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(54) **Integrated engine brake**

Integrierte Motorbremse

Frein moteur intégré

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## Description

### CROSS-REFERENCE(S) TO RELATED APPLICATIONS

[0001] The present application claims priority to Korean Patent Application No. 10-2013-0121171, filed on October 11, 2013.

### BACKGROUND OF THE INVENTION

#### Field of the Invention

[0002] Exemplary embodiments of the present invention relate to an engine brake and, more particularly, to an integrated engine brake in which a structure associated with a valve mechanism such as an exhaust rocker arm or a cam shaft is formed, thereby decreasing a size along with weight to provide a more compact configuration.

#### Description of Related Art

[0003] In general, since large commercial vehicles cannot secure a sufficient braking force using only a foot brake which catches and restrains wheels, various auxiliary brakes are further mounted.

[0004] Such auxiliary brakes are based on a principle in which power transmitted to a crankshaft during intake-compression-expansion-exhaust strokes of combustion strokes of an engine is reduced to further secure the braking force.

[0005] The auxiliary brakes may include an engine brake, a Jake brake, and an exhaust brake by way of example.

[0006] Among them, the engine brake has a mode in which vacuum pressure resistance applied to a piston during an intake stroke, compression resistance during a compression stroke, compression resistance during an exhaust stroke, and a mechanical frictional force generated when the engine rotates are used as a braking force.

[0007] For example, in the mode, a driving force of a vehicle is generated during typical travelling in which the intake-compression-explosion-exhaust strokes are normally performed, but an exhaust valve is forcibly opened at a compression top dead center while an accelerator pedal is released, and thereby the vehicle is decelerated.

[0008] Such deceleration of the vehicle occurs because, while air compressed at the compression top dead center is discharged into the atmosphere, the compressed air does not push down the piston, to prevent generation of the driving force.

[0009] On the other hand, when the exhaust valve is not opened at the compression top dead center while the accelerator pedal is released, the piston consumes a predetermined amount of energy (driving force) while compressing the air that has entered a cylinder during the intake stroke during the compression stroke. However,

the air compressed in the cylinder is expanded to push down the piston again during the explosion stroke, and generates a predetermined amount of energy (driving force). Thereby, the deceleration hardly takes place. In this case, since the fuel is not ignited or burnt spontaneously in the cylinder, no explosion occurs.

[0010] Typically, the engine brakes are formed on an upper portion of the engine along with a valve mechanism, and circulate oil to operate an exhaust rocker arm when activated. Thus, the exhaust rocker arm presses the exhaust valve, and thereby an exhaust gas in a combustion chamber is forcibly discharged.

[0011] However, the engine brakes are not at all structurally associated with the valve mechanism such as the rocker arm or the cam shaft while controlling the operation of the rocker arm of the valve mechanism on the upper portion of the engine, are manufactured as a separate assembly, and are installed on the upper portion of the engine so that the manufactured separate assembly is connected to the valve mechanism.

[0012] For this reason, the engine brakes are increased in weight, particularly in size because all of a solenoid valve, a control valve, master and slave pistons, and an oil circulation path are incorporated into a housing. Thus, it is obvious that such engine brakes are disadvantageous to commercial vehicle engines in which exhaust regulation and improvement of fuel efficiency are required.

[0013] Furthermore, since two cylinders are controlled by one engine brake, a six-cylinder engine should be mounted with three engine brakes. For this reason, it is obvious that such engine brakes are further disadvantageous to the commercial vehicle engines which have high horsepower and high torque, which is decreased in size, and in which the exhaust regulation and the improvement of fuel efficiency are required. Document EP 2439381 A1 shows an engine braking apparatus having a cam, a rocker arm, a valve bridge and braking pistons. Document EP 2 677 127 A1, prior art under Art. 54(3) EPC, shows an engine brake having a braking actuation mechanism, braking pistons, a valve bridge and an oil passage. Further engine brake apparatuses are shown in documents US 2010/170471 A1, DE 10 2006 054312 A1, US 2005/211206 A1 and WO 2010/141633 A1.

[0014] The information disclosed in this Background of the Invention section is only for enhancement of understanding of the general background of the invention and should not be taken as an acknowledgement or any form of suggestion that this information forms the prior art already known to a person skilled in the art.

### BRIEF SUMMARY

[0015] Various aspects of the present invention are directed to providing an integrated engine brake in which an oil channel is formed using an exhaust rocker arm configured to activate an exhaust valve during an exhaust stroke, and thereby weight is reduced along with a size,

and can be easily applied to a commercial vehicle engine which has high horsepower and high torque, which is decreased in size, and in which the exhaust regulation and the improvement of fuel efficiency are required, due to a compact configuration resulting from the reduction in weight and size.

**[0016]** In order to accomplish the above object, the present invention provides an integrated engine brake according to claim 1. Further advantageous embodiments are set out in the dependent claims.

**[0017]** The oil outlet may be formed in an adjustor bolt, and the adjustor bolt may be coupled to the exhaust rocker arm and come into contact with the bridge.

**[0018]** The oil outlet may be formed in an internal space of the adjustor bolt in an axial direction, and the oil outlet may communicate with the oil flow path through a circumferential hole of the adjustor bolt.

**[0019]** The chamber may include a plug having a plug chamber oil inlet into which the oil discharged from the oil outlet flows, and which discharges the oil to the chamber.

**[0020]** The pair of first and second master pistons may be housed in the pair of first and second piston chambers in which the oil pressure is formed, and the pair of first and second piston chambers may be connected to a pair of first and second oil diffusion paths which extend toward both of left and right ends of the chamber.

**[0021]** The exhaust rocker arm may further include a bias spring, and the bias spring presses the exhaust rocker arm so that the adjustor bolt coupled to the exhaust rocker arm comes into contact with the bridge.

**[0022]** The protrusion may be located on a lower portion of the exhaust rocker arm, and protrude from an outer circumferential surface of a rotated exhaust cam.

**[0023]** The protrusion may come into contact with an exhaust rocker arm roller, and the exhaust rocker arm roller may be formed on the exhaust rocker arm.

**[0024]** The methods and apparatuses of the present invention have other features and advantages which will be apparent from or are set forth in more detail in the accompanying drawings, which are incorporated herein, and the following Detailed Description, which together serve to explain certain principles of the present invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0025]**

FIGS. 1A and 1B show a configuration of an integrated engine brake according to an exemplary embodiment of the present invention.

FIG. 2 shows a configuration in which an oil supply member of the integrated engine brake according to an exemplary embodiment of the present invention is monolithically formed with an exhaust rocker arm.

FIG. 3 shows a detailed configuration of a bridge associated with the oil supply member of FIG. 2.

FIG. 4 shows a state in which the integrated engine brake according to an exemplary embodiment of the present invention is activated by an oil flow and pressure until a piston reaches a compression top dead center.

FIGS. 5A to 5C show a state in which an exhaust valve of the integrated engine brake according to an exemplary embodiment of the present invention is forcibly opened, and then returned to an original state.

**[0026]** It should be understood that the appended drawings are not necessarily to scale, presenting a somewhat simplified representation of various features illustrative of the basic principles of the invention. The specific design features of the present invention as disclosed herein, including, for example, specific dimensions, orientations, locations, and shapes will be determined in part by the particular intended application and use environment.

**[0027]** In the figures, reference numbers refer to the same or equivalent parts of the present invention throughout the several figures of the drawing.

## DETAILED DESCRIPTION

**[0028]** Reference will now be made in detail to various embodiments of the present invention(s), examples of which are illustrated in the accompanying drawings and described below. While the invention(s) will be described in conjunction with exemplary embodiments, it will be understood that the present description is not intended to limit the invention(s) to those exemplary embodiments. On the contrary, the invention(s) is/are intended to cover not only the exemplary embodiments, but also various alternatives, modifications, equivalents and other embodiments, which may be included within the spirit and scope of the invention as defined by the appended claims.

**[0029]** FIGS. 1A and 1B show a configuration of an integrated engine brake according to an exemplary embodiment of the present invention.

**[0030]** As shown in FIGS. 1A and 1B, the engine brake includes an engine brake lever 10, an oil supply member 20, an adjustor bolt 50, a bridge 60, a bias spring 70, a reset bar 80, and a lifter 90.

**[0031]** The engine brake lever 10 is installed on a steering wheel 7 and generates an On/Off signal.

**[0032]** The oil supply member 20 forms a flow path in which engine oil flows through an exhaust rocker arm 3 when the engine brake lever 10 is switched on. The exhaust rocker arm 3 is a member of a valve mechanism 1 that is installed on an upper portion of the engine and opens/closes a pair of first and second exhaust valves

5-1 and 5-2 installed on each cylinder of the engine.

**[0033]** The adjustor bolt 50 is cooperated with movement of the exhaust rocker arm 3 and functions as a path through the engine oil supplied from the oil supply member 20 is discharged to the bridge 60.

**[0034]** The bridge 60 presses the pair of first and second exhaust valves 5-1 and 5-2 due to an action of the introduced engine oil, thereby forcibly discharging a combustion gas within the cylinder.

**[0035]** The bias spring 70 presses the exhaust rocker arm 3 so that the adjustor bolt 50 and the bridge 60 are brought into contact with each other.

**[0036]** The reset bar 80 is located on a lower portion of the bridge 60 so as to discharge the engine oil within the bridge 60 at a predetermined point in time.

**[0037]** The lifter 90 raises the exhaust rocker arm 3 at a compression top dead center. To this end, the lifter 90 includes an exhaust cam 91, an exhaust rocker arm roller 93, and a protrusion 90-1 installed between them, and the protrusion 90-1 protrudes from an outer circumferential surface of the exhaust cam 91 at a position of the compression top dead center.

**[0038]** FIG. 2 shows a detailed configuration of the oil supply member 20.

**[0039]** As shown in FIG. 2, the oil supply member 20 includes a valve 30 that opens an engine oil flow path 4a when the engine brake lever 10 is operated, and an internal oil flow path 40 that forms a path of the introduced engine oil.

**[0040]** The valve 30 blocks the engine oil flow path 4a of a rocker arm shaft 4 and then opens the engine oil flow path 4a when the engine brake lever 10 is operated. A solenoid type is applied to the valve 30.

**[0041]** The internal oil flow path 40 includes an oil inlet 41, an oil flow path 43, and an oil outlet 45.

**[0042]** The oil inlet 41 is formed in a shaft hole of the exhaust rocker arm 3 to which the rocker arm shaft 4 is coupled. The oil flow path 43 is formed inside the exhaust rocker arm 3 so that the oil flowing into the oil inlet 41 flows to an end portion of the exhaust rocker arm 3, and the oil outlet 45 is formed in the adjustor bolt 50 so that the oil is discharged through the adjustor bolt 50.

**[0043]** The oil flow path 43 has an end connected to a joint of the adjustor bolt 50.

**[0044]** The oil outlet 45 is formed in an internal space of a bolt shank 51 of the adjustor bolt 50 in an axial direction, and has an inlet communicating with the oil flow path 43 through a circumferential hole of the bolt shank 51 and an outlet connected to the bridge 60.

**[0045]** FIG. 3 shows a detailed configuration of the bridge 60.

**[0046]** As shown in FIG. 3, the bridge 60 includes a bridge body 61 in which a chamber is formed by an inner hollow space, a plug 62 that has a plug chamber oil inlet 62-1 into which the oil of the oil supply member 20 flows and a plug chamber 61-1 of the bridge body 61, a pair of first and second master pistons 67-1 and 67-2 which are located at both left and right sides of the bridge body 61

and to which a pressure of the oil flowing from the plug chamber oil inlet 62-1 into the chamber is applied, and a reset pin 69 that is installed on a lower portion of the bridge body 61 so that the oil of the chamber is discharged to the outside.

**[0047]** The chamber of the bridge body 61 includes the plug chamber 61-1 into which the plug 62 is inserted, a pair of first and second oil diffusion paths 63-1 and 63-2 that extend toward the pair of first and second master pistons 67-1 and 67-2 at left and right sides of the plug chamber 61-1, and a pair of first and second piston chambers 65-1 and 65-2 that are formed in ends of the pair of first and second oil diffusion paths 63-1 and 63-2 so that the pair of first and second master pistons 67-1 and 67-2 are housed therein.

**[0048]** The plug chamber oil inlet 62-1 of the plug 62 communicates with the plug chamber 61-1.

**[0049]** In the pair of first and second master pistons 67-1 and 67-2, the first master piston 67-1 presses the first exhaust valve 5-1, and the second master piston 67-2 presses the second exhaust valve 5-2.

**[0050]** In particular, the first master piston 67-1 and the first exhaust valve 5-1 are formed at a predetermined interval without being in contact with each other, and the second master piston 67-2 and the second exhaust valve 5-2 are formed at a predetermined interval without being in contact with each other. These intervals are the same interval D.

**[0051]** Therefore, the pair of first and second master pistons 67-1 and 67-2 are pushed to the interval D or more by the oil pressure. Thereby, the pair of first and second master pistons 67-1 and 67-2 press the pair of the first and second exhaust valves 5-1 and 5-2, and forcibly be opens the pushed first and second exhaust valves 5-1 and 5-2.

**[0052]** The reset pin 69 is configured so that one part thereof is housed in the plug chamber 61-1 of the bridge body 61 and the other part thereof is exposed to the outside of the bridge body 61 and is in contact with the reset bar 80. As such, the reset pin 69 moves to discharge the oil in the inside of the bridge 60 to the outside thereof due to an action of the reset bar 80 at a predetermined point in time.

**[0053]** FIG. 4 shows a state in which the integrated engine brake according to an exemplary embodiment of the present invention is activated by an oil flow and pressure until the piston reaches a compression top dead center.

**[0054]** As shown in FIG. 4, when the engine brake lever 10 installed on the steering wheel 7 is switched on, the engine oil flow path 4a of the rocker arm shaft 4 is opened by activation of the valve 30 based on an engine control unit (ECU) 9, and the internal oil flow path 40 of the exhaust rocker arm 3 is supplied with the oil.

**[0055]** In other words, the oil inlet 41 causes the engine oil to flow into the oil flow path 43, and the oil flowing into the oil flow path 43 flows to the adjustor bolt 50 located on an end of the oil flow path 43 due to the oil pressure.

**[0056]** Then, the oil flowing through the oil flow path 43 flows into the oil outlet 45 formed in the bolt shank 51 of the adjustor bolt 50, and the oil flowing into the oil outlet 45 flows along the oil outlet 45. Thereby, the oil flowing through the oil outlet 45 flows into the plug chamber oil inlet 62-1 of the plug 62.

**[0057]** Subsequently, the oil flowing into the plug chamber oil inlet 62-1 is discharged to the plug chamber 61-1. Thereby, the oil pressure is formed in the plug chamber 61-1, and the oil of the plug chamber 61-1 is discharged to the pair of first and second oil diffusion paths 63-1 and 63-2 which are connected to both of the left and right sides of the plug chamber 61-1.

**[0058]** The oil discharged to the pair of first and second oil diffusion paths 63-1 and 63-2 flows into the pair of first and second piston chambers 65-1 and 65-2 formed on the ends of the respective oil diffusion paths 63-1 and 63-2. Thereby, the oil pressure is formed in the pair of first and second piston chambers 65-1 and 65-2, and the pair of first and second master pistons 67-1 and 67-2 housed in the pair of first and second piston chambers 65-1 and 65-2 move downward by the oil pressure.

**[0059]** Due to such downward movement of the pair of first and second master pistons 67-1 and 67-2, the interval D formed between the pair of first and second master pistons 67-1 and 67-2 and the pair of first and second exhaust valves 5-1 and 5-2 is decreased. As a result, the first master piston 67-1 comes into contact with the first exhaust valve 5-1, and the second master piston 67-2 comes into contact with the second exhaust valve 5-2. A state in which the interval D is equal to 0 (zero) is denoted by an interval D-1.

**[0060]** Such an operation is realized until the piston reaches the compression top dead center.

**[0061]** FIG. 5A shows a state in which the pair of first and second exhaust valves 5-1 and 5-2 are forcibly opened.

**[0062]** As shown in FIG. 5A, when the protrusion 90-1 comes into contact with the exhaust rocker arm roller 93 at the compression top dead center while the exhaust cam 91 rotates, the exhaust rocker arm 3 is lifted by the protrusion 90-1.

**[0063]** Then, due to the seesaw mechanism, the rocker arm shaft 4 associated with the bridge 60 is lowered using the rocker arm shaft as an axis, and thereby the bridge 60 is pushed.

**[0064]** Subsequently, the forcible pushing of the bridge 60 acts on the pair of first and second master pistons 67-1 and 67-2 which continue to be in contact with the pair of first and second exhaust valves 5-1 and 5-2 (at the interval D-1), and thereby the pair of first and second master pistons 67-1 and 67-2 are pressed downward.

**[0065]** As a result, the first exhaust valve 5-1 and the second exhaust valve 5-2 are pushed, and thereby the combustion chamber is switched to a forced open state.

**[0066]** Thus, in the engine, the compressed air is discharged to the atmosphere at the compression top dead center, and thus does not push down the piston. Thereby,

the engine brake realizes the operation of preventing the driving force from being generated.

**[0067]** FIG. 5B shows a state in which the exhaust cam 91 further rotates after the compression top dead center, and thereby the exhaust rocker arm 3 lifted by the protrusion 90-1 is returned to an original state again, and in which the interval between the pair of first and second master pistons 67-1 and 67-2 and the pair of the first and second exhaust valves 5-1 and 5-2 is returned from the interval D-1 to the interval D ( $D \neq 0$ ) again.

**[0068]** As shown in FIG. 5C, the reset bar 80 applies a force F to a lower portion of the reset pin 69, and thus the reset pin 69 is pushed into the internal chamber of the bridge 60. Thereby, the oil filled in the internal chamber of the bridge 60 is discharged to the outside. As such, the return state of the interval D ( $D \neq 0$ ) is realized.

**[0069]** As described above, the integrated engine brake according to the exemplary embodiment of the present invention includes the internal oil flow path 40 through which the oil flowing toward the exhaust rocker arm 3 is supplied to the bridge 60 to form the oil pressure so that the bridge 60 is lowered due to the oil pressure and comes into contact with the pair of first and second exhaust valves 5-1 and 5-2 installed in the combustion chamber. Thereby, the integrated engine brake is reduced in size and weight, and can be easily applied to the commercial vehicle engine which has high horsepower and high torque, which is decreased in size and in which the exhaust regulation and the improvement of fuel efficiency are required, due to a compact configuration resulting from the reduction in weight and size.

**[0070]** As described above, according to the engine brake of the present invention, the engine brake has the oil flow path in the valve mechanism that controls a combustion stroke cycle on the upper portion of the engine, and thereby an effect of decreasing size and weight is achieved.

**[0071]** In addition, according to the engine brake of the present invention, the oil flow path using the valve mechanism is applied to the cam shaft that controls a combustion stroke cycle or the exhaust rocker arm that activates the exhaust valve during the exhaust stroke, and thereby an effect of decreasing size and can be further achieved.

**[0072]** According to the engine brake of the present invention, the engine brake has a compact configuration resulting from the reduction in weight and size, and is suitable for the commercial vehicle engine for which the exhaust regulation and the improvement of fuel efficiency are required. The engine brake is easily applied to the commercial vehicle engine which has, in particular, high horsepower and high torque while its size is decreased according to requirements for the exhaust regulation and the improvement of fuel efficiency.

**[0073]** For convenience in explanation and accurate definition in the appended claims, the terms "upper", "lower", "inner" and "outer", are used to describe features of the exemplary embodiments with reference to the positions of such features as displayed in the figures.

**[0074]** The foregoing descriptions of specific exemplary embodiments of the present invention have been presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the invention to the precise forms disclosed, and obviously many modifications and variations are possible in light of the above teachings. The exemplary embodiments were chosen and described in order to explain certain principles of the invention and their practical application, to thereby enable others skilled in the art to make and utilize various exemplary embodiments of the present invention, as well as various alternatives and modifications thereof. It is intended that the scope of the invention be defined by the Claims appended hereto.

## Claims

### 1. An integrated engine brake assembly, comprising:

a valve (30) that forces oil circulating through an engine to flow to an exhaust rocker arm (3) when an engine brake lever (10) is operated;  
a bridge (60) that forms an interval with a pair of first (5-1) and second (5-2) exhaust valves installed on a combustion chamber;  
an internal oil flow path (40) which supplies the oil flowing toward the exhaust rocker arm to the bridge through an internal space of the exhaust rocker arm, and along which the oil is supplied to the bridge and brings the bridge into contact with the pair of first and second exhaust valves under pressure; and  
a protrusion (90-1) that lifts up the exhaust rocker arm at a compression top dead center so that the pair of first and second exhaust valves are pressed and opened forcibly by the bridge, and the bridge is pressed by seesaw movement of the exhaust rocker arm,  
wherein the internal oil flow path (40) includes:

an oil inlet (41) that is formed in a shaft hole of the exhaust rocker arm (3) and into which the oil that flows toward the exhaust rocker arm flows;  
an oil flow path (43) that is formed inside the exhaust rocker arm so that an oil flow of the oil inlet leads to an end portion of the exhaust rocker arm; and  
an oil outlet (45) that is connected to the oil flow path so that the oil flowing into the oil flow path is discharged to the bridge (60);  
and

wherein the bridge (60) includes:

a chamber that is filled with the oil discharged from the oil outlet (45) to form oil

pressure;

a pair of first (67-1) and second (67-2) master pistons that are housed in the chamber to be lowered due to the oil pressure of the chamber and come into contact with the pair of first (5-1) and second (5-2) exhaust valves;

a reset pin (69), a portion of which is exposed to an outside of the chamber **characterized in that** the reset pin (69) is in contact with a reset bar (80) so that the oil within the chamber is discharged to the outside, when the reset pin is activated, wherein the reset bar (80) is configured such that it applies a force to the lower portion of the reset pin (69) and thus the reset pin (69) is pushed into the chamber of the bridge to discharge the oil filled in the chamber.

2. The integrated engine brake assembly of claim 1, wherein the oil outlet (45) is formed in an adjustor bolt (50), and the adjustor bolt is coupled to the exhaust rocker arm (3) and comes into contact with the bridge (60).
3. The integrated engine brake assembly of claim 2, wherein the oil outlet (45) is formed in an internal space of the adjustor bolt (50) in an axial direction, and the oil outlet communicates with the oil flow path (40) through a circumferential hole of the adjustor bolt.
4. The integrated engine brake assembly of claim 1, wherein the chamber includes a plug (62) having a plug chamber oil inlet (62-1) into which the oil discharged from the oil outlet (45) flows, and which discharges the oil to the chamber.
5. The integrated engine brake assembly of claim 1, wherein the pair of first and second master pistons are housed in the pair of first and second piston chambers in which the oil pressure is formed, and wherein the pair of first and second piston chambers are connected to a pair of first and second oil diffusion paths which extend toward both of left and right ends of the chamber.
6. The integrated engine brake assembly of claim 1, wherein the exhaust rocker arm (3) further includes a bias spring (70), and the bias spring presses the exhaust rocker arm so that the adjustor bolt (50) coupled to the exhaust rocker arm comes into contact with the bridge (60).
7. The integrated engine brake assembly of claim 1, wherein the protrusion (90-1) protrudes from an outer circumferential surface of a rotated exhaust cam (91).

8. The integrated engine brake assembly of claim 7, wherein the protrusion (90-1) comes into contact with an exhaust rocker arm roller (93), and the exhaust rocker arm roller is formed on the exhaust rocker arm (3).

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## Patentansprüche

1. Integrierte Motorbremsvorrichtung aufweisend:

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ein Ventil (30), welches Öl, das in einem Motor zirkuliert, zwingt, zu einem Auslass-Kipphebelarm (3) zu fließen, wenn ein Motorbremshebel (10) betätigt wird,

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eine Brücke (60), die einen Zwischenraum bildet zwischen einem Paar von einem ersten Auslassventil (5-1) und einem zweiten Auslassventil (5-2), das an einer Verbrennungskammer installiert ist,

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einen internen Ölflusspfad (40), welcher das zu dem Auslass-Kipphebelarm fließende Öl durch einen Innenraum des Auslass-Kipphebelarms zu der Brücke leitet und entlang dessen das Öl zu der Brücke geleitet wird und die Brücke mit dem Paar von einem ersten Auslassventil und einem Zweiten Auslassventil unter Druck in Kontakt bringt, und

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einen Vorsprung (90-1), der den Auslass-Kipphebelarm an einem oberen Totpunkt eines Kompressionshubs anhebt, sodass das Paar von einem ersten Auslassventil und einem zweiten Auslassventil von der Brücke gedrückt und zwangsgeöffnet wird und die Brücke durch eine Wippbewegung des Auslass-Kipphebelarms gedrückt wird,

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wobei der interne Ölflusspfad (40) aufweist:

einen Öl-Einlass (41), der in einem Schaftloch des Auslass-Kipphebelarms (3) gebildet ist und in den das Öl fließt, welches zu dem Auslass-Kipphebelarm fließt,

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einen Ölflusspfad (43), der im Inneren des Auslass-Kipphebelarms gebildet ist, sodass ein Ölfluss des Öl-Einlasses zu einem Endabschnitt des Auslass-Kipphebelarms führt, und

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einen Öl-Auslass (45), der mit dem Ölflusspfad verbunden ist, sodass das in den Ölflusspfad fließende Öl zu der Brücke (60) abgegeben wird, und

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wobei die Brücke (60) aufweist:

eine Kammer, welche gefüllt ist mit dem aus dem Öl-Auslass (45) abgegebenen Öl, um Öldruck zu bilden, ein Paar von einem ersten Geberkolben

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(67-1) und einem zweiten Geberkolben (67-2), die in der Kammer untergebracht sind, um aufgrund des Öldrucks der Kammer abwärts bewegt zu werden und mit dem Paar von einem ersten Auslassventil (5-1) und einem zweiten Auslassventil (5-2) in Kontakt zu kommen,

einen Rückstellzapfen (69), von dem ein Abschnitt davon zu einer Außenseite der Kammer freiliegt, **dadurch gekennzeichnet, dass**

der Rückstellzapfen (69) mit einer Rückstellstange (80) in Kontakt ist, sodass das Öl innerhalb der Kammer nach außen abgegeben wird, wenn der Rückstellzapfen (69) aktiviert wird, wobei die Rückstellstange (80) so ausgebildet ist, dass sie auf den unteren Abschnitt des Rückstellzapfens (69) eine Kraft ausübt und somit der Rückstellzapfen (69) in die Kammer der Brücke gedrückt wird, um das in die Kammer gefüllte Öl abzugeben.

2. Integrierte Motorbremsvorrichtung gemäß Anspruch 1, wobei der Öl-Auslass (45) in einer Einstellschraube (50) gebildet ist, und wobei die Einstellschraube mit dem Auslass-Kipphebelarm (3) verbunden ist und mit der Brücke (60) in Kontakt kommt.

3. Integrierte Motorbremsvorrichtung gemäß Anspruch 2, wobei der Öl-Auslass (45) in einem Innenraum der Einstellschraube (50) in einer Axialrichtung gebildet ist, und wobei der Öl-Auslass durch ein Umfangsloch der Einstellschraube mit dem Ölflusspfad (40) kommuniziert.

4. Integrierte Motorbremsvorrichtung gemäß Anspruch 1, wobei die Kammer einen Stopfen (62) aufweist, der einen Stopfen-Kammer-Öl-Einlass (62-1) hat, in welchen das von dem Öl-Auslass (45) abgegebene Öl fließt, und welcher das Öl an die Kammer abgibt.

5. Integrierte Motorbremsvorrichtung gemäß Anspruch 1, wobei das Paar von einem ersten Geberkolben und einem zweiten Geberkolben aufgenommen ist in dem Paar von einer ersten Kolbenkammer und einer zweiten Kolbenkammer, in welchen der Öldruck gebildet wird, und wobei das Paar von einer ersten Kolbenkammer und einer zweiten Kolbenkammer mit einem Paar von einem ersten Öl-Diffusionspfad und einem zweiten Öl-Diffusionspfad verbunden ist, die sich zu einem rechten Ende und einem linken Ende der Kammer erstrecken.

6. Integrierte Motorbremsvorrichtung gemäß Anspruch 1, wobei der Auslass-Kipphebelarm (3) ferner eine Vorspannfeder (70) aufweist, und die Vorspannfeder den Auslass-Kipphebelarm drückt, sodass die mit

dem Auslass-Kipphebelarm verbundene Einstellschraube (50) mit der Brücke (60) in Kontakt kommt.

7. Integrierte Motorbremsvorrichtung gemäß Anspruch 1, wobei der Vorsprung (90-1) von einer Außenumfangsfläche eines rotierten Auslassnockens (91) vorsteht. 5
8. Integrierte Motorbremsvorrichtung gemäß Anspruch 7, wobei der Vorsprung (90-1) mit einer Auslass-Kipphebelarm-Rolle (93) in Kontakt kommt, und wobei die Auslass-Kipphebelarm-Rolle an dem Auslass-Kipphebelarm (3) gebildet ist. 10

## Revendications

1. Ensemble frein moteur intégré, comprenant : 15

une soupape (30) qui oblige l'huile à circuler à travers un moteur de façon à ce qu'elle circule vers un culbuteur d'échappement (3) quand un levier de frein moteur (10) est actionné ; 20

un pont (60) qui forme un intervalle avec une paire de première (5 - 1) et seconde (5 - 2) soupapes d'échappement installées sur une chambre de combustion ; 25

un chemin de circulation d'huile interne (40) qui fournit l'huile qui circule vers le culbuteur d'échappement, jusqu'au pont à travers un espace intérieur du culbuteur d'échappement, et le long duquel l'huile est fournie au pont et met le pont en contact avec la paire de première et seconde soupapes d'échappement sous pression ; et 30

une saillie (90 - 1) qui soulève le culbuteur d'échappement au niveau d'un point mort haut de compression de telle sorte que la paire de première et seconde soupapes d'échappement soient enfoncées et ouvertes de force par le pont, et le pont est enfoncé par un déplacement en bascule du culbuteur d'échappement ; 35

dans lequel le chemin de circulation d'huile interne (40) comprend : 40

une admission d'huile (41) qui est formée dans un trou d'arbre du culbuteur d'échappement (3) et dans lequel circule l'huile qui s'écoule vers le culbuteur d'échappement ; 45

un chemin de circulation d'huile (43) qui est formé à l'intérieur du culbuteur d'échappement de telle sorte qu'une circulation d'huile de l'admission d'huile mène à une partie extrémité du culbuteur d'échappement ; et 50

une sortie d'huile (45) qui est connectée au chemin de circulation d'huile de telle sorte que l'huile qui s'écoule dans le chemin de circulation d'huile, soit évacuée vers le pont 55

(60) ; et

dans lequel le pont (60) comporte :

une chambre remplie de l'huile qui est évacuée à partir de la sortie d'huile (45) de façon à établir une pression d'huile ;  
une paire de premier (67 - 1) et second (67 - 2) pistons maîtres qui sont logés dans la chambre et qui sont abaissés en raison de la pression d'huile qui règne dans la chambre, et qui viennent en contact avec la paire de première (5 - 1) et seconde (5 - 2) soupapes d'échappement ;  
une broche de réinitialisation (69), dont une partie est exposée à l'extérieur de la chambre ;

**caractérisé en ce que** la broche de réinitialisation (69) est en contact avec une barre de réinitialisation (80) de telle sorte que l'huile à l'intérieur de la chambre soit évacuée vers l'extérieur, lorsque la broche de réinitialisation est activée, dans lequel la barre de réinitialisation (80) est configurée de manière à appliquer une force vers la partie inférieure de la broche de réinitialisation (69), poussant ainsi la broche de réinitialisation (69) dans la chambre du pont de façon à évacuer l'huile qui remplit la chambre.

2. Ensemble frein moteur intégré selon la revendication 1, dans lequel la sortie d'huile (45) est formée dans un boulon de réglage (50), et le boulon de réglage est accouplé au culbuteur d'échappement (3) et entre en contact avec le pont (60). 45
3. Ensemble frein moteur intégré selon la revendication 2, dans lequel la sortie d'huile (45) est formée dans un espace intérieur du boulon de réglage (50) dans une direction axiale, et la sortie d'huile communique avec le chemin de circulation d'huile (40) à travers un trou circonférentiel du boulon de réglage. 50
4. Ensemble frein moteur intégré selon la revendication 1, dans lequel la chambre comprend un bouchon (62) qui présente une admission d'huile de chambre de bouchon (62 - 1), dans lequel circule l'huile évacuée en provenance de la sortie d'huile (45), et qui évacue l'huile vers la chambre. 55
5. Ensemble frein moteur intégré selon la revendication 1, dans lequel la paire de premier et second pistons maîtres sont logés dans la paire de première et seconde chambres de piston dans lesquelles est établie la pression d'huile ; et dans lequel la paire de première et seconde cham-

bres de piston sont connectées à une paire de premier et second chemins de diffusion d'huile qui s'étendent vers les deux extrémités gauche et droite de la chambre.

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6. Ensemble frein moteur intégré selon la revendication 1, dans lequel le culbuteur d'échappement (3) comprend en outre un ressort de sollicitation (70), et le ressort de sollicitation appuie sur le culbuteur d'échappement de telle sorte que le boulon de réglage (50) accouplé au culbuteur d'échappement entre en contact avec le pont (60). 10
7. Ensemble frein moteur intégré selon la revendication 1, dans lequel la saillie (90 - 1) fait saillie à partir d'une surface circonférentielle extérieure d'une came d'échappement mise en rotation (91). 15
8. Ensemble frein moteur intégré selon la revendication 7, dans lequel la saillie (90 - 1) entre en contact avec un rouleau de culbuteur d'échappement (93), et le rouleau de culbuteur d'échappement est formé sur le culbuteur d'échappement (3). 20

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FIG.1A

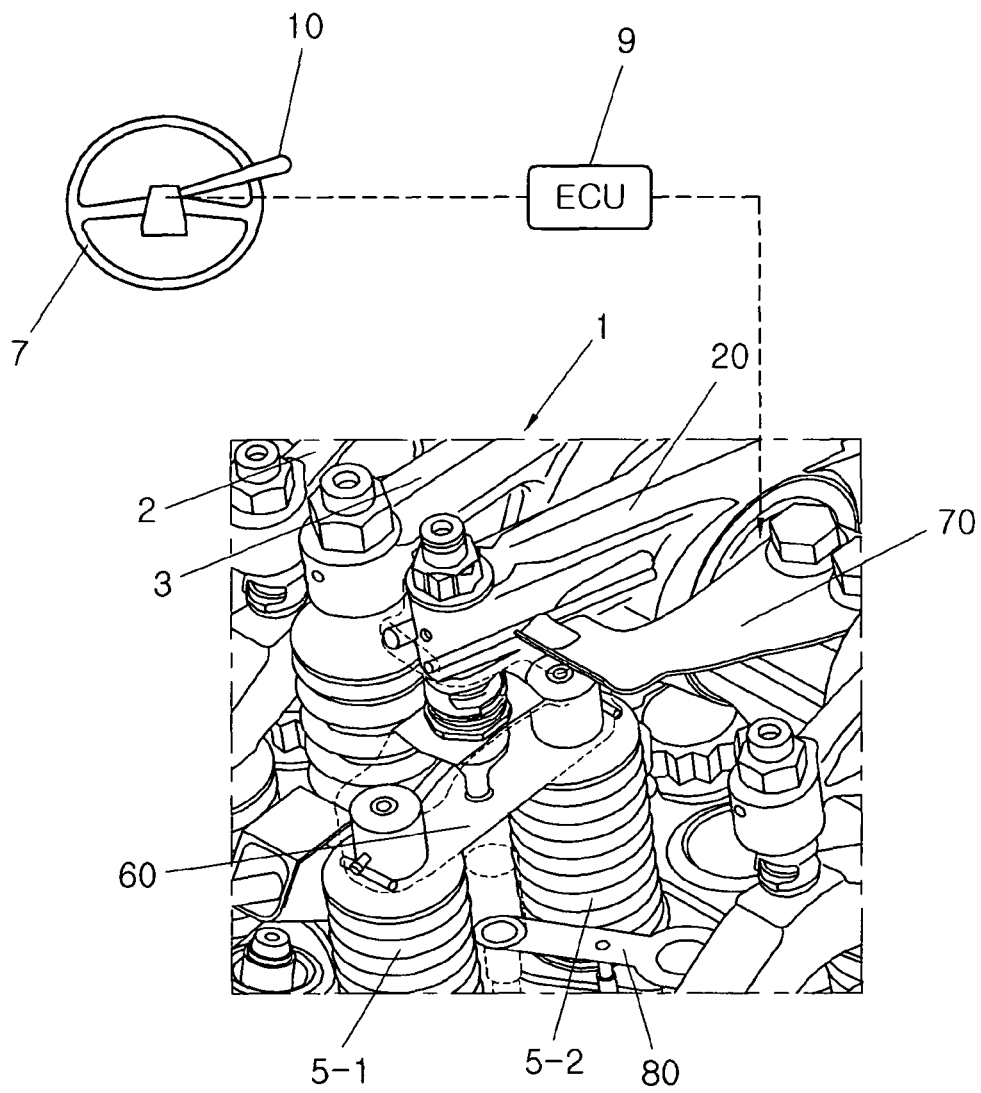


FIG.1B

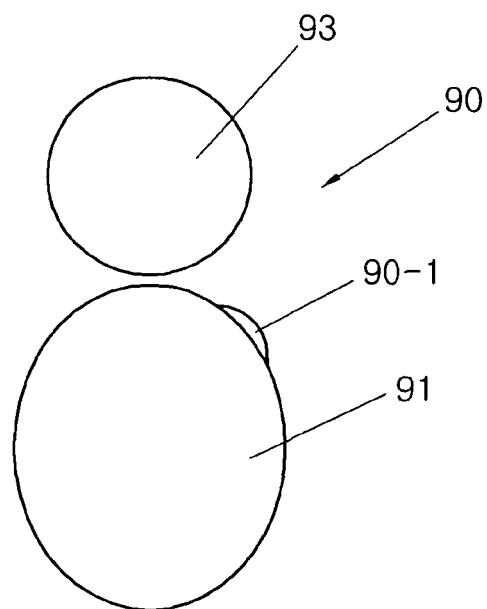


FIG.2

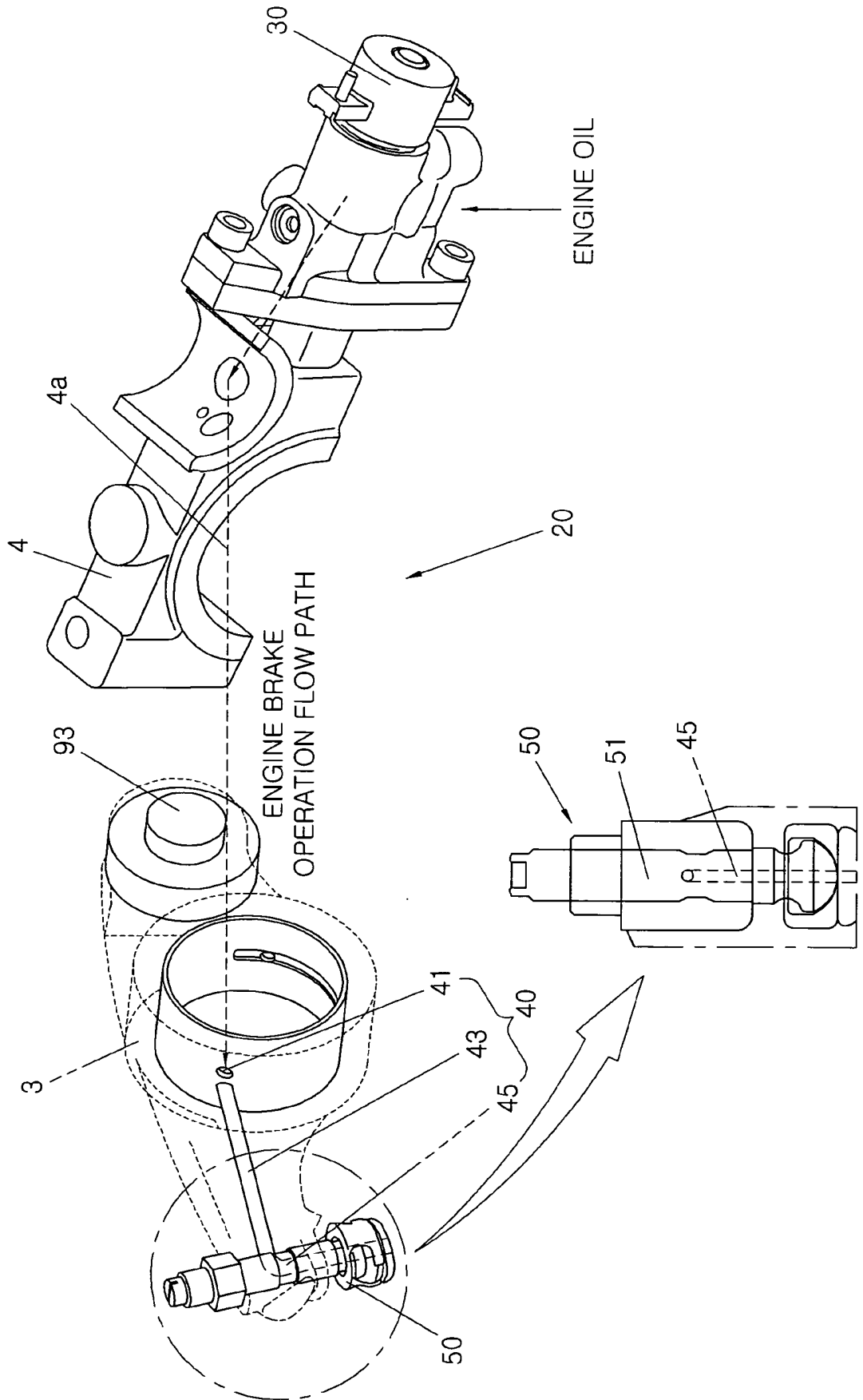


FIG.3

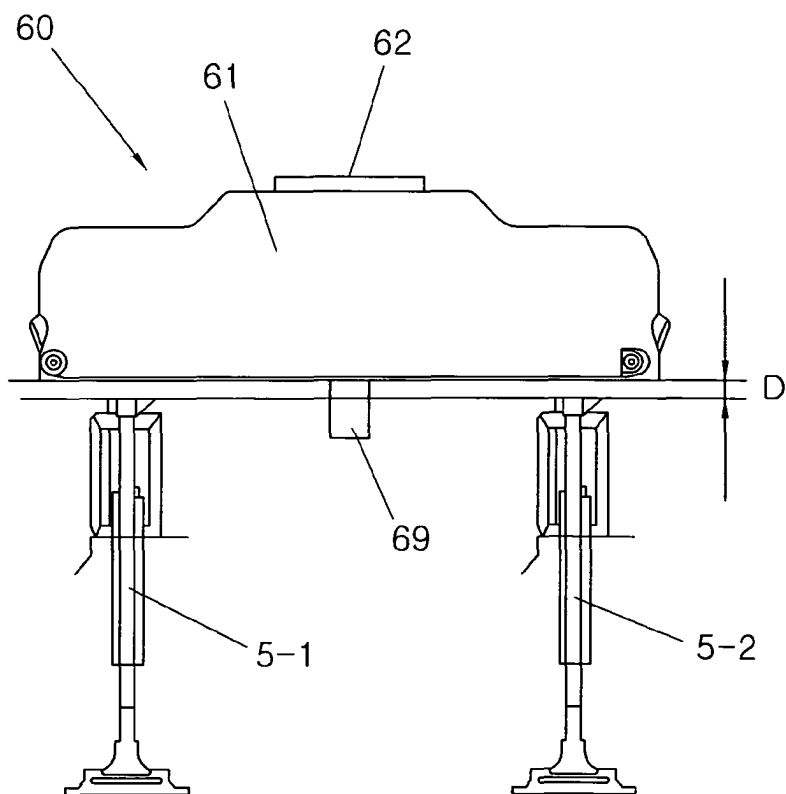
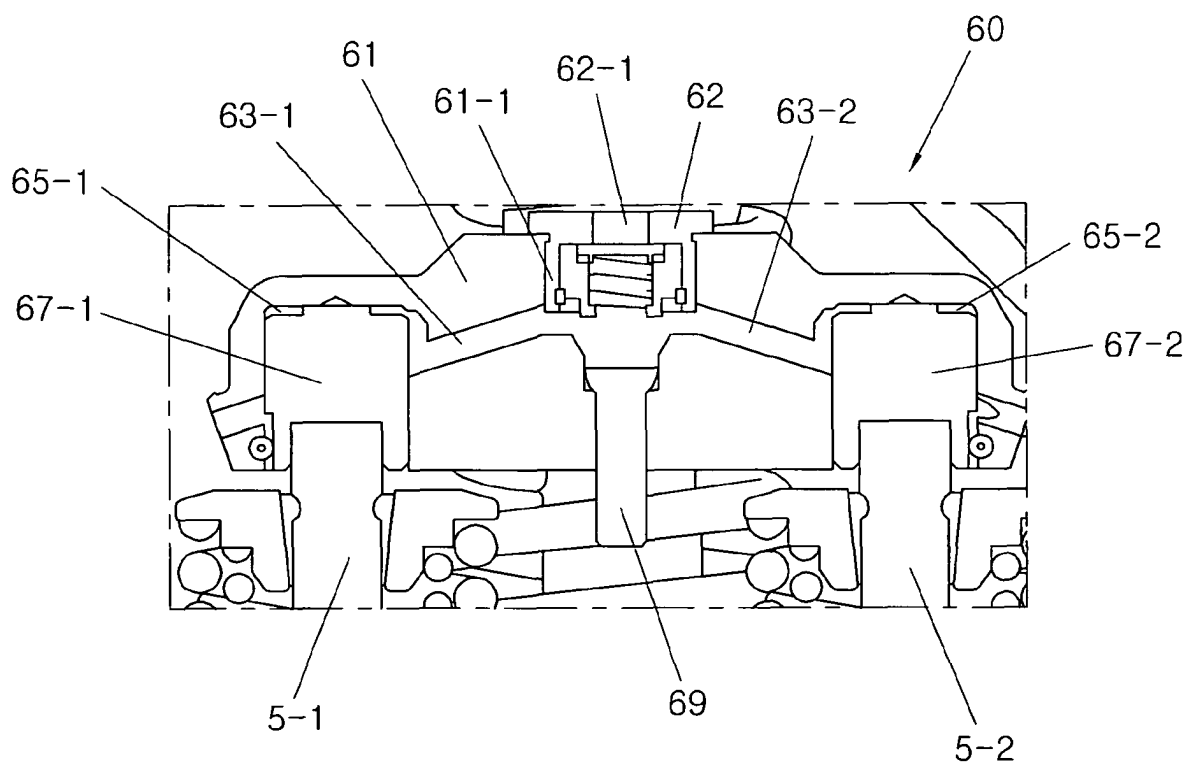


FIG.4

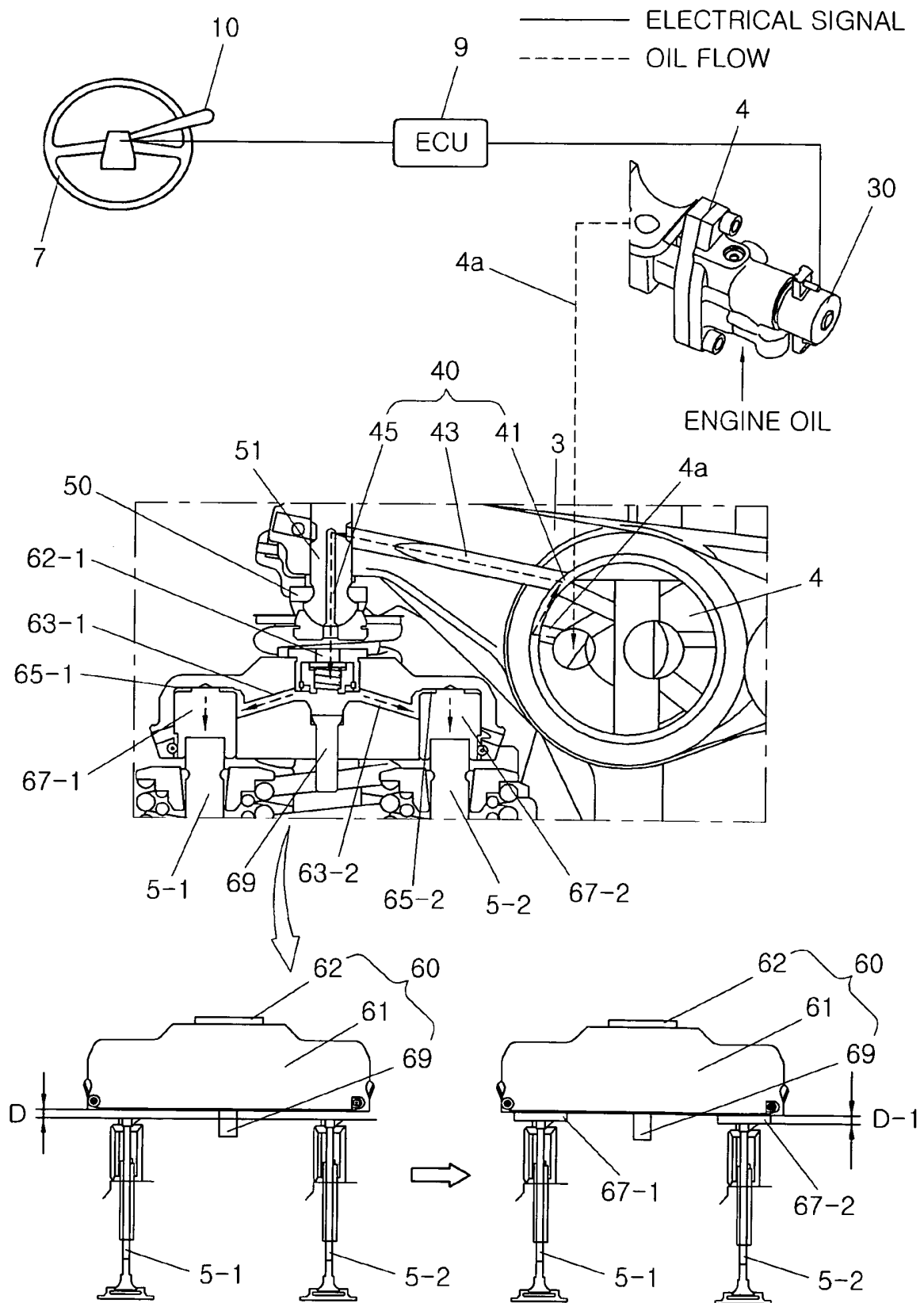


FIG.5A

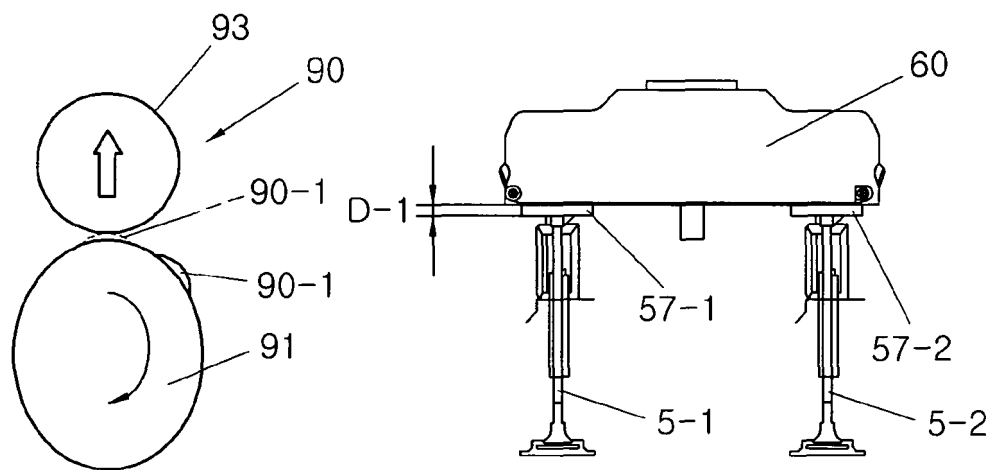


FIG.5B

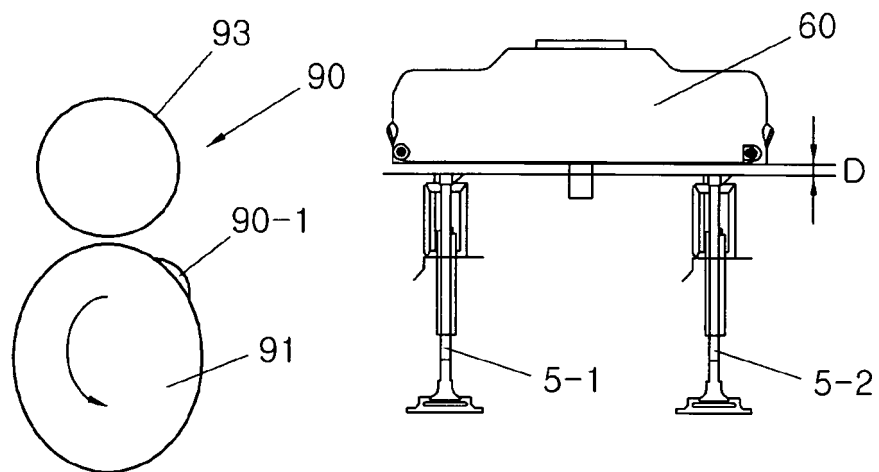
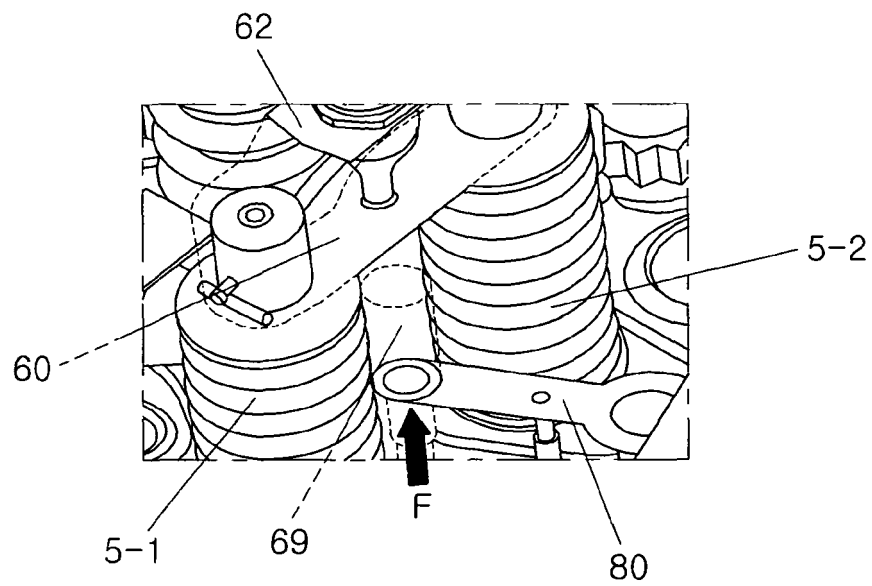


FIG.5C



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