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(54) **Title:**
COAXIAL EPICYCLIC GEAR TRAIN WITH BIDIRECTIONAL INPUT AND ONE-WAY OUTPUT

(57) **Abstract:**
COAXIAL EPICYCLIC GEAR TRAIN WITH BIDIRECTIONAL INPUT AND ONE-WAY OUTPUT ABSTRACT For the coaxial epicyclic gear train with bidirectional input and one-way output, by way of the epicyclic gear train and the integrated one-way transmission to constitute the epicyclic gear train, in which the rotary direction driving the input shaft of the gear train with bidirectional input and one-way output is changed, and the rotary direction at the output shaft is constant. Figure 8

COAXIAL EPICYCLIC GEAR TRAIN WITH BIDIRECTIONAL INPUT AND ONE-WAY OUTPUT

ABSTRACT

For the coaxial epicyclic gear train with bidirectional input and one-way output, by way of the epicyclic gear train and the integrated one-way transmission to constitute the epicyclic gear train, in which the rotary direction driving the input shaft of the gear train with bidirectional input and one-way output is changed, and the rotary direction at the output shaft is constant.

Figure 8

COAXIAL EPICYCLIC GEAR TRAIN WITH BIDIRECTIONAL INPUT AND ONE-WAY OUTPUT

BACKGROUND OF THE INVENTION

(a) Field of the Invention

For the coaxial epicyclic gear train with bidirectional input and one-way output, the external transmission structure of the epicyclic gear train integrates with the one-way transmission to implement the transmission operation with bidirectional input and one-way output for the epicyclic gear train; for the coaxial epicyclic gear train with bidirectional input and one-way output, if the input shaft is driven at the first rotary direction and at the second rotary direction, respectively, there are different transmission ratios occurring at the one-way output shaft, while there is same transmission ratio between the bidirectional input shaft and the one-way output shaft; thus the limitation of the coaxial gear train with bidirectional input and one-way output constituted by the planetary type transmission gear train is resolved, in which the internal transmission structure cannot make the transmission ratio between the input shaft driven at the first rotary direction and the output shaft and that between the input shaft driven at the second rotary direction and the output shaft without difference to implement one-way output.

(b) Description of the Prior Art

The conventional gear train with bidirectional input and constant rotary direction output is limited, which is constituted by the planetary type transmission gear train, because the internal transmission structure cannot make the transmission ratio between the input shaft driven at the first rotary direction and the output shaft and that between the input shaft driven at the second rotary direction and the output shaft without difference to implement one-way output.

SUMMARY OF THE INVENTION

For the coaxial epicyclic gear train with bidirectional input and one-way output, by way of the epicyclic gear train and the integrated one-way transmission to constitute the epicyclic gear train, in which the rotary direction driving the input shaft of gear train with bidirectional input and one-way output is changed, and the rotary direction at the output shaft is constant, and it is characterized by that the external transmission structure of the epicyclic gear train integrates with the one-way transmission to implement the transmission operation with bidirectional input and one-way output for the epicyclic gear train; for the coaxial epicyclic gear train with bidirectional input and one-way output, if the input shaft is driven at the first rotary direction and at the second rotary direction, respectively, there are different transmission ratios occurring at the one-way output shaft, while there is same transmission ratio between the bidirectional input shaft and the one-way output shaft; thus the limitation of the coaxial gear train with bidirectional input and one-way output constituted by the planetary type transmission gear train is resolved, in which the internal transmission structure cannot make the transmission ratio between the input shaft driven at the first rotary direction and the output shaft and that between the input shaft driven at the second rotary direction and the output shaft without difference to implement one-way output.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a structural schematic view showing the 1st embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

Fig. 2 is a structural schematic view showing the 2nd embodiment of the coaxial epicyclic gear train with bidirectional input and one-way

output constituted by the epicyclic gear train, according to the present invention.

Fig. 3 is a structural schematic view showing the 3rd embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

Fig. 4 is a structural schematic view showing the 4th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

Fig. 5 is a structural schematic view showing the 5th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

Fig. 6 is a structural schematic view showing the 6th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

Fig. 7 is a structural schematic view showing the 7th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

Fig. 8 is a structural schematic view showing the 8th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

Fig. 9 is a structural schematic view showing the 9th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

Fig. 10 is a structural schematic view showing the 10th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

Fig. 11 is a structural schematic view showing the 11th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

Fig. 12 is a structural schematic view showing the 12th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

Fig. 13 is a structural schematic view showing the 13th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

Fig. 14 is a structural schematic view showing the 14th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

DESCRIPTION OF MAIN COMPONENT SYMBOLS

(301), (302), (303), (305): One-way transmission

(400): Epicyclic gear support arm annular shelf

(401): Epicyclic gear shaft

(402): Inner bevel wheel

(403): Epicyclic gear

(404): Outer bevel wheel

(500): Shell of the transmission gear train

(600): Machine body

(2000): Input shaft

(3000): Output shaft

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

For the coaxial epicyclic gear train with bidirectional input and one-way output, the structural types include the input shaft and the output shaft coaxially installed in series, or the both coaxial fitting;

the main features are as following:

-- transmission component: related to the epicyclic gear train constituted by gears and/or friction wheels;

-- the forward and reverse rotary power source deriving from one or more of the following power source, including human power, machine power, electric motors, hydraulic motors or pneumatic motors; including:

1) the forward and reversely driven by human power; or

2) the forward and reversely driven by machine power; or

3) the forward and reversely driven by hydraulic or pneumatic motors; or

4) the forward and reversely driven by electric motors; or

5) driven at different directions by the rotary power sources from 1) ~4).

The operational features of the coaxial epicyclic gear train with bidirectional input and one-way output are as following:

-- the first rotary direction and the second rotary direction are reverse;

-- if the input terminal is driven by the first rotary direction, the first rotary direction output is produced through the first driving gear train driving the output terminal;

-- if the input terminal is driven by the second rotary direction, the first rotary direction output is produced through the second driving gear train driving the output terminal;

-- an one-way transmission is installed between the first driving gear train and the second driving gear train to avoid the interference from the second driving gear train when the first driving gear train is used to be the first rotary direction input and produces the first rotary direction output; and

-- an one-way transmission is installed between the second driving gear train and the first driving gear train to avoid the interference from the first driving gear train when the second driving gear train is used to be the second rotary direction input and produces the first rotary direction output.

Some embodiments are provided as following to describe the enforceability of the coaxial epicyclic gear train with bidirectional input and one-way output, and the other embodiments with same functions are omitted.

The following are a variety of structural types of the coaxial epicyclic gear train with bidirectional input and one-way output, the structural descriptions are as following:

As shown in Figs. 1 to 14, the coaxial epicyclic gear train with bidirectional input and one-way output is constituted by the epicyclic gear train, and the input shaft and the output shaft are coaxially installed in series, including:

Fig. 1 is a structural schematic view showing the 1st embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

As shown in Fig. 1, the coaxial epicyclic gear train with bidirectional input and one-way output is constituted by the epicyclic gear train with the input shaft and the output shaft coaxially installed in series, the main components including:

-- one end of the input shaft (2000) through installed at one side of

the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) and the output shaft (3000) coaxially installed in series via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- an epicyclic gear (403) installed between an outer bevel wheel (404) and an inner bevel wheel (402); the center of the epicyclic gear (403) rotating at an epicyclic gear shaft (401); and one end of the epicyclic gear shaft (401) fixed at the shell of the transmission gear train (500);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the one-way transmission (301) installed between the outer bevel wheel (404) and the output shaft (3000);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402) for further driving the epicyclic gear (403) and the outer bevel wheel (404), and through the outer bevel wheel (404) and the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

Fig. 2 is a structural schematic view showing the 2nd embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

As shown in Fig. 2, the coaxial epicyclic gear train with bidirectional input and one-way output is constituted by the epicyclic gear train with the input shaft and the output shaft coaxially installed in series, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) and the output shaft (3000) coaxially installed in series via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) through the inner bevel wheel (402), and the one-way transmission (305) installed between the above both;

-- an epicyclic gear (403) installed between an outer bevel wheel (404) and an inner bevel wheel (402); the center of the epicyclic gear (403) rotating at an epicyclic gear shaft (401); and one end of the epicyclic gear shaft (401) fixed at the shell of the transmission gear train (500);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the one-way transmission (301) installed between the outer bevel wheel (404) and the output shaft (3000);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the one-way transmission (305) for driving the inner bevel wheel (402) and for further driving the epicyclic gear (403) and the outer bevel wheel (404), and through the outer bevel wheel (404) and the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

Fig. 3 is a structural schematic view showing the 3rd embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

As shown in Fig. 3, the coaxial epicyclic gear train with bidirectional input and one-way output is constituted by the epicyclic gear train with the input shaft and the output shaft coaxially installed in series, the main

components including:

-- one end of the input shaft (2000) through installed at an epicyclic gear support arm annular shelf (400) via bearing structure, the epicyclic gear support arm annular shelf (400) integrated with one side of the shell of the transmission gear train (500) via the one-way transmission (303), and another end of the input shaft (2000) and the output shaft (3000) coaxially installed in series via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), one end of the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400), and rotating between the input shaft (2000) and the one-way transmission (303);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in

which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

Fig. 4 is a structural schematic view showing the 4th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

As shown in Fig. 4, the coaxial epicyclic gear train with bidirectional input and one-way output is constituted by the epicyclic gear train with the input shaft and the output shaft coaxially installed in series, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) and the output shaft (3000) coaxially installed in series via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), one end of the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400), and the epicyclic gear support arm annular shelf (400) rotating at the input shaft (2000) between the shell of the transmission gear train (500) and the inner bevel wheel (402) via the one-way transmission (303);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving

gear train.

Fig. 5 is a structural schematic view showing the 5th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

As shown in Fig. 5, the coaxial epicyclic gear train with bidirectional input and one-way output is constituted by the epicyclic gear train with the input shaft and the output shaft coaxially installed in series, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) and the output shaft (3000) coaxially installed in series via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400) installed between the inner bevel wheel (402) and the one-way transmission (302), and the one-way transmission (303) installed between the epicyclic gear support arm annular shelf (400) and the input shaft (2000);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

Fig. 6 is a structural schematic view showing the 6th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

As shown in Fig. 6, the coaxial epicyclic gear train with bidirectional input and one-way output is constituted by the epicyclic gear train with the input shaft and the output shaft coaxially installed in series, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another

end of the input shaft (2000) and the output shaft (3000) coaxially installed in series via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400) installed at the output shaft (3000), and the one-way transmission (303) installed between the epicyclic gear support arm annular shelf (400) and the output shaft (3000);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving

the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

Fig. 7 is a structural schematic view showing the 7th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

As shown in Fig. 7, the coaxial epicyclic gear train with bidirectional input and one-way output is constituted by the epicyclic gear train with the input shaft and the output shaft coaxially installed in series, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) and the output shaft (3000) coaxially installed in series via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft

(401) integrated with the epicyclic gear support arm annular shelf (400), and the one-way transmission (303) installed between the epicyclic gear support arm annular shelf (400) and the outer bevel wheel (404);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

Fig. 8 is a structural schematic view showing the 8th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

As shown in Fig. 8, the coaxial epicyclic gear train with bidirectional

input and one-way output is constituted by the epicyclic gear train with the input shaft and the output shaft coaxial fitting, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) through the output shaft (3000) via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), one end of the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400), the epicyclic gear support arm annular shelf (400) fixed at the shell of the transmission gear train (500);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the one-way transmission (301) installed between the outer bevel wheel (404) and the output shaft (3000);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration,

or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (301) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402) for further driving the epicyclic gear (403) and the outer bevel wheel (404), and through the outer bevel wheel (404) and the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

Fig. 9 is a structural schematic view showing the 9th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

As shown in Fig. 9, the coaxial epicyclic gear train with bidirectional input and one-way output is constituted by the epicyclic gear train with the input shaft and the output shaft coaxial fitting, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) through the output shaft (3000) via the one-way transmission (302), the epicyclic gear support arm annular shelf (400) and the one-way transmission (301), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the one-way transmission (305) installed between the input shaft

(2000) and the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft (401) installed at the epicyclic gear support arm annular shelf (400), and the epicyclic gear support arm annular shelf (400) coaxially installed between the one-way transmission (301) and the one-way transmission (302);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the one-way transmission (301) installed between the outer bevel wheel (404) and the epicyclic gear support arm annular shelf (400);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) and the one-way transmission (301) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the one-way transmission (305) for driving the epicyclic gear (403) and the outer bevel wheel (404), and for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

Fig. 10 is a structural schematic view showing the 10th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way

output constituted by the epicyclic gear train, according to the present invention.

As shown in Fig. 10, the coaxial epicyclic gear train with bidirectional input and one-way output is constituted by the epicyclic gear train with the input shaft and the output shaft coaxial fitting, the main components including:

-- one end of the input shaft (2000) through installed at the epicyclic gear support arm annular shelf (400) via bearing structure, the epicyclic gear support arm annular shelf (400) integrated with one side of the shell of the transmission gear train (500) via the one-way transmission (303), another end of the input shaft (2000) through the output shaft (3000) via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400), and the epicyclic gear support arm annular shelf (400) rotating between the input shaft (2000) and the one-way transmission (303);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

Fig. 11 is a structural schematic view showing the 11th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

As shown in Fig. 11, the coaxial epicyclic gear train with bidirectional input and one-way output is constituted by the epicyclic gear train with the input shaft and the output shaft coaxial fitting, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) through the output shaft (3000) via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed

for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400) near the shell of the transmission gear train (500), and the one-way transmission (303) installed between the epicyclic gear support arm annular shelf (400) and the input shaft (2000);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through

the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

Fig. 12 is a structural schematic view showing the 12th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

As shown in Fig. 12, the coaxial epicyclic gear train with bidirectional input and one-way output is constituted by the epicyclic gear train with the input shaft and the output shaft coaxial fitting, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) through the output shaft (3000) via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400) installed between the inner bevel wheel (402) and the one-way transmission (302), and the one-way transmission (303) installed between the epicyclic gear support arm annular shelf (400) and the input shaft (2000);

-- the shell of the transmission gear train (500) fixed at the machine

body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

Fig. 13 is a structural schematic view showing the 13th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

As shown in Fig. 13, the coaxial epicyclic gear train with bidirectional input and one-way output is constituted by the epicyclic gear train with the input shaft and the output shaft coaxial fitting, the main components including:

-- one end of the input shaft (2000) through installed at one side of

the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) through the output shaft (3000) via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400) installed at the output shaft (3000), and the one-way transmission (303) installed between the epicyclic gear support arm annular shelf (400) and the output shaft (3000);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving

the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

Fig. 14 is a structural schematic view showing the 14th embodiment of the coaxial epicyclic gear train with bidirectional input and one-way output constituted by the epicyclic gear train, according to the present invention.

As shown in Fig. 14, the coaxial epicyclic gear train with bidirectional input and one-way output is constituted by the epicyclic gear train with the input shaft and the output shaft coaxial fitting, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) through the output shaft (3000) via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400),

and the one-way transmission (303) installed between the epicyclic gear support arm annular shelf (400) and the outer bevel wheel (404);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

CLAIMS

1. A coaxial epicyclic gear train with bidirectional input and one-way output, wherein the external transmission structure of the epicyclic gear train integrates with the one-way transmission to implement the transmission operation with bidirectional input and one-way output for the epicyclic gear train; for the coaxial epicyclic gear train with bidirectional input and one-way output, if the input shaft is driven at the first rotary direction and at the second rotary direction, respectively, there are different transmission ratios occurring at the one-way output shaft, while there is same transmission ratio between the bidirectional input shaft and the one-way output shaft;

for the coaxial epicyclic gear train with bidirectional input and one-way output, the structural types include the input shaft and the output shaft coaxially installed in series, or the both coaxial fitting;

the main features are as following:

-- transmission component: related to the epicyclic gear train constituted by gears and/or friction wheels;

-- the forward and reverse rotary power source deriving from one or more of the following power source, including human power, machine power, electric motors, hydraulic motors or pneumatic motors; including:

1) the forward and reversely driven by human power; or

2) the forward and reversely driven by machine power; or

3) the forward and reversely driven by hydraulic or pneumatic motors; or

4) the forward and reversely driven by electric motors; or

5) driven at different directions by the rotary power sources from 1)～4);

the operational features of the coaxial epicyclic gear train with bidirectional input and one-way output are as following:

-- the first rotary direction and the second rotary direction are reverse;

-- if the input terminal is driven by the first rotary direction, the first rotary direction output is produced through the first driving gear train driving the output terminal;

-- if the input terminal is driven by the second rotary direction, the first rotary direction output is produced through the second driving gear train driving the output terminal;

-- an one-way transmission is installed between the first driving gear train and the second driving gear train to avoid the interference from the second driving gear train when the first driving gear train is used to be the first rotary direction input and produces the first rotary direction output; and

-- an one-way transmission is installed between the second driving gear train and the first driving gear train to avoid the interference from the first driving gear train when the second driving gear train is used to be the second rotary direction input and produces the first rotary direction output.

2. The coaxial epicyclic gear train with bidirectional input and one-way output as claimed in Claim 1, wherein the system is constituted by the epicyclic gear train with the input shaft and the output shaft coaxially installed in series, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) and the output shaft (3000) coaxially installed in series via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional

input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- an epicyclic gear (403) installed between an outer bevel wheel (404) and an inner bevel wheel (402); the center of the epicyclic gear (403) rotating at an epicyclic gear shaft (401); and one end of the epicyclic gear shaft (401) fixed at the shell of the transmission gear train (500);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the one-way transmission (301) installed between the outer bevel wheel (404) and the output shaft (3000);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402) for further driving the epicyclic gear (403) and the outer bevel wheel (404), and through the outer bevel wheel (404) and the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second

driving gear train.

3. The coaxial epicyclic gear train with bidirectional input and one-way output as claimed in Claim 1, wherein the system is constituted by the epicyclic gear train with the input shaft and the output shaft coaxially installed in series, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) and the output shaft (3000) coaxially installed in series via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) through the inner bevel wheel (402), and the one-way transmission (305) installed between the above both;

-- an epicyclic gear (403) installed between an outer bevel wheel (404) and an inner bevel wheel (402); the center of the epicyclic gear (403) rotating at an epicyclic gear shaft (401); and one end of the epicyclic gear shaft (401) fixed at the shell of the transmission gear train (500);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the one-way transmission (301) installed between the outer bevel wheel (404) and the output shaft (3000);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration,

deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the one-way transmission (305) for driving the inner bevel wheel (402) and for further driving the epicyclic gear (403) and the outer bevel wheel (404), and through the outer bevel wheel (404) and the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

4. The coaxial epicyclic gear train with bidirectional input and one-way output as claimed in Claim 1, wherein the system is constituted by the epicyclic gear train with the input shaft and the output shaft coaxially installed in series, the main components including:

-- one end of the input shaft (2000) through installed at an epicyclic gear support arm annular shelf (400) via bearing structure, the epicyclic gear support arm annular shelf (400) integrated with one side of the shell of the transmission gear train (500) via the one-way transmission (303), and another end of the input shaft (2000) and the output shaft (3000) coaxially installed in series via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed

for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), one end of the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400), and rotating between the input shaft (2000) and the one-way transmission (303);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output

shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

5. The coaxial epicyclic gear train with bidirectional input and one-way output as claimed in Claim 1, wherein the system is constituted by the epicyclic gear train with the input shaft and the output shaft coaxially installed in series, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) and the output shaft (3000) coaxially installed in series via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), one end of the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400), and the epicyclic gear support arm annular shelf (400) rotating at the input shaft (2000) between the shell of the transmission gear train (500) and the inner bevel wheel (402) via the one-way transmission (303);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer

bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

6. The coaxial epicyclic gear train with bidirectional input and one-way output as claimed in Claim 1, wherein the system is constituted by the epicyclic gear train with the input shaft and the output shaft coaxially installed in series, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) and the output shaft (3000) coaxially installed in series via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400) installed between the inner bevel wheel (402) and the one-way transmission (302), and the one-way transmission (303) installed between the epicyclic gear support arm annular shelf (400) and the input shaft (2000);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output

shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

7. The coaxial epicyclic gear train with bidirectional input and one-way output as claimed in Claim 1, wherein the system is constituted by the epicyclic gear train with the input shaft and the output shaft coaxially installed in series, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) and the output shaft (3000) coaxially installed in series via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400) installed at the output shaft (3000), and the one-way transmission (303) installed between the epicyclic gear support arm annular shelf (400) and the output shaft (3000);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

8. The coaxial epicyclic gear train with bidirectional input and one-way output as claimed in Claim 1, wherein the system is constituted by the epicyclic gear train with the input shaft and the output shaft coaxially installed in series, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) and the output shaft (3000) coaxially installed in series via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400), and the one-way transmission (303) installed between the epicyclic gear support arm annular shelf (400) and the outer bevel wheel (404);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

9. The coaxial epicyclic gear train with bidirectional input and one-way output as claimed in Claim 1, wherein the system is constituted by the epicyclic gear train with the input shaft and the output shaft coaxial fitting, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) through the output shaft (3000) via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), one end of the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400), the epicyclic gear support arm annular shelf (400) fixed at the shell of the transmission gear train (500);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the one-way transmission (301) installed between the outer bevel wheel (404) and the output shaft (3000);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration,

deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (301) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402) for further driving the epicyclic gear (403) and the outer bevel wheel (404), and through the outer bevel wheel (404) and the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

10. The coaxial epicyclic gear train with bidirectional input and one-way output as claimed in Claim 1, wherein the system is constituted by the epicyclic gear train with the input shaft and the output shaft coaxial fitting, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) through the output shaft (3000) via the one-way transmission (302), the epicyclic gear support arm annular shelf (400) and the one-way transmission (301), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the one-way transmission (305) installed between the input shaft (2000) and the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft (401) installed at the epicyclic gear support arm annular shelf (400), and the epicyclic gear support arm annular shelf (400) coaxially installed between the one-way transmission (301) and the one-way transmission (302);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the one-way transmission (301) installed between the outer bevel wheel (404) and the epicyclic gear support arm annular shelf (400);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) and the one-way transmission (301) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the one-way transmission (305) for driving the epicyclic gear (403) and the outer bevel

wheel (404), and for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

11. The coaxial epicyclic gear train with bidirectional input and one-way output as claimed in Claim 1, wherein the system is constituted by the epicyclic gear train with the input shaft and the output shaft coaxial fitting, the main components including:

-- one end of the input shaft (2000) through installed at the epicyclic gear support arm annular shelf (400) via bearing structure, the epicyclic gear support arm annular shelf (400) integrated with one side of the shell of the transmission gear train (500) via the one-way transmission (303), another end of the input shaft (2000) through the output shaft (3000) via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400), and the epicyclic gear support arm annular shelf (400) rotating between the input shaft (2000) and the one-way transmission (303);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000)

via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

12. The coaxial epicyclic gear train with bidirectional input and one-way output as claimed in Claim 1, wherein the system is constituted by the epicyclic gear train with the input shaft and the output shaft coaxial fitting, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) through the output shaft (3000) via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed

for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400) near the shell of the transmission gear train (500), and the one-way transmission (303) installed between the epicyclic gear support arm annular shelf (400) and the input shaft (2000);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402),

the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

13. The coaxial epicyclic gear train with bidirectional input and one-way output as claimed in Claim 1, wherein the system is constituted by the epicyclic gear train with the input shaft and the output shaft coaxial fitting, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) through the output shaft (3000) via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400) installed between the inner bevel wheel (402) and the one-way transmission (302), and the one-way transmission (303) installed between the epicyclic gear support arm annular shelf (400) and the input shaft (2000);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000)

via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

14. The coaxial epicyclic gear train with bidirectional input and one-way output as claimed in Claim 1, wherein the system is constituted by the epicyclic gear train with the input shaft and the output shaft coaxial fitting, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) through the output shaft (3000) via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed

for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400) installed at the output shaft (3000), and the one-way transmission (303) installed between the epicyclic gear support arm annular shelf (400) and the output shaft (3000);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then

through the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

15. The coaxial epicyclic gear train with bidirectional input and one-way output as claimed in Claim 1, wherein the system is constituted by the epicyclic gear train with the input shaft and the output shaft coaxial fitting, the main components including:

-- one end of the input shaft (2000) through installed at one side of the shell of the transmission gear train (500) via bearing structure, another end of the input shaft (2000) through the output shaft (3000) via the one-way transmission (302), and a bearing installed between the output shaft (3000) and the shell of the transmission gear train (500);

-- shell of the transmission gear train (500): machine parts installed for constituting the coaxial epicyclic gear train with bidirectional input and one-way output;

-- machine body (600): relatively static organization structure;

-- the input shaft (2000) integrated with the inner bevel wheel (402);

-- the epicyclic gear (403) installed between the outer bevel wheel (404) and the inner bevel wheel (402); the center of the epicyclic gear (403) rotating at the epicyclic gear shaft (401), the epicyclic gear shaft (401) integrated with the epicyclic gear support arm annular shelf (400), and the one-way transmission (303) installed between the epicyclic gear support arm annular shelf (400) and the outer bevel wheel (404);

-- the shell of the transmission gear train (500) fixed at the machine body (600);

-- the outer bevel wheel (404) surrounding the output shaft (3000) via the one-way transmission (301);

-- the inner bevel wheel (402), the epicyclic gear (403), and the outer

bevel wheel (404) constituted by gears or friction wheels;

-- the epicyclic gear (403) driven by the inner bevel wheel (402), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- the outer bevel wheel (404) driven by the epicyclic gear (403), in which the status of the transmission ratio is for acceleration, deceleration, or constant velocity;

-- by way of the above structure, the input shaft (2000) driven at the first rotary direction, through the one-way transmission (302) for driving the output shaft (3000) to produce the first rotary direction output to constitute the first driving gear train;

-- by way of the above structure, the input shaft (2000) is driven at the second rotary direction, through the inner bevel wheel (402), the epicyclic gear (403), and the outer bevel wheel (404), and then through the one-way transmission (301), for driving the output shaft (3000) to produce the first rotary direction output to constitute the second driving gear train.

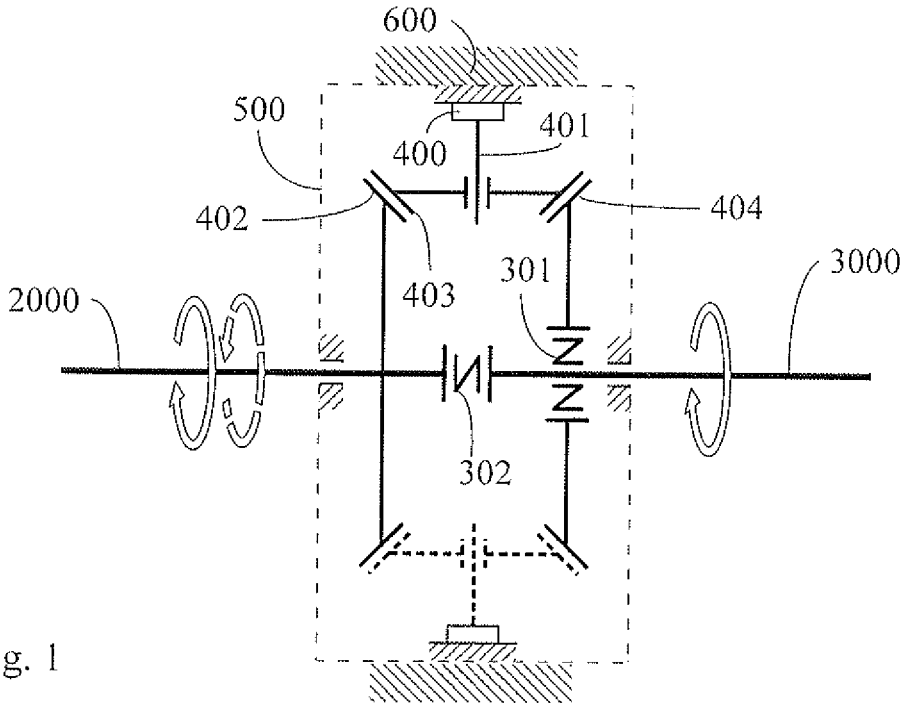
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Fig. 1

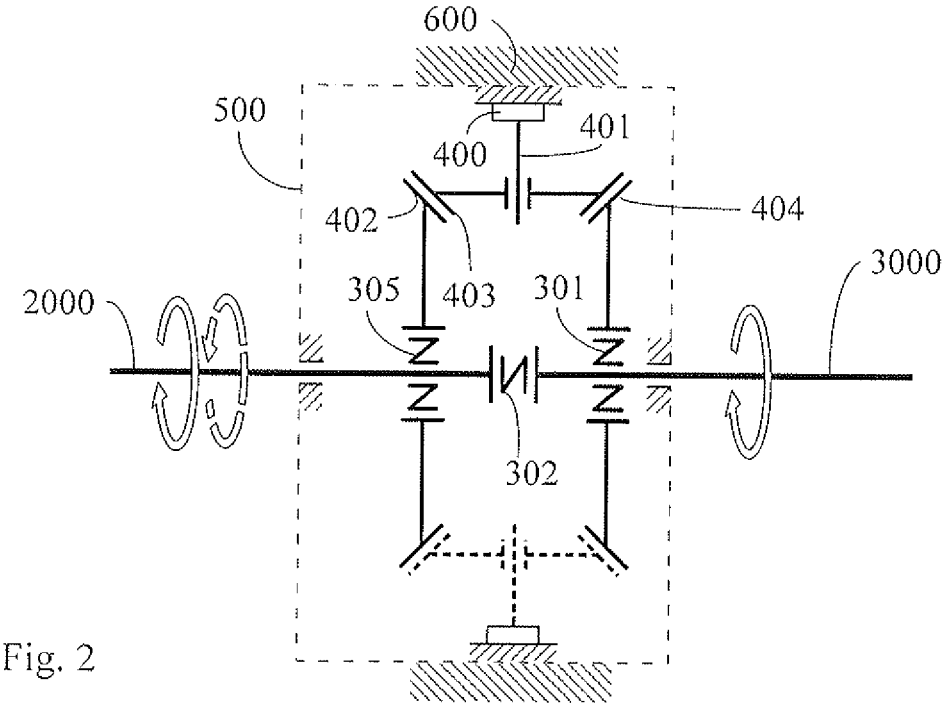
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Fig. 2

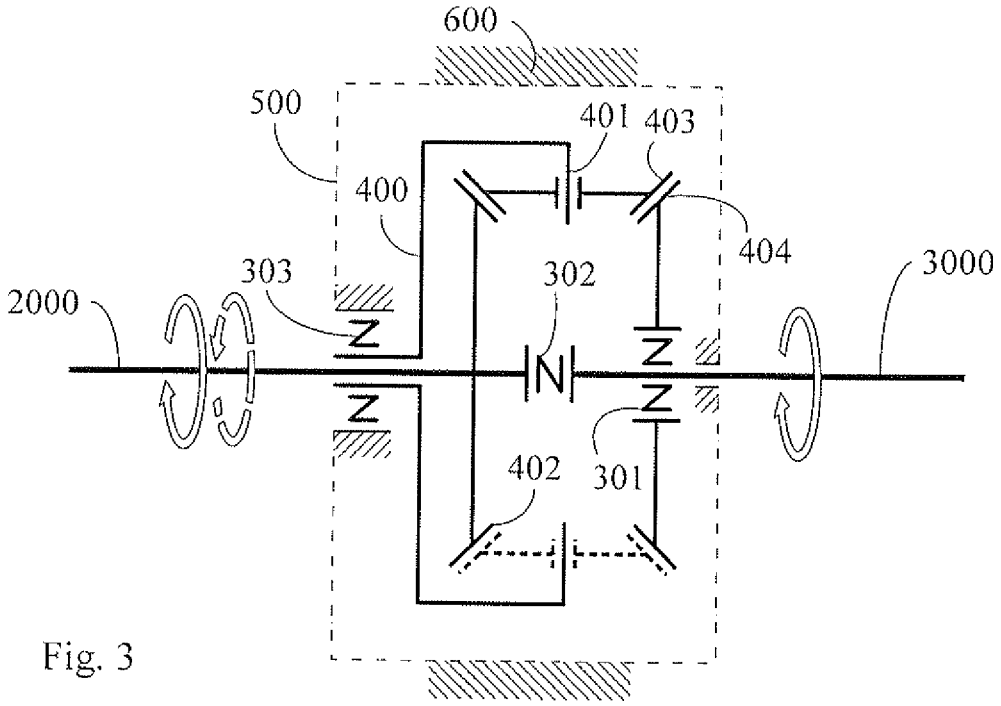
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Fig. 3

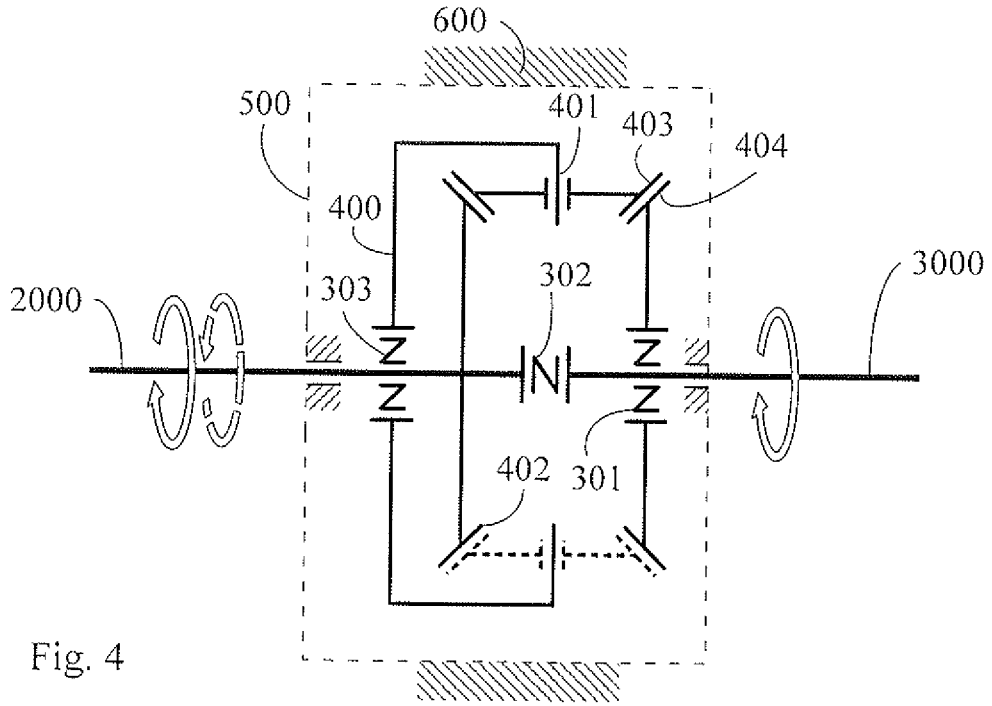
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Fig. 4

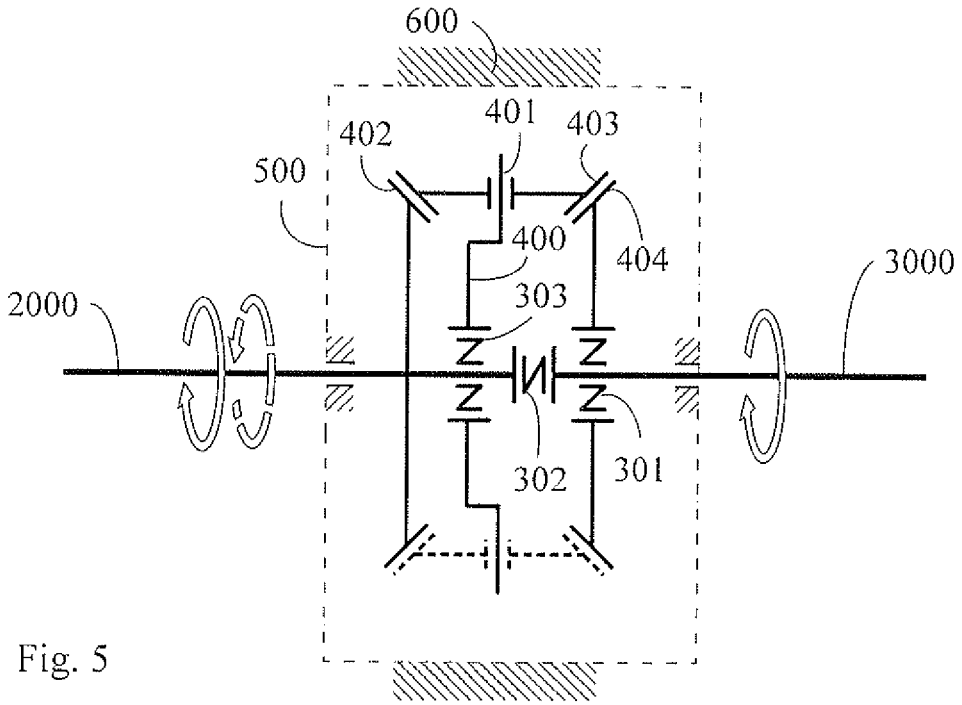
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Fig. 5

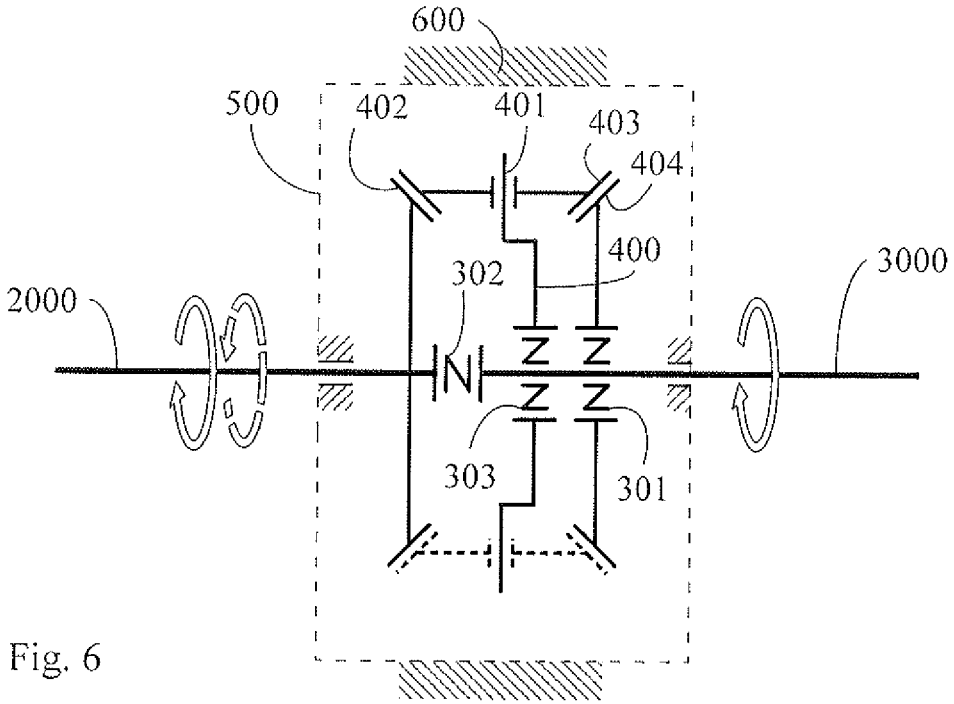
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Fig. 6

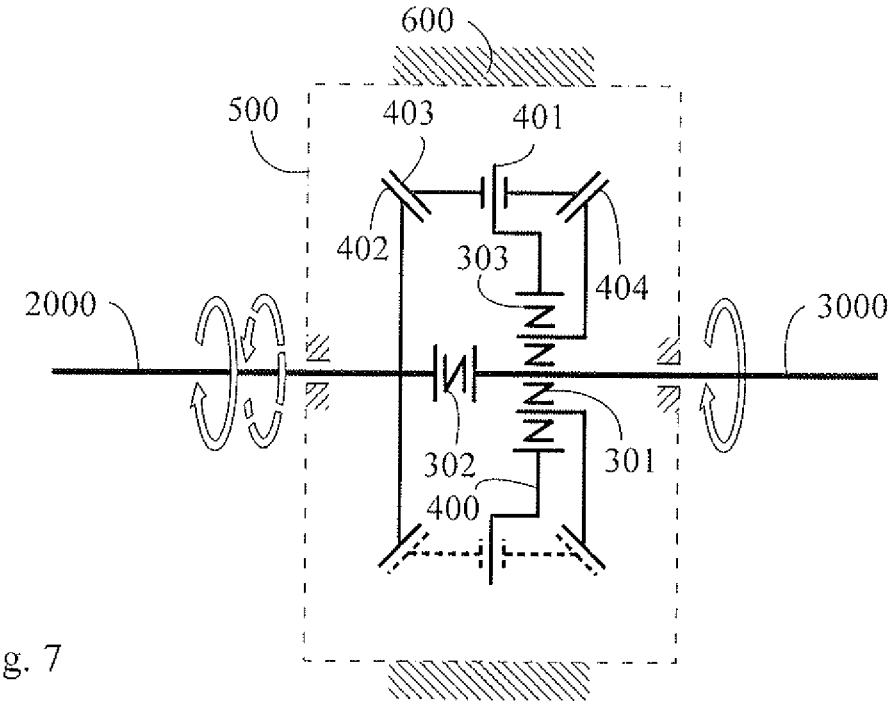
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Fig. 7

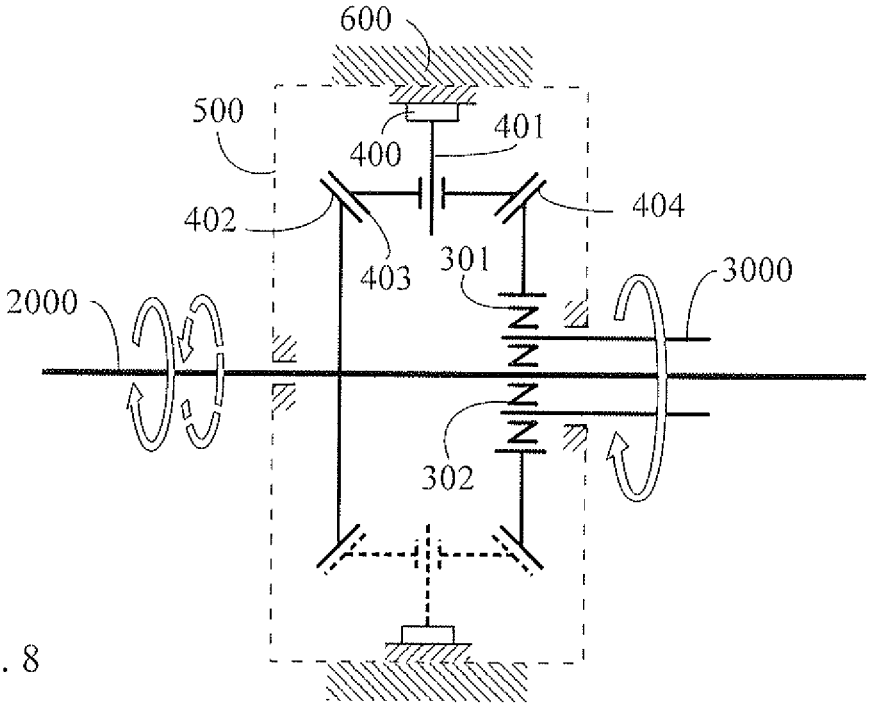
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Fig. 8

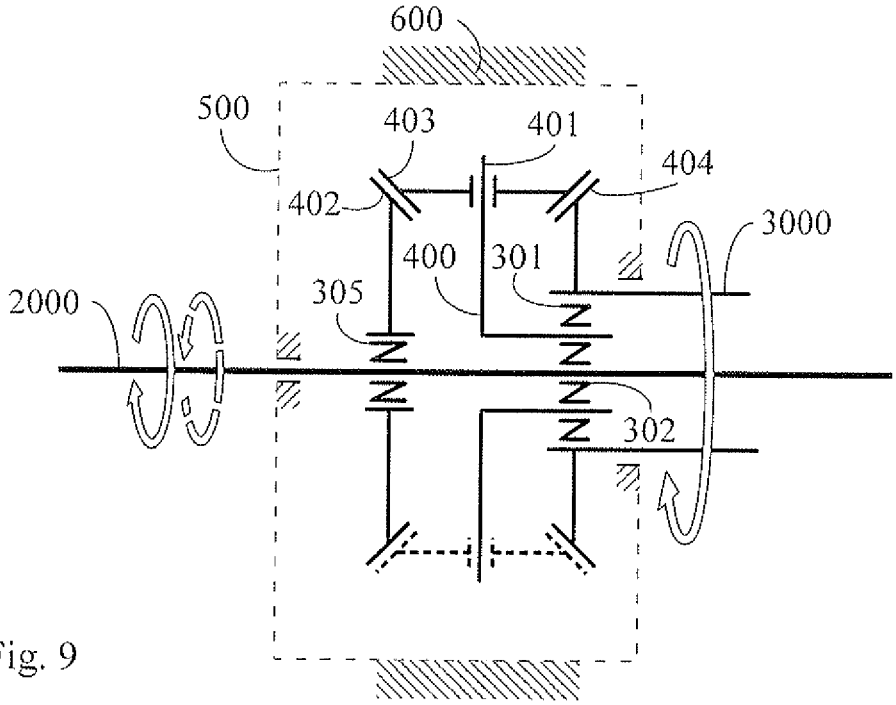
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Fig. 9

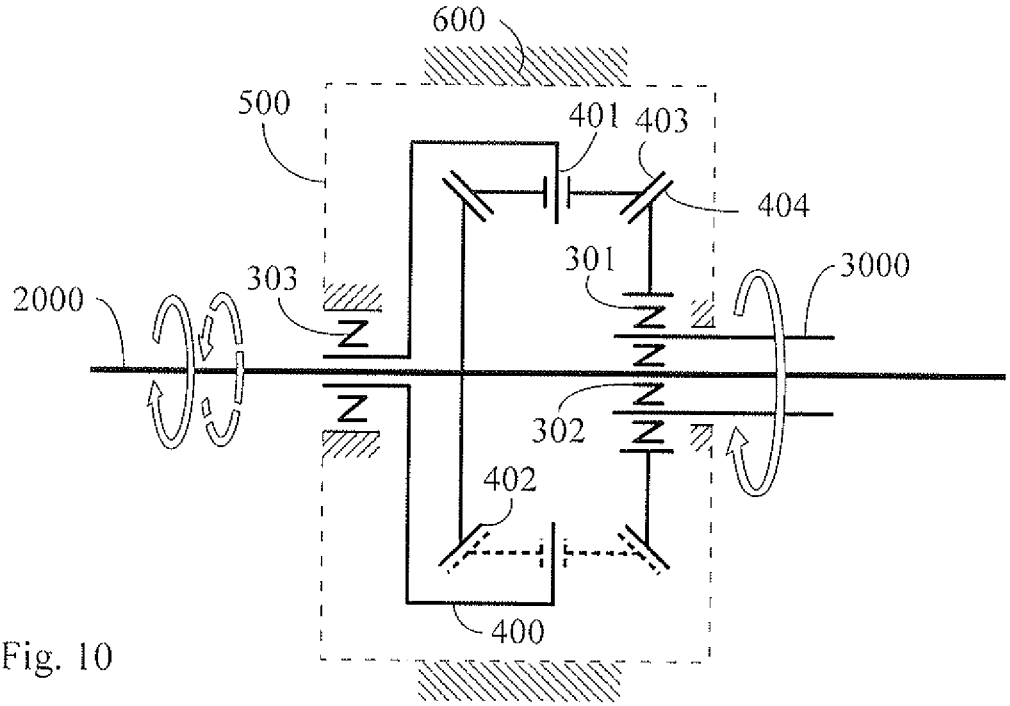
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Fig. 10

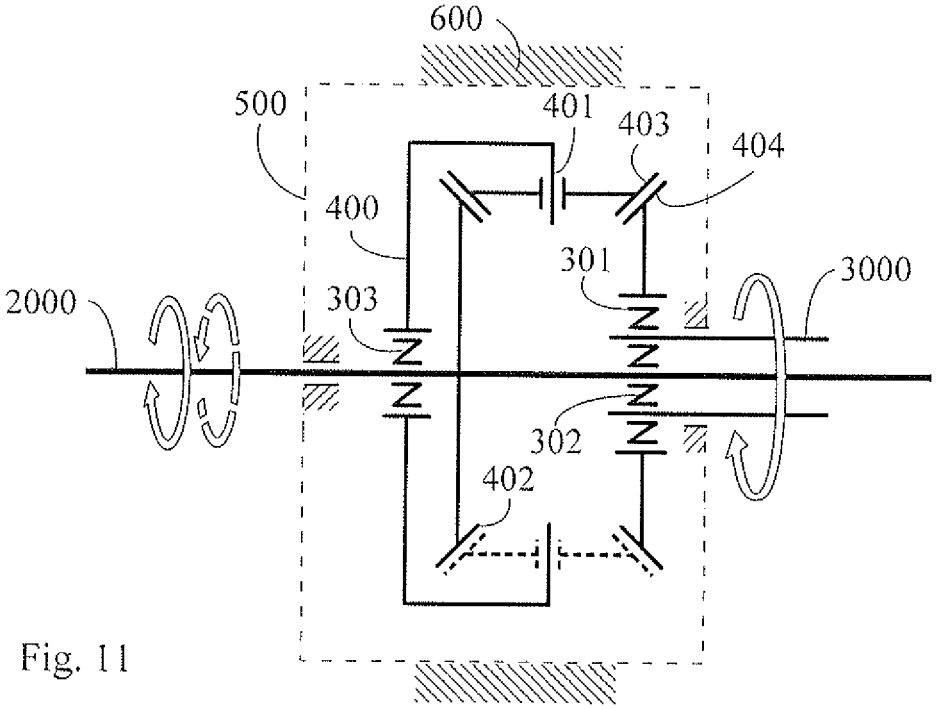
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Fig. 11

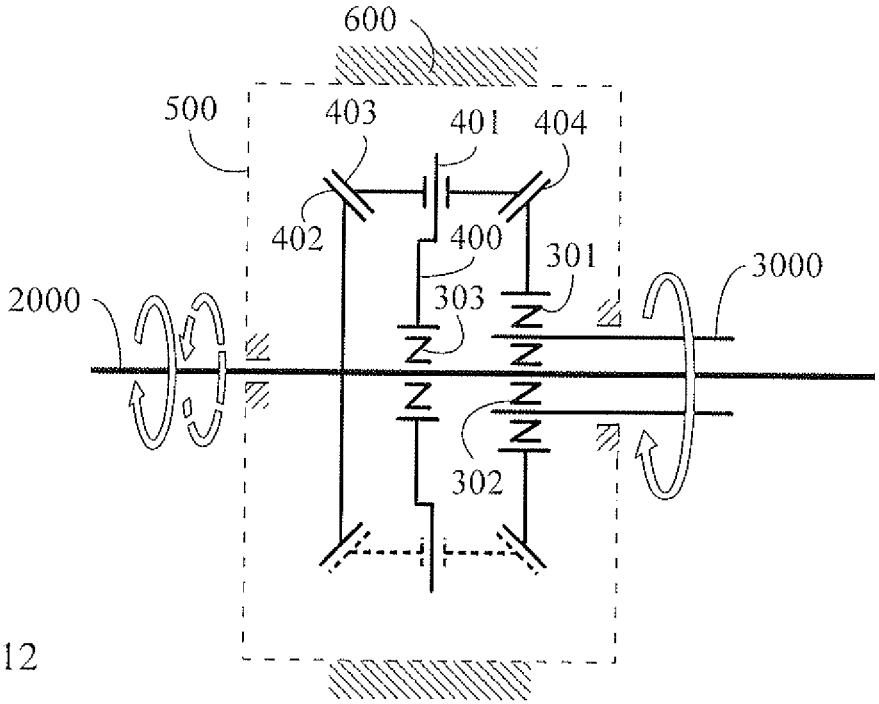
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Fig. 12

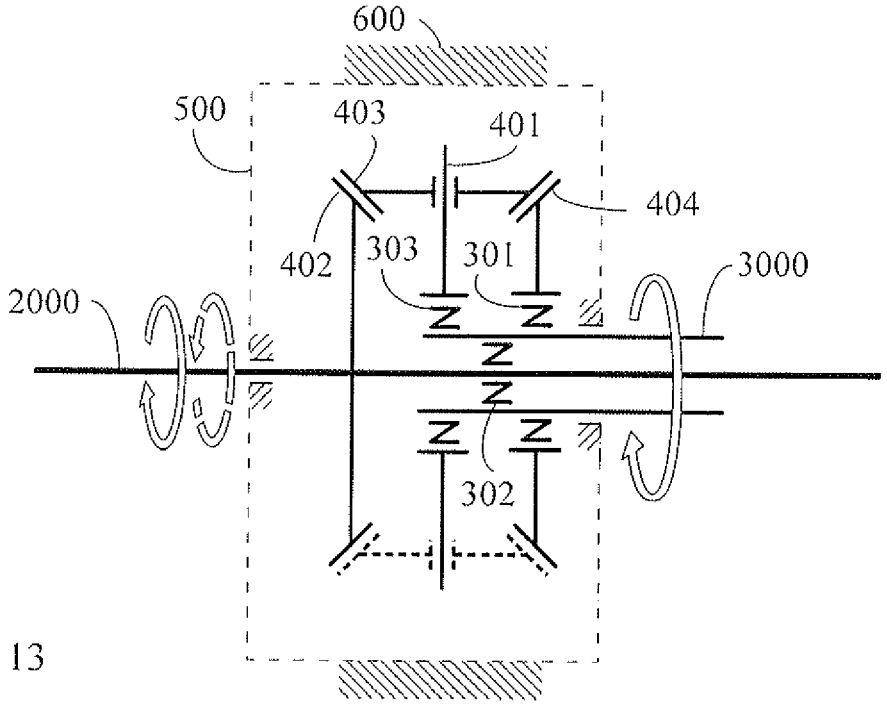
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Fig. 13

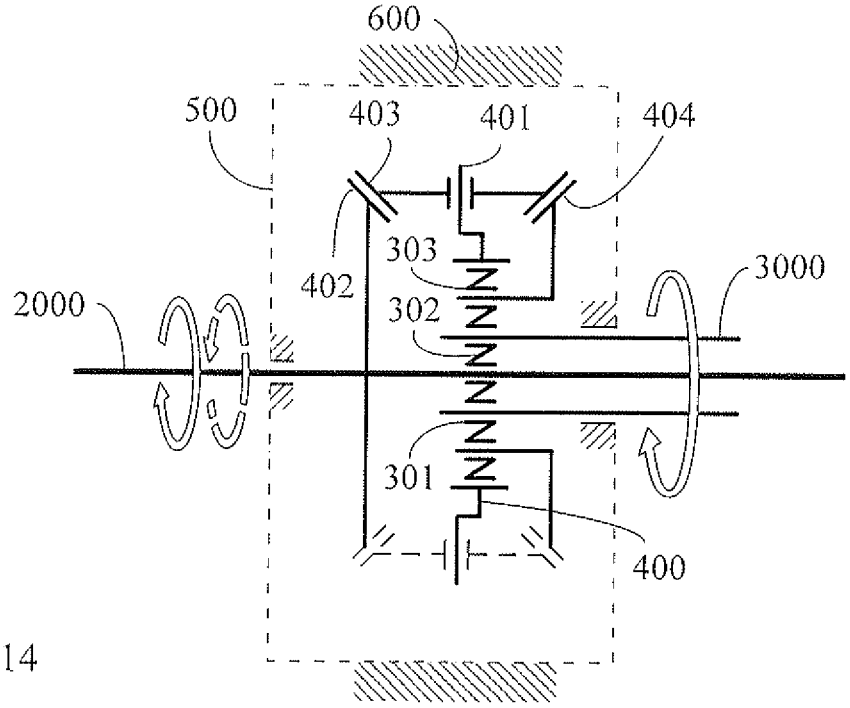
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Fig. 14