionally installed according to actual needs;

--output end clutch device (CL100), (CL200), (CL300), (CL400): the output end clutch device (CL100) is installed between the output end of the controllable multiple speed-ratio device (VT100) and the wheel set (W100) for controlling the controllable multiple speed-ratio device (VT100) to output the rotary kinetic power to the wheel set (W100), the output end clutch device (CL200) is installed between the output end of the controllable multiple speed-ratio device (VT200) and the wheel set (W200) for controlling the controllable multiple speed-ratio device (VT200) to output the rotary kinetic power to the wheel set (W200), the output end clutch device (CL300) is installed between the output end of the controllable multiple speed-ratio device (VT300) and the wheel set (W300) for controlling the controllable multiple speed-ratio device (VT300) to output the rotary kinetic energy to the wheel set (W300), and the output end clutch device (CL400) is installed between the output end of the controllable multiple speed-ratio device (VT400) and the wheel set (W400) for controlling the controllable multiple speed-ratio device (VT400) to output the rotary kinetic energy to the wheel set (W400); the output end clutch devices (CL100), (CL200), (CL300), (CL400) include being controlled by manual force or centrifugal force, or controlled through the operation interface (MI100) and the control unit (ECU100), and formed as a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end; the output end clutch device can further includes being driven by electric force and/or magnetic force and/or mechanical force and/or air pressure and/or hydraulic force for controlling the coupling torque between engaging

and releasing, e.g. an electromagnetic wet type multi-plate clutch controlling coupling torque through magnetic exciting current, or a wet type multi-plate clutch driven by mechanical force and/or pressure and/or hydraulic force;

The structure of the output end clutch device (CL100), (CL200), (CL300), (CL400) includes:

(1) a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing;

(2) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for linearly controlling the continuous coupling torque between transmission engaging and releasing;

(3) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having torque limited coupling function smaller than the engaging torque, after being released;

(4) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being increased while the rotation differential being increased, after being released;

(5) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being reduced while the rotation differential being increased, after being

released;

(6) (1) to (5) including a radial clutch device;

(7) (1) to (5) including an axial clutch device;

The output end clutch devices (CL100), (CL200), (CL300), (CL400) can be optionally installed according to actual needs;

--common load body (L100) can be provided with one or more than one non-powered wheels according to actual needs;

With the operation of the mentioned devices, when the common load body (L100) is driven to operate by the rotary kinetic power source (P100), and the wheel set (W100) at the rear left side and the wheel set (W200) at the rear right side of the loading end are operated in differential speeds, the speed ratios of the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200) are individually adjusted along with the load varying of the wheel set (W100) and the wheel set (W200) of the loading end, and the two output ends of the first epicyclic gear set (EG101) perform differential operation for adjustment, so as to drive in differential speed between the input end of the controllable multiple speed-ratio device (VT100) and the input end of the controllable multiple speed-ratio device (VT200); when the wheel set (W300) at the front left side and the wheel set (W400) at the front right side of the loading end are operated in differential speeds, the speed ratios of the controllable multiple speed-ratio device (VT300) and the controllable multiple speed-ratio device (VT400) are individually adjusted along with the load varying of the wheel set (W300) and the wheel set (W400) of the loading end, and the left end output shaft (1011) and the right end output shaft (1012) of the two output ends of the first epicyclic gear set (EG101) perform differential operation for adjustment so as to drive in differential speed between the input end of the controllable multiple speed-ratio device (VT300) and the input end of the controllable

multiple speed-ratio device (VT400); if the operation in differential speed are performed between the wheel set (W100) and the wheel set (W200) and between the wheel set (W300) and the wheel set (W400) at the same time, the interactive differential operation is jointly formed between the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200) and between the controllable multiple speed-ratio device (VT300) and the controllable multiple speed-ratio device (VT400), and between the left end output shaft (1011) and the right end output shaft (1012) of the two output ends of the first epicyclic gear set (EG101), or the operation interface (MI100) is used to control the control unit (ECU100) so as to control the individual speed ratio adjustment between the controllable multiple speed-ratio device (VT100), the controllable multiple speed-ratio device (VT200), the controllable multiple speed-ratio device (VT300) and the controllable multiple speed-ratio device (VT400).

4. A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 3, wherein the rotary output end of the rotary kinetic power source (P100) installed at the common load body (L100) is utilized to directly or through the transmission device (T101) to drive the first epicyclic gear set (EG101), and the controllable multiple speed-ratio device (VT100) is individually installed between the left end output shaft (1011) of the two output ends of the first epicyclic gear set (EG101) and the wheel set (W100) at the rear left side of the loading end at the left side of the common load body (L100), and the controllable multiple speed-ratio device (VT200) is individually installed between the right end output shaft (1012) of the two output ends of the first epicyclic gear set (EG101) and the wheel set (W200) at the rear right side of the loading end at the right side of the common load body (L100); and the rotary output end of the rotary kinetic power

source (P100) to directly or through the transmission device (T101) to drive the second epicyclic gear set (EG102), and the controllable multiple speed-ratio device (VT300) is individually installed between the left end output shaft (1021) of the two output ends of the second epicyclic gear set (EG102) and the wheel set (W300) at the front left side of the loading end at the left side of the common load body (L100), and the controllable multiple speed-ratio device (VT400) is individually installed between the right end output shaft (1022) and the wheel set (W400) at the front right side of the loading end at the right side of the common load body (L100), thereby forming the drive system capable of being operated in the differential speed state, which mainly consists of:

--rotary kinetic power source (P100): constituted by a power source outputting kinetic power through rotary, e.g. an internal combustion engine, external combustion engine, spring power source, hydraulic power source, pressure power source, flywheel power source or manual force, or animal force, wind power source, and/or composed of a AC or DC, brush or brushless, synchronous or non-synchronous, internal rotating or external rotating type rotary motor installed with relative control devices and electrically driven by power supply and/or storage device; the output end thereof includes outputting directly or outputting through a clutch device;

--input end clutch device (CL101): installed between the output end of the rotary kinetic power source (P100) and the input end of the first transmission device (T101), capable of controlling the rotary kinetic power source (P100) to control the transmission or termination of the rotary kinetic power to the first transmission device (T101); the input end clutch device (CL101) includes being controlled by manual force or centrifugal force, or being controlled through the operation interface (MI100), and formed as a clutch device or structure driven by electric

force and/or magnetic force and/or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end; the input end clutch device (CL101) can be optionally installed according to actual needs;

--transmission device (T101): constituted by a transmission device having fixed speed ratio or variable speed ratio or continuous variable speed and consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets, and installed between the rotary kinetic power source (P100) and the first epicyclic gear set (EG101) and the second epicyclic gear set (EG102); the transmission device (T101) can be optionally adopted according to actual needs;

--first epicyclic gear set (EG101): constituted by an epicyclic gear set having an input shaft and two output shafts capable of differentially operating, directly driven by the rotary kinetic power provided by an engine, or driven by the engine through the transmission device (T101); the left end output shaft (1011) of the two output shafts capable of differentially operating is served to drive the input end of the controllable multiple speed-ratio device (VT100), and the right end output shaft (1012) is served to drive the input end of the controllable multiple speed-ratio device (VT200);

--second epicyclic gear set (EG102): constituted by an epicyclic gear set having an input shaft and two output shafts capable of differentially operating, directly driven by the rotary kinetic power provided by an engine, or driven by the engine through the transmission device (T101); the left end output shaft (1021) of the two output shafts capable of differentially operating is served to drive the input end of the controllable multiple speed-ratio device (VT300), and the right end output shaft (1022) is served to drive the input end of the controllable multiple speed-ratio device (VT400);

-- controllable multiple speed-ratio device (VT100), (VT200), (VT300), (VT400): the output end of the controllable multiple speed-ratio device (VT100) is served to drive the wheel set (W100) at the left side of the loading end, and the input end of the controllable multiple speed-ratio device (VT100) is driven by the rotary kinetic power from the left end output shaft (1011) at the output end of the first epicyclic gear set (EG101); the output end of the controllable multiple speed-ratio device (VT200) is served to drive the wheel set (W200) at the right side, and the input end of the controllable multiple speed-ratio device (VT200) is driven by the rotary kinetic power from the right end output shaft (1012) at the output end of the first epicyclic gear set (EG101); the output end of the controllable multiple speed-ratio device (VT300) is served to drive the wheel set (W300) at the left side of the loading end, and the input end of the controllable multiple speed-ratio device (VT300) is driven by the rotary kinetic power from the left end output shaft (1021) at the output end of the second epicyclic gear set (EG102); the output end of the controllable multiple speed-ratio device (VT400) is served to drive the wheel set (W400) at the right side, and the input end of the controllable multiple speed-ratio device (VT400) is driven by the rotary kinetic power from the right end output shaft (1022) at the output end of the second epicyclic gear set (EG102); the controllable multiple speed-ratio device (VT100), the controllable multiple speed-ratio device (VT200), the controllable multiple speed-ratio device (VT300) and the controllable multiple speed-ratio device (VT400) are consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets, and structured as a multiple-step transmission device for acceleration or deceleration or changing direction, e.g. an automatic type, automated manual type or manumatic type, or mechanic clutch switching type, or electric clutch switching type, or pressure switching type, or oil pressure switching type

controllable multiple speed-ratio device controlled by manual force or by the control unit (ECU100);

--operation interface (MI100): constituted by a mechanical operation device control by manual force or system, and structured by a linear analog type or digital type or hybrid type electromechanical device and/or solid state electric circuit, and provided for directly controlling the rotary kinetic power source (P100), and/or the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/or the controllable multiple speed-ratio device (VT200) and/or the controllable multiple speed-ratio device (VT300), and/or the controllable multiple speed-ratio device (VT400), or for controlling the control unit (ECU100) so as to control the operation state of the rotary kinetic power source (P100), and/or control the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/ or the controllable multiple speed-ratio device (VT200), and/or the controllable multiple speed-ratio device (VT300), and/or the controllable multiple speed-ratio device (VT400) ;

--control unit (ECU100): constituted by electromechanical devices and/or electric circuit components and/or power semiconductors and/or microprocessors and software, for being connected to an electric power source (B100) and controlled by the operation interface (MI100) or operated through the signal of controlling system operation state, for controlling the operation state of the rotary kinetic power source (P100), and/or controlling the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/or the controllable multiple speed-ratio device (VT200), and/or the controllable multiple speed-ratio device (VT300), and/or the controllable multiple speed-ratio device (VT400);

--stabilize device (SDT100), (STD200): constituted by a limited slip differential, or a dual shaft connecting device composed of a coupling

device having slip damp coupling torque, including a stabilize device with the dual shaft structure configured through fluid viscous effect, hydrodynamic damp effect, mechanical friction effect, electromagnetic vortex effect or power generation reverse torque effect; wherein two rotating ends of the stabilize device (SDT100) are respectively connected between the wheel set (W100) at the rear left side and the wheel set (W200) at the rear right side of the loading end, and two rotating ends of the stabilize device (SDT200) are respectively connected between the wheel set (W300) at the front left side and the wheel set (W400) at the front right side of the loading end; during the driving operation, if the load varying at the individual two sides of the loading end causes the unstable operation, with the slip damp coupling torque of the stabilize device (SDT100) and/or the stabilize device (SDT200) installed between the two opposite wheel sets at the left and right sides, the operation of the system can be stabilized; the stabilize device (SDT100) and/or the stabilize device (SDT200) can be optionally installed according to actual needs;

--transmission device (T100), (T200), (T300), (T400): the output end of the transmission device (T100) is served to drive the wheel set (W100) at the rear left side of the loading end, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT100); the output end of the transmission device (T200) is served to drive the wheel set (W200) at the rear right side, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT200); the output end of (T300) is served to drive the wheel set (W300) at the front left side of the loading end, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT300); the output end of the transmission device (T400) is served to drive the wheel set

(W400) at the front right side, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT400); the transmission devices (T100), (T200), (T300), (T400) are consisted of mechanical gear sets, or chain sets, pulley sets or linkage rod sets, and structured as a multiple-step transmission device for acceleration or deceleration or changing direction, e.g. an automatic type, automated manual type or manumatic type, or mechanic clutch switching type, or electric clutch switching type, or pressure switching type, or oil pressure switching type controllable multiple speed-ratio device controlled by manual force or by the control unit (ECU100), or a structural configuration capable of automatically changing speed ratio through being passively driven by the driving rotational speed and/or the loading torque, or a continuous variable transmission capable of automatically changing speed ratio through being externally controlled, e.g. a rubber belt type, metal belt type, chain type continuous variable transmission, or Eddy current type continuous variable transmission, or torque converter, or electric continuous variable transmission (ECVT), or friction disk type, or conventional uncoaxial continuous variable transmission; the transmission device (T100), (T200) and/or (T300), (T400) can be optionally installed according to actual needs;

--output end clutch device (CL100), (CL200), (CL300), (CL400): the output end clutch device (CL100) is installed between the output end of the controllable multiple speed-ratio device (VT100) and the wheel set (W100) for controlling the controllable multiple speed-ratio device (VT100) to output the rotary kinetic power to the wheel set (W100), the output end clutch device (CL200) is installed between the output end of the controllable multiple speed-ratio device (VT200) and the wheel set (W200) for controlling the controllable multiple speed-ratio device (VT200) to output the rotary kinetic power to the wheel set

(W200), the output end clutch device (CL300) is installed between the output end of the controllable multiple speed-ratio device (VT300) and the wheel set (W300) for controlling the controllable multiple speed-ratio device (VT300) to output the rotary kinetic energy to the wheel set (W300), and the output end clutch device (CL400) is installed between the output end of the controllable multiple speed-ratio device (VT400) and the wheel set (W400) for controlling the controllable multiple speed-ratio device (VT400) to output the rotary kinetic energy to the wheel set (W400); the output end clutch devices (CL100), (CL200), (CL300), (CL400) include being controlled by manual force or centrifugal force, or controlled through the operation interface (MI100) and the control unit (ECU100), and formed as a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end; the output end clutch device can further includes being driven by electric force and/or magnetic force and/or mechanical force and/or air pressure and/or hydraulic force for controlling the coupling torque between engaging and releasing, e.g. an electromagnetic wet type multi-plate clutch controlling coupling torque through magnetic exciting current, or a wet type multi-plate clutch driven by mechanical force and/or pressure and/or hydraulic force;

The structure of the output end clutch device (CL100), (CL200), (CL300), (CL400) includes:

(1) a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing;

(2) driven by electric force and/or magnetic force and/ or mechanical

force and/or air pressure and/or hydraulic force for linearly controlling the continuous coupling torque between transmission engaging and releasing;

(3) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having torque limited coupling function smaller than the engaging torque, after being released;

(4) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being increased while the rotation differential being increased, after being released;

(5) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being reduced while the rotation differential being increased, after being released;

(6) (1) to (5) including a radial clutch device;

(7) (1) to (5) including an axial clutch device;

The output end clutch devices (CL100), (CL200), (CL300), (CL400) can be optionally installed according to actual needs;

--common load body (L100) can be provided with one or more than one non-powered wheels according to actual needs;

With the operation of the mentioned devices, when the common load body (L100) is driven to operate by the rotary kinetic power source (P100), and the wheel set (W100) at the rear left side and the wheel set (W200) at the rear right side of the loading end are operated

in differential speeds, the speed ratios of the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200) are individually adjusted along with the load varying of the wheel set (W100) and the wheel set (W200) of the loading end, and the two output ends of the first epicyclic gear set (EG101) perform differential operation for adjustment, so as to drive in differential speed between the input end of the controllable multiple speed-ratio device (VT100) and the input end of the controllable multiple speed-ratio device (VT200); when the wheel set (W300) at the front left side and the wheel set (W400) at the front right side of the loading end are operated in differential speeds, the speed ratios of the controllable multiple speed-ratio device (VT300) and the controllable multiple speed-ratio device (VT400) are individually adjusted along with the load varying of the wheel set (W300) and the wheel set (W400) of the loading end, and the left end output shaft (1021) and the right end output shaft (1022) of the two output ends of the second epicyclic gear set (EG102) perform differential operation for adjustment so as to drive in differential speed between the input end of the controllable multiple speed-ratio device (VT300) and the input end of the controllable multiple speed-ratio device (VT400), or the operation interface (MI100) is used to control the control unit (ECU100) so as to control the individual speed ratio adjustment between the controllable multiple speed-ratio device (VT100), the controllable multiple speed-ratio device (VT200), the controllable multiple speed-ratio device (VT300) and the controllable multiple speed-ratio device (VT400).

5. A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 1, wherein a direction changing signal sensor (S100) can be further installed, so when changing directions, the signal of the

direction changing signal sensor (S100) can be sent to the control unit (ECU100) for controlling the relative speed ratio switching between the controllable multiple speed-ratio devices installed at two sides of the common load body (L100), thereby enhancing the performance of the drive for changing direction.

6. A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 2, wherein the signal of a direction changing signal sensor (S100) is send to the control unit (ECU100) for controlling the relative speed ratio switching of the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200), which mainly consists of:

--rotary kinetic power source (P100): constituted by a power source outputting kinetic power through rotary, e.g. an internal combustion engine, external combustion engine, spring power source, hydraulic power source, pressure power source, flywheel power source or manual force, or animal force, wind power source, and/or composed of a AC or DC, brush or brushless, synchronous or non-synchronous, internal rotating or external rotating type rotary motor installed with relative control devices and electrically driven by power supply and/or storage device; the output end thereof includes outputting directly or outputting through a clutch device;

--input end clutch device (CL101): installed between the output end of the rotary kinetic power source (P100) and the input end of the first transmission device (T101), capable of controlling the rotary kinetic power source (P100) to control the transmission or termination of the rotary kinetic power to the first transmission device (T101); the input end clutch device (CL101) includes being controlled by manual force or centrifugal force, or being controlled through the operation interface (MI100), and formed as a clutch device or structure driven by electric

force and/or magnetic force and/or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end; the input end clutch device (CL101) can be optionally installed according to actual needs;

--transmission device (T101): constituted by a transmission device having fixed speed ratio or variable speed ratio or continuous variable speed and consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets; and installed between the rotary kinetic power source (P100) and the first epicyclic gear set (EG101); the transmission device (T101) can be optionally adopted according to actual needs;

--first epicyclic gear set (EG101): constituted by an epicyclic gear set having an input shaft and two output shafts capable of differentially operating, directly driven by the rotary kinetic power provided by an engine, or driven by the engine through the transmission device (T101); the left end output shaft (1011) of the two output shafts capable of differentially operating is served to drive the input end of the controllable multiple speed-ratio device (VT100), and the right end output shaft (1012) is served to drive the input end of the controllable multiple speed-ratio device (VT200);

--controllable multiple speed-ratio device (VT100), (VT200): the output end of the controllable multiple speed-ratio device (VT100) is served to drive the wheel set (W100) at the left side of the loading end, and the input end of the controllable multiple speed-ratio device (VT100) is driven by the rotary kinetic power from the left end output shaft (1011) at the output end of the first epicyclic gear set (EG101); the output end of the controllable multiple speed-ratio device (VT200) is served to drive the wheel set (W200) at the right side, and the input end of the controllable multiple speed-ratio device (VT200) is driven

by the rotary kinetic power from the right end output shaft (1012) at the output end of the first epicyclic gear set (EG101); the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200) are consisted of mechanical gear sets, or chain sets or pulley sets or linkage rod sets, and structured as a multiple-step transmission device for acceleration or deceleration or changing direction, e.g. an automatic type, automated manual type or manumatic type, or mechanic clutch switching type, or electric clutch switching type, or pressure switching type, or oil pressure switching type controlled multiple speed-ratio device controlled by manual force or by the control unit (ECU100);

--operation interface (MI100): constituted by a mechanical operation device control by manual force or system, and structured by a linear analog type or digital type or hybrid type electromechanical device and/or solid state electric circuit, provided for directly controlling the rotary kinetic power source (P100), and/or the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/or the controllable multiple speed-ratio device (VT200), or for controlling the control unit (ECU100) so as to control the operation state of the rotary kinetic power source (P100), and/or control the operation speed ratios of the controllable multiple speed-ratio device (VT100) and/ or the controllable multiple speed-ratio device (VT200);

--control unit (ECU100): constituted by electromechanical devices and/or electric circuit components and/or power semiconductors and/or microprocessors and software, for being connected to an electric power source (B100) and controlled by the operation interface (MI100) or controlled by the direction changing signal sensor (S100), operated through the signal of controlling system operation state, for controlling the operation state of the rotary kinetic power source (P100), and/or controlling the operation speed ratios of the controllable multiple

speed-ratio device (VT100) and/or the controllable multiple speed-ratio device (VT200);

-- direction changing signal sensor (S100): defined as one or more than one physical sensing devices, for sensing detection signals relative to direction changing which includes one or more than one of following signals including: signals of direction changing degree from the steering machine, signals of inclined angle of vehicle body, signals of vehicle idling, signals of upward/downward slope, signals of acceleration or deceleration, and together with the signal of the operation interface (MI100) to be transmitted to the control unit (ECU100);

--stabilize device (SDT100): constituted by a limited slip differential, or a dual shaft connecting device composed of a coupling device having slip damp coupling torque, including a stabilize device with the dual shaft structure configured through fluid viscous effect, hydrodynamic damp effect, mechanical friction effect, electromagnetic vortex effect or power generation reverse torque effect; wherein two rotating ends thereof are respectively connected between the wheel set (W100) at the left side and the wheel set (W200) at the right side of the loading end; during the driving operation, if the load varying at the individual two sides of the loading end causes the unstable operation, with the slip damp coupling torque of the stabilize device (SDT100) installed between the wheel sets at the left and right sides, the operation of the system can be stabilized; the stabilize device (SDT100) can be optionally installed according to actual needs;

--transmission device (T100), (T200): the output end of the transmission device (T100) is served to drive the wheel set (W100) at the left side of the loading end, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT100); the output end of the

transmission device (T200) is served to drive the wheel set (W200) at the right side, and the input end thereof is driven by the rotary kinetic power from the output end of the controllable multiple speed-ratio device (VT200); the transmission device (T100) and the transmission device (T200) are consisted of mechanical gear sets, or chain sets, pulley sets or linkage rod sets, and structured as a multiple-step transmission device for acceleration or deceleration or changing direction, e.g. an automatic type, automated manual type or manumatic type, or mechanic clutch switching type, or electric clutch switching type, or pressure switching type, or oil pressure switching type controllable multiple speed-ratio device controlled by manual force or by the control unit (ECU100), or a structural configuration capable of automatically changing speed ratio through being passively driven by the driving rotational speed and/or the loading torque, or a continuous variable transmission capable of automatically changing speed ratio through being externally controlled, e.g. a rubber belt type, metal belt type, chain type continuous variable transmission, or Eddy current type continuous variable transmission, or torque converter, or electric continuous variable transmission (ECVT), or friction disk type, or conventional uncoaxial continuous variable transmission; the transmission device (T100), (T200) can be optionally installed according to actual needs;

--output end clutch device (CL100), (CL200): the output end clutch device (CL100) is installed between the output end of the controllable multiple speed-ratio device (VT100) and the wheel set (W100) for controlling the controllable multiple speed-ratio device (VT100) to output the rotary kinetic power to the wheel set (W100), and the output end clutch device (CL200) is installed between the output end of the controllable multiple speed-ratio device (VT200) and the wheel set (W200) for controlling the controllable multiple speed-ratio device

(VT200) to output the rotary kinetic power to the wheel set (W200); the output end clutch device (CL100) and the output end clutch device (CL200) include being controlled by manual force or centrifugal force, or controlled through the operation interface (MI100) and the control unit (ECU100), and formed as a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end; the output end clutch device can further includes being driven by electric force and/or magnetic force and/or mechanical force and/or air pressure and/or hydraulic force for controlling the coupling torque between engaging and releasing, e.g. an electromagnetic wet type multi-plate clutch controlling coupling torque through magnetic exciting current, or a wet type multi-plate clutch driven by mechanical force and/or pressure and/or hydraulic force;

The structure of the output end clutch device (CL100), (CL200) includes:

(1) a clutch device or structure driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing;

(2) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for linearly controlling the continuous coupling torque between transmission engaging and releasing;

(3) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having torque limited coupling function smaller than the engaging torque, after being released;

(4) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being increased while the rotation differential being increased, after being released;

(5) driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a linear damp function smaller than the engaging torque and being reduced while the rotation differential being increased, after being released;

(6) (1) to (5) including a radial clutch device;

(7) (1) to (5) including an axial clutch device;

The output end clutch devices (CL100), (CL200) can be optionally installed according to actual needs

--common load body (L100) can be provided with one or more than one non-powered wheels according to actual needs;

With the operation of the mentioned devices, when the common load body (L100) is driven to operate by the rotary kinetic power source (P100), and the wheel set (W100) at the left side and the wheel set (W200) at the right side of the loading end are operated in differential speeds, the speed ratios of the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200) are individually adjusted along with the load varying of the wheel set (W100) and the wheel set (W200) of the loading end, and the two output ends of the first epicyclic gear set (EG101) perform differential operation for adjustment, so as to drive in differential speed between the input end of the controllable multiple speed-ratio device (VT100) and the input end of the controllable multiple speed-ratio

device (VT200), or the operation interface (MI100) is used to control the control unit (ECU100) so as to control the individual speed ratio adjustment between the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200).

7. A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 3, wherein a direction changing signal sensor (S100) can be further installed, so when changing directions, the signal of the direction changing signal sensor (S100) can be sent to the control unit (ECU100) for controlling the relative speed ratio switching between the controllable multiple speed-ratio device (VT100) and controllable multiple speed-ratio device (VT200), and between the controllable multiple speed-ratio device (VT300) and controllable multiple speed-ratio device (VT400), thereby enhancing the performance of the drive for changing direction.

8. A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 4, wherein a direction changing signal sensor (S100) can be further installed, so when changing directions, the signal of the direction changing signal sensor (S100) can be sent to the control unit (ECU100) for controlling the relative speed ratio switching between the controllable multiple speed-ratio device (VT100) and controllable multiple speed-ratio device (VT200), and between the controllable multiple speed-ratio device (VT300) and controllable multiple speed-ratio device (VT400), thereby enhancing the performance of the drive for changing direction.

9. A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 1, wherein the controllable multiple speed-ratio devices, the output end clutch devices, and the transmission devices

installed at two sides of the common load body (L100) are combined at two output sides of individual epicyclic gear set.

10. A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 2, wherein the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200), the output end clutch devices (CL100), (CL200), and the transmission devices (T100), (T200) are combined at two output sides of the first epicyclic gear set (EG101).

11. A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 3, wherein the controllable multiple speed-ratio devices (VT100, VT200, VT300, VT400), the output end clutch devices (CL100, CL200, CL300, CL400), and the transmission devices (T100, T200, T300, T400) are respectively combined at two output sides of the first epicyclic gear set (EG101).

12. A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 4, wherein the controllable multiple speed-ratio devices (VT100, VT200, VT300, VT400), the output end clutch devices (CL100, CL200, CL300, CL400), and the transmission devices (T100, T200, T300, T400) are respectively combined at two output sides of the first epicyclic gear set (EG101) and the second epicyclic gear set (EG102).

13. A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 9, wherein the signal of the direction changing signal sensor (S100) is sent to the control unit (ECU100) for controlling the relative speed ratio switching between the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio

device (VT200).

14. A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 10, wherein the signal of the direction changing signal sensor (S100) is sent to the control unit (ECU100) for controlling the relative speed ratio switching between the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200), and wherein:

-- direction changing signal sensor (S100): defined as one or more than one physical sensing devices, for sensing detection signals relative to direction changing which includes one or more than one of following signals including: signals of direction changing degree from the steering machine, signals of inclined angle of vehicle body, signals of vehicle idling, signals of upward/downward slope, signals of acceleration or deceleration, and together with the signal of the operation interface (MI100) to be transmitted to the control unit (ECU100).

15. A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 11, wherein the signal of the direction changing signal sensor (S100) is sent to the control unit (ECU100) for controlling the relative speed ratio switching between the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200), and between the controllable multiple speed-ratio device (VT300) and the controllable multiple speed-ratio device (VT400) and wherein:

-- direction changing signal sensor (S100): defined as one or more than one physical sensing devices, for sensing detection signals relative to direction changing which includes one or more than one of following signals including: signals of direction changing degree from the

steering machine, signals of inclined angle of vehicle body, signals of vehicle idling, signals of upward/downward slope, signals of acceleration or deceleration, and together with the signal of the operation interface (MI100) to be transmitted to the control unit (ECU100).

16.A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 12, wherein the signal of the direction changing signal sensor (S100) is sent to the control unit (ECU100) for controlling the relative speed ratio switching between the controllable multiple speed-ratio device (VT100) and the controllable multiple speed-ratio device (VT200), and between the controllable multiple speed-ratio device (VT300) and the controllable multiple speed-ratio device (VT400), and wherein:

-- direction changing signal sensor (S100): defined as one or more than one physical sensing devices, for sensing detection signals relative to direction changing which includes one or more than one of following signals including: signals of direction changing degree from the steering machine, signals of inclined angle of vehicle body, signals of vehicle idling, signals of upward/downward slope, signals of acceleration or deceleration, and together with the signal of the operation interface (MI100) to be transmitted to the control unit (ECU100).

17.A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 1, wherein an output end transmission device composed of a stepped or continuous transmission device having fixed speed ratio for acceleration or deceleration or changing direction can be further installed between the output end of the first transmission device (T101) and the individual loading end wheel set; the mentioned

output end transmission device is composed of mechanical gear sets, or chain sets, pulley sets or linkage rod sets, and structured as a transmission device having fixed speed ratio for acceleration or deceleration or direction changing, or a manually-operated or automatic or semi-automatic speed ratio or belt type continuous variable transmission, or a hydraulic type torque converter.

18. A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 1, wherein the location where the output end clutch device being individually installed between the output end of the first transmission device (T101) to the individual transmission wheel system of individual loading end wheel set includes one or more than one of followings, including:

(1) installed between the output end of the first transmission device (T101) and the input end of the individual output end transmission device;

(2) installed at the input end of the output end transmission device;

(3) installed at the output end of the output end transmission device;

(4) installed in series between internal power transmission set of the individual output end transmission device;

(5) installed at the input end of the loading end wheel set;

The mentioned output end clutch device include being controlled by manual force or centrifugal force, or controlled through the operation interface, and driven by electric force and/or magnetic force and/ or mechanical force and/or air pressure and/or hydraulic force for performing transmission engaging or releasing, and having a rotating input end and a rotating output end.

19. A driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device as claimed in claim 1, wherein a flexible transmission device composed

of the limited slip differential or the dual shaft connecting device having slip coupling torque can be further installed at the opposite locations horizontally and coaxially at two sides along the driving direction of the common load body (L100) and between the same transmission operation sets; when the differential operation is performed between the wheel shaft and wheel set at the left side and the wheel shaft and wheel set at the right side combined to the dual shafts of the flexible transmission device, e.g. the differential operation performed by the flexible transmission device while the common load body (L100) is making a turn, through releasing the output end clutch device between the inner wheel set and the first transmission device (T101), the outer wheel set having high rotational speed performs the flexible transmission with rotary differential to the inner wheel set having low rotational speed through the flexible transmission device, such that the rotary speed of the inner wheel set is lower than that of the outer wheel set but still has the driving power; the flexible transmission device includes the coupling torque dual shaft connecting device composed of the coupling device have slip damp, e.g. a flexible transmission device formed with a dual shaft structure through fluid viscous effect, hydrodynamic damp effect, mechanical friction effect, electromagnetic vortex effect or power generation reverse torque effect, two rotating ends are respectively combined at: one or more than one of opposite locations horizontally and coaxially defined on the following transmission operation sets, including:

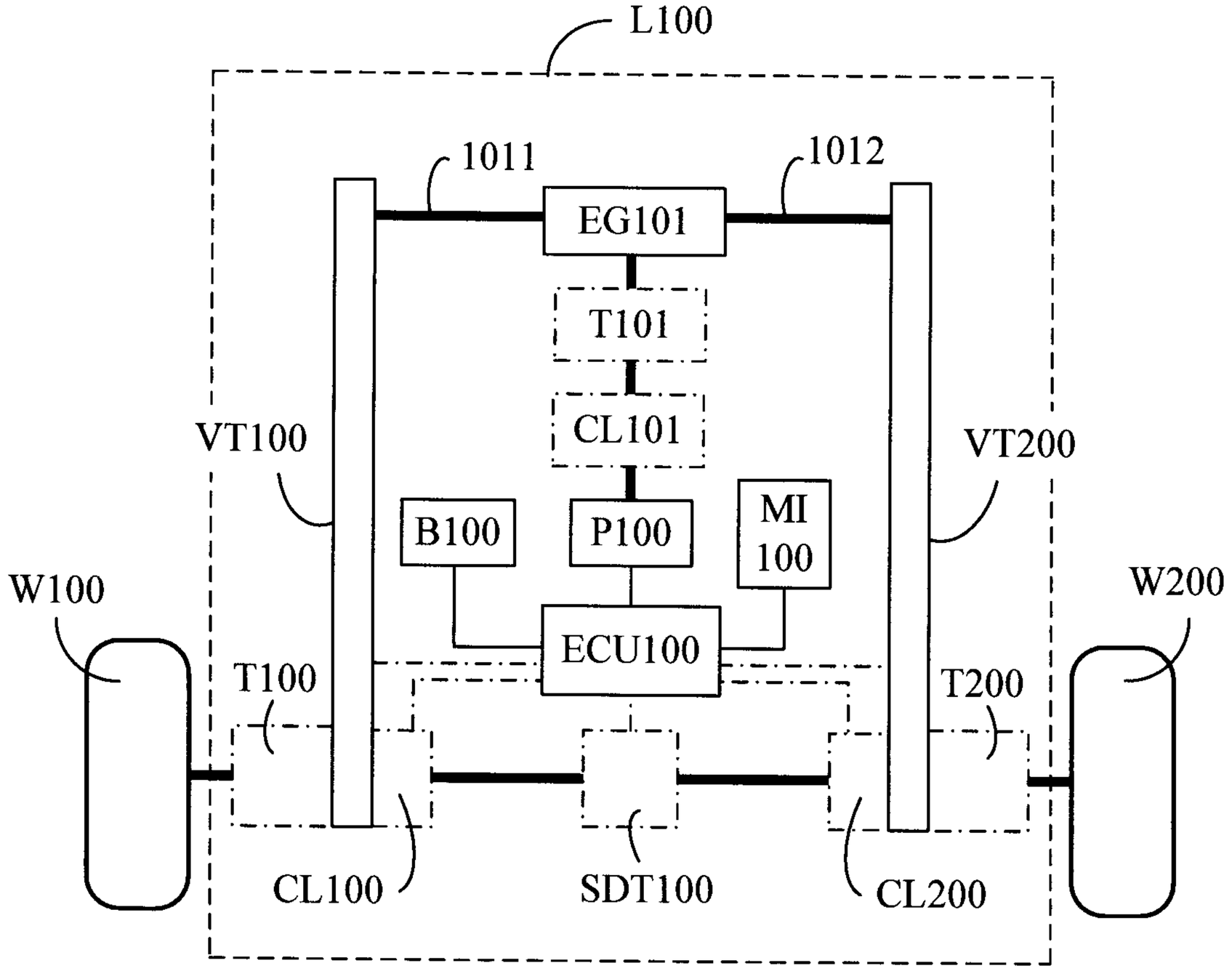
(1) installed between the wheel shaft connecting the wheel set at the left side and the wheel set at the right side of the common load body (L100);

(2) installed between the opposite input ends of the output end transmission devices at the left and the right sides of the common load body (L100);

(3) installed between the opposite output ends of the output end clutch devices at the left and the right sides of the common load body (L100);

(4) installed between the transmission components having the same rotational speed while being in the normal straight running state in the transmission wheel system of the output end transmission devices at the left and the right sides of the common load body (L100);

According to the driving system having epicycle gear sets with dual output ends equipped with individually-controlled multiple speed-ratio device, the limited slip differential or the flexible transmission device composed of the dual shaft connecting devices having slip coupling torque installed at the opposite locations horizontally and coaxially defined at two sides along the driving direction of the common load body (L100) and between the installed wheel sets and the drive operation sets can be all or partially installed.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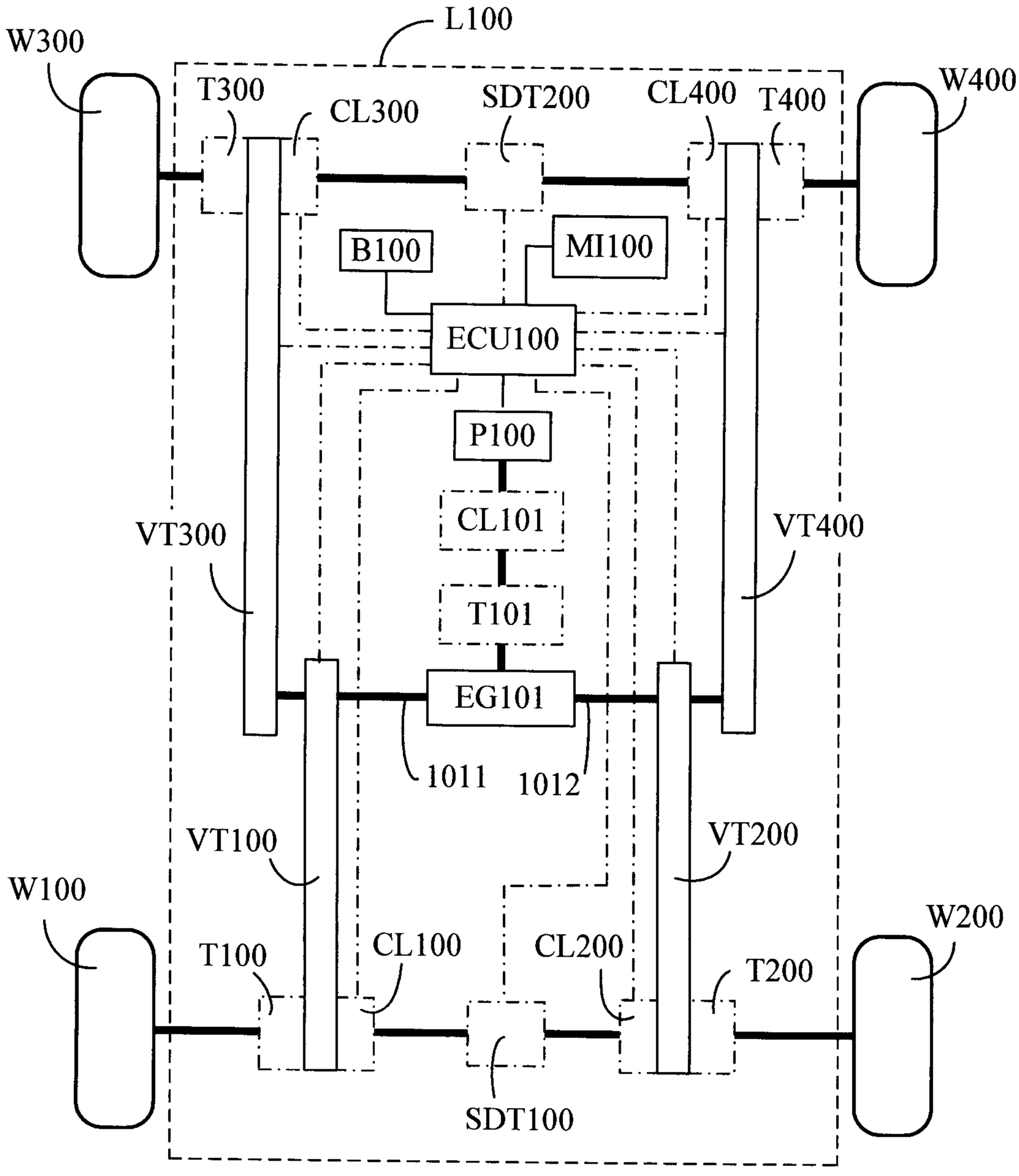
1011
1012
EG101
T101
CL101
VT100
VT200
B100
P100
MI
100
W100
W200
ECU100
T100
T200
CL100
SDT100
CL200

FIG. 1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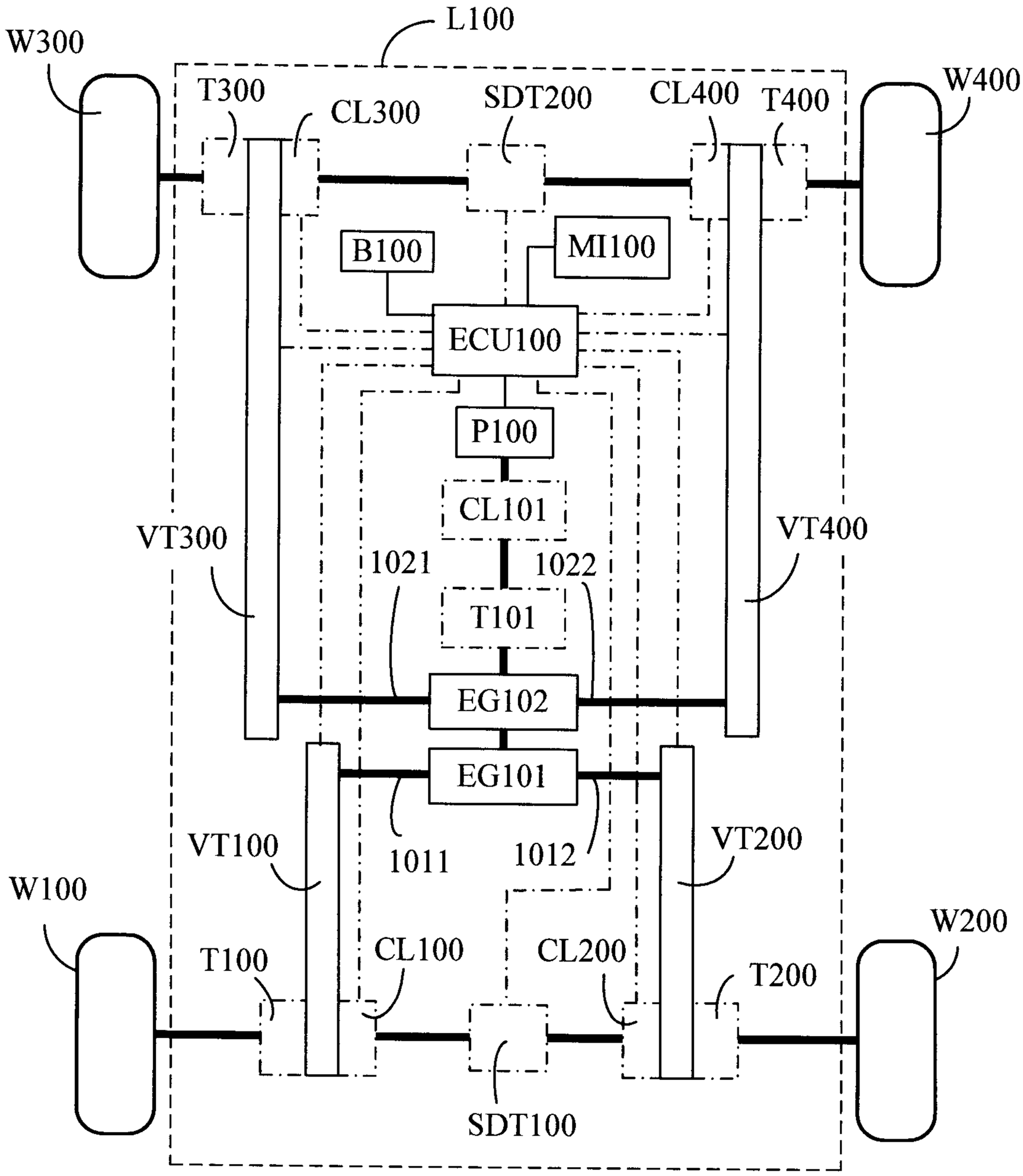
CL200
T200
W200
SDT100

FIG. 2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VT400
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W100
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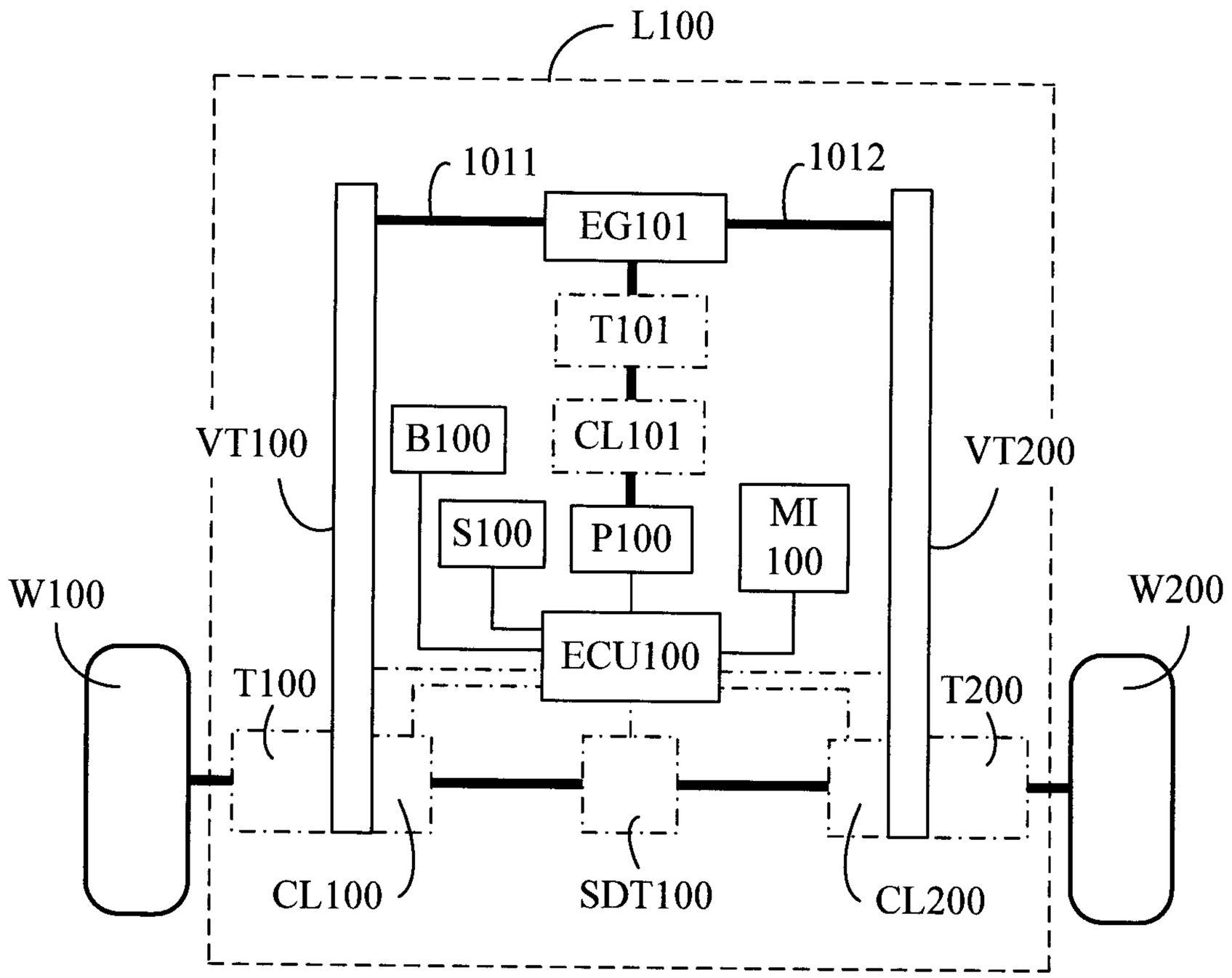
CL200
T200
SDT100

FIG. 3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1012
EG101
T101
CL101
B100
VT100
VT200
S100
P100
MI
100
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W200
ECU100
T100
T200
CL100
SDT100
CL200

FIG. 4

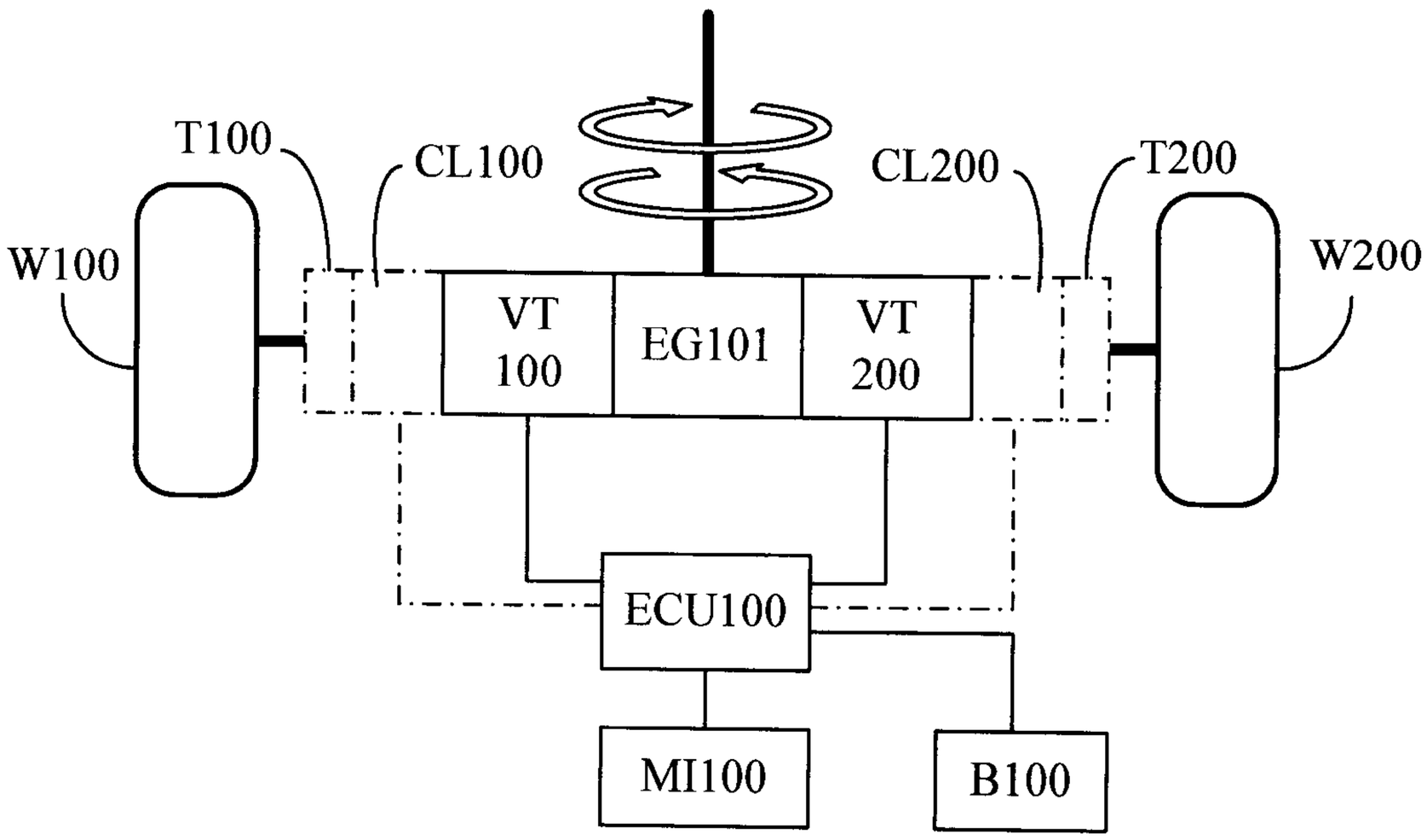

T100
CL100
CL200
T200
W100
W200
VT
100
EG101
VT
200
ECU100
MI100
B100

FIG. 5

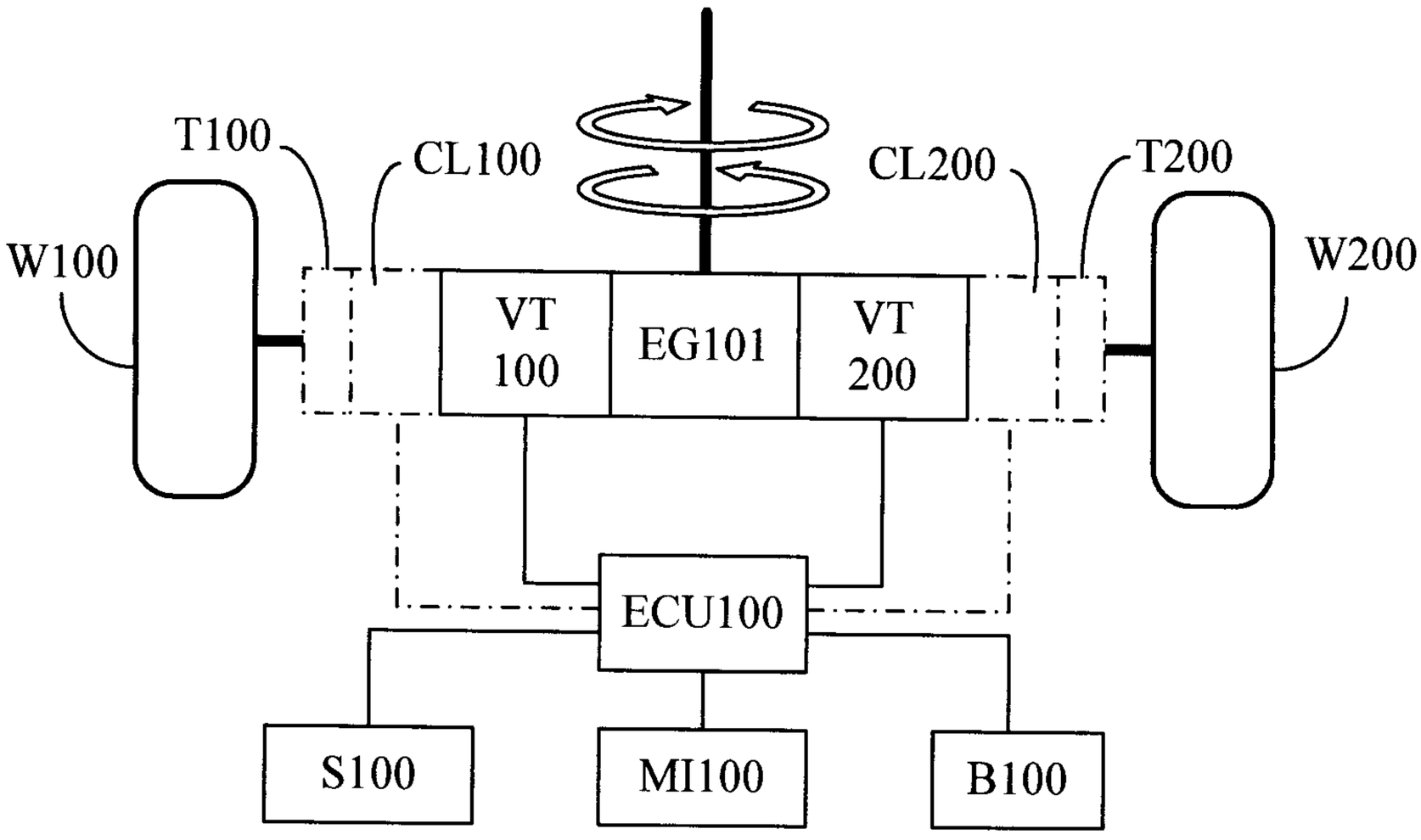
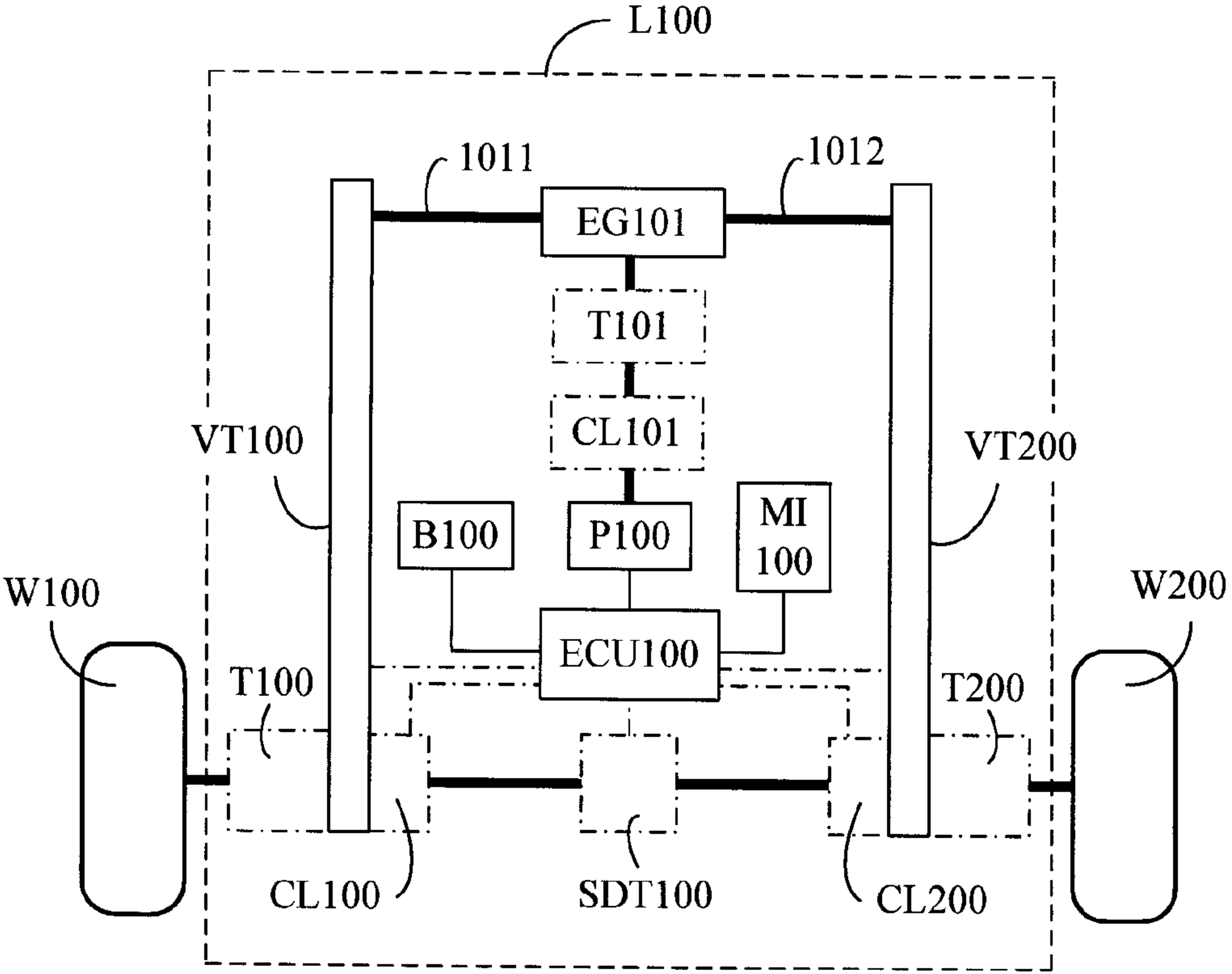

T100
CL100
CL200
T200
W100
W200
VT
100
EG101
VT
200
ECU100
S100
MI100
B100

FIG. 6


L100
1011
1012
EG101
T101
CL101
VT100
VT200
B100
P100
MI
100
W100
W200
ECU100
T100
T200
CL100
SDT100
CL200