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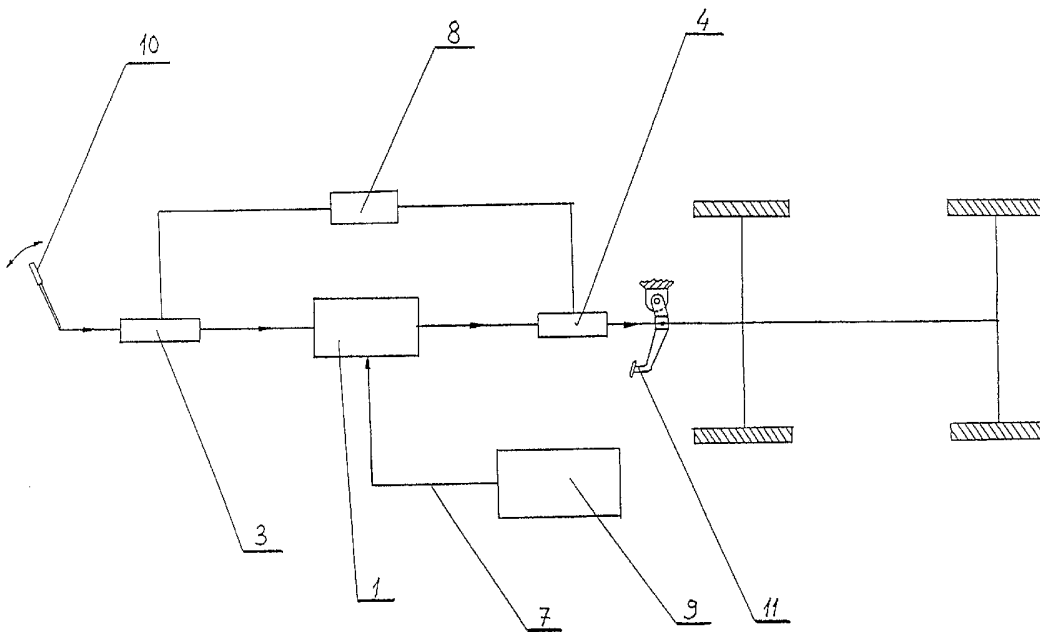
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(54) Title: SYSTEM , USE AND VEHICLE FOR HAND OPERATION OF BRAKE PEDAL AND/OR CLUTCH PEDAL



(57) Abstract: The present invention relates to a system for a hand operation of a brake and/or clutch pedal with a lever, as well as to a vehicle adapted for handicapped persons containing such a system, consisting of at least two hydraulic cylinders (3) and (4) and of one servo-device (1). By using this invention control of the working machines is facilitated, as well as driving of the vehicle by handicapped persons.

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SYSTEM, USE AND VEHICLE FOR HAND OPERATION OF BRAKE PEDAL AND/OR CLUTCH PEDAL

Field of invention

This invention relates to a system for the hand operation of the brake pedal and/or clutch pedal with a lever. This invention has been classified in accordance with the International Patent Classification (7th Edition) into section B60 T 7/06 – as a system for the operation of brakes, namely devices for the actuation of brakes by a driver, namely by hand and it is also classified into section B 60 K 20/06 – arrangement or mounting of change-speed gearing control devices in vehicles mounted on a steering column or the like.

Technical problem

Different types of machines in different working conditions request a great degree of coordination of foot commands by using of a brake pedal or with a hand operated gas control which enable accomplishing of different functions. Beside that, in vehicles adapted for handicapped persons, equipment which provides handicapped persons hand operation of the brake or clutch pedals is usually heavy-handed and not so easy for use. Particularly, the system of levers on which such equipment is based requires a great force for activation of the brake or clutch. For a significant number of handicapped persons power in their hands is not sufficient to activate the brake or clutch with using such equipment, especially in case of persons that have various kinds of paralysis.

The technical solution according to this invention enables the manual activation of the lever on a brake or clutch pedal without the use of various electronic circuits, and also the activation of the brake or clutch which does not require the use of significant forces, nor does it require great power with the hands. For handicapped persons it is a very useful improvement, while for the use with the working machines it reduces a number of limbs used for controlling of the machine, and thus reducing a number of errors caused by the human factor.

State of the Art

Document EP0120105 relates to an operation of a vehicle for handicapped persons which consists of a control lever used for the hydraulic pump control in such a way that the movement of the lever onward causes a vehicle to accelerate and movement of the lever backward causes

the vehicle to slow down. However, the hydraulic pump does not control the brake pedal of the vehicle directly, but it controls the acceleration by means of hydraulic motors which are used for the acceleration or respectively for the stopping of vehicle.

Document JP2002120701 relates to a vehicle for handicaped persons and to a braking system which facilitates the braking by using of the control lever. Document JP2002120701 differs from the invention disclosed in this application by the fact that the whole system is based on the mechanical transmission of the braking force on a brake pedal.

Document WO 0166392 discloses a system for the managing/controlling of a braking force. Although, this system for the activation of braking is located on the steering wheel (or nearby it) this document does not teach anything about the connection between the hand commands and the foot pedals. As opposed to that, it gives an impression that this document discloses a technical solution for the dislocating of the braking pedal from the usual location to a location that enables the hand braking of a vehicle.

Document EP 069090 describes a device which transfers the controlling of the throttle pedal to enable the hand operation of the throttle. However, this device has been constructed on the basis of the mechanical principles, without the use of the hydraulic cylinders and servo-devices, and such construction requires a significant force from a user to activate it.

Short description of the drawings:

- Fig. 1 shows a schematic construction of a system for the hand operation of the brake and/or clutch pedal with a lever by using two hydraulic cylinders
- Fig. 2 shows a schematic construction of one example of a system for the hand operation of the brake and/or clutch pedal with a lever

Disclosure of invention

In accordance with figure 1 a system for the hand operation of a brake and/or clutch pedal according to this invention, consists of at least two hydraulic cylinders (3) and (4) and one servo-device (1). However, at least one hydraulic cylinder (3) is positioned before the servo-device (1) and equally at least one hydraulic cylinder (4) is placed after the servo-device (1). The number and dimensions of the hydraulic cylinders and servo-devices depends on the purpose of the system for the hand control according to the present invention, on the size and mass of the vehicle, on the distance from the cylinders to the servo-device and also they depend on the various other factors that are not part of this invention.

It is visible from figure 2 that the hydraulic cylinder (3) is connected to a storage of servo fluid (8) and to a hand actuator of the brake or clutch (10) which is used for the hand control of the brake or clutch lever/pedal (11). From each side of the servo-device (1) there could be at least one hydraulic cylinder (5) and/or (6), depending on the specific construction of the invention. There are some constructions according to this invention in which on one side of the servo-device there are different numbers of hydraulic cylinders than on the other side of the servo-device. The second hydraulic cylinder (4) is connected directly on the brake or clutch lever/pedal.

Therefore it is possible that the force applied on the hand actuator of the brake or clutch (10) is multiplied and enlarged to the amount sufficient for the translation of the brake or clutch lever/pedal and thus causing the braking of a vehicle or engaging/disengaging of the vehicle coupling.

To prevent accidental pressure drop at certain points in the system, connections between the cylinders (3) and (5), and respectively the cylinders (4) and (6) are made with rigid or flexible high-pressure pipes. For the same reason, the connections between the cylinders (3) and (4) and the servo-device (1) are made with rigid or flexible high-pressure pipes. The low pressure needed for the operation of the servo-device (1) is gained through a connection of the servo-device (1) with an internal combustion engine (9) through a pipe (7).

Description of at least one example of the construction

The system for a hand operation of a brake or clutch lever/pedal according to this invention can be constructed as it is shown on figure 2, with four hydraulic cylinders (3), (5) and (4), (6), with two cylinders (3) and (5) before the servo-device (1) and with two cylinders (4) and (6) after the servo-device (1).

One hydraulic cylinder (3) is located directly after the hand actuator of the brake or clutch (10), while the other hydraulic cylinder (5) is positioned just before the servo-device (1). The second pair of hydraulic cylinders (4) and (6) is placed after the servo-device (1), however cylinder (6) is located immediately after the servo-device (1), while cylinder (4) is positioned close to the brake or clutch pedal (11) where it influences the pedal proportionally depending on the effect of the force applied on the hand actuator of the brake or clutch (10).

For the prevention of a pressure drop at certain points in the system all connections between cylinders (3), (5), and (4), (6) are made with rigid or flexible high-pressure pipes. The hydraulic

cylinders (3), (5), and (4), (6) are connected with the shared working fluid reservoir (8). Low pressure needed for the operation of the servo-device (1) is gained through a connection of the servo-device (1) with pipe (7) to an inlet pipe (2) of the internal combustion engine (9).

The braking process or process of the clutch activation is carried out by the activation of a hand actuator of the brake or clutch (10) which pressures a working medium in the connecting pipes and the pressure of the medium is increased in the hydraulic cylinder (3), and it is then transferred into the hydraulic cylinder (5) which is positioned immediately before the servo-device (1). The pressure of a working medium is also increased by passing through the servo-device (1) and through appropriately a dimensioned hydraulic cylinder (6) positioned after the servo-device (1). Following the hydraulic cylinder (6) the pressure of fluid acts on the piston positioned in the hydraulic cylinder (4) which furthermore directly acts on the brake or clutch pedal (11). Such construction allows that the force applied on the hand actuator of the brake or clutch (10) is multiplied and enlarged in an appropriate manner that is sufficient for the proportional movement of the brake or clutch pedal, and finally causing braking, or respectively activation/deactivation of the clutch of the vehicle.

Previously described system is used independently for the implementation of the hand control with a lever of the brake pedal or for the hand control with a lever of the clutch pedal. In case of construction of such a system of the hand control for both the brake pedal and for the clutch pedal, it is necessary that two independent systems are implemented, one for the control of the brake pedal and the other for the control of the clutch pedal.

All mentioned parts according to this invention may be placed inside the vehicle cabin, however due to the saving of space in the cabin, in the described construction, the servo-device (1) and hydraulic cylinders (4) and (6) are located in the trunk of the vehicle.

For the vehicle adapted for handicapped persons, one of the constructions implies the use of both systems – system for the hand operation of the brake pedal and system for the hand operation of the clutch pedal. In this case, the control of the brake and clutch pedals may be carried out with one or two independent hand actuators. In the version with one actuator, the brake would be activated by pushing the actuator into one direction, while the clutch would be activated with the push into the other direction. These directions are not of the opposite directions.

PATENT CLAIMS

1. System for a hand operation of a brake or clutch pedal, **characterized by** the fact that it consists of at least two hydraulic cylinders (3) and (4), one servo-device (1) and a hand actuator of the lever/pedal of the brake or clutch (10).
2. System for a hand operation of a brake or clutch pedal according to claim 1, **characterized by** the fact that there is a one hydraulic cylinder (3) and (4) on each side of the servo-device (1).
3. System for a hand operation of a brake or clutch pedal according to claim 1, **characterized by** the fact it additionally contains at least one hydraulic cylinder (5) and/or (6).
4. System for a hand operation of a brake or clutch pedal according to claim 1 or 2, **characterized by** the fact that it multiplies and enlarges pressure that originates as a result of the movement of a hand actuator of the brake or clutch lever/pedal (10) into desirable direction.
5. System for a hand operation of a brake or clutch pedal according to claim 1, **characterized by** the fact that the connections between the hydraulic cylinders (3) and (4) and the servo-device (1) are made by using rigid high pressure pipes.
6. System for a hand operation of a brake or clutch pedal according to claim 2, **characterized by** the fact that the connections between the hydraulic cylinders (3) and (4) and the servo-device (1) and the connections between the hydraulic cylinders (3) and (5) and respectively (4) and (6) are made by using rigid high pressure pipes.
7. System for a hand operation of a brake or clutch pedal according to claim 1, **characterized by** the fact that the connections between the hydraulic cylinders (3) and (4) and the servo-device (1) are made by using flexible high pressure pipes.
8. System for a hand operation of a brake or clutch pedal according to claim 2, **characterized by** the fact that the connections between the hydraulic cylinders (3) and

- (4) and the servo-device (1) and the connections between the hydraulic cylinders (3) and (5) and respectively (4) and (6) are made by using flexible high pressure pipes.
9. System for a hand operation of a brake or clutch pedal according to any of the preceding claims **characterized by** the fact that low pressure for the servo-device (1) is gained through the connection with the inlet pipe of the internal combustion engine (2).
 10. Use of the hydraulic cylinders without use of the electronic circuit for the control and regulation of the inlet and/or outlet pressure, **characterized by** the fact that they are used for the system for the hand operation of a brake or clutch lever/pedal.
 11. Use of the servo-device without use of the electronic circuit for the control and regulation of the inlet and/or outlet pressure, **characterized by** the fact that it is used for the system for a hand operation of a brake or clutch lever/pedal.
 12. Vehicle adapted for handicapped persons, **characterized by** the installed system for a hand operation of a brake pedal consists of at least two hydraulic cylinders and of one servo-device.
 13. Vehicle adapted for handicapped persons according to claim 12, **characterized by** the installed system for a hand operation of a clutch pedal consists of at least two hydraulic cylinders and of one servo-device.
 14. Vehicle adapted for handicapped persons according to claim 13, **characterized by** the fact that the control of the brake and clutch pedals is performed by means of one actuator.
 15. Vehicle adapted for handicapped persons according to claim 13, **characterized by** the fact that the control of brake and clutch pedals is performed by means of two independent actuators.

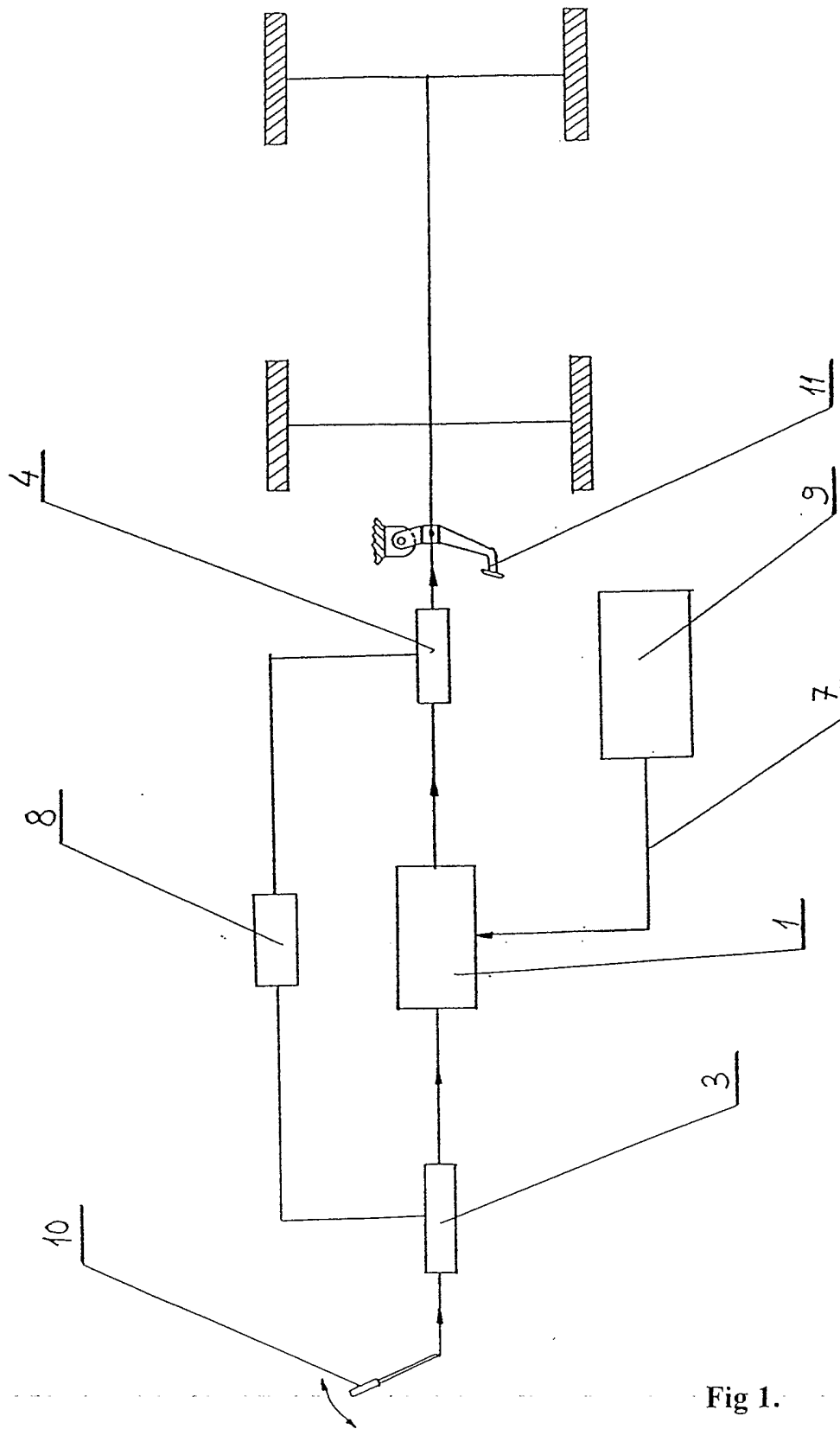


Fig 1.

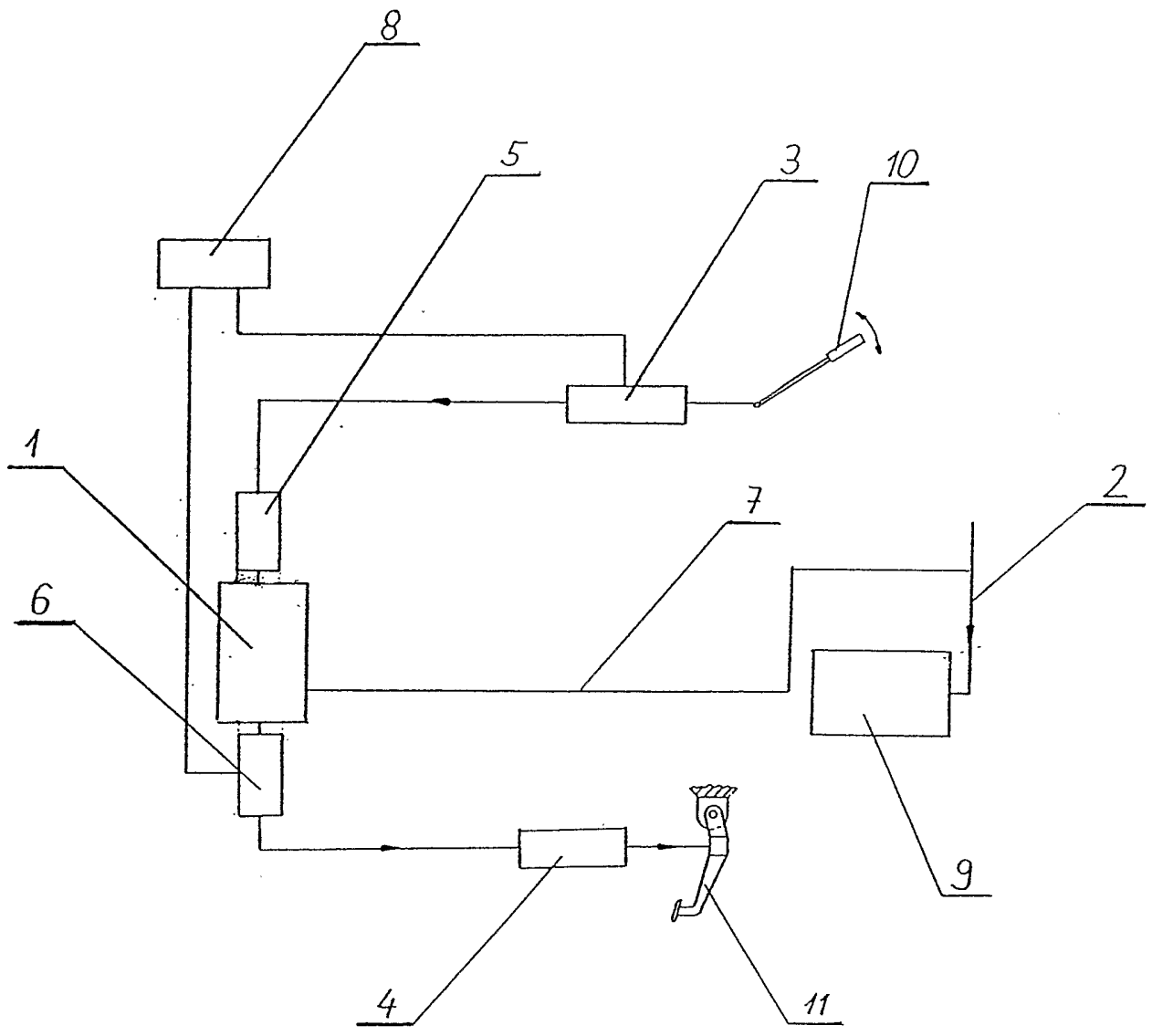


Fig 2.

INTERNATIONAL SEARCH REPORT

International application No
PCT/HR2005/000061

A. CLASSIFICATION OF SUBJECT MATTER
B60T11/20 B60T7/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B60T B60K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	EP 1 219 514 A (SEBAZCO, ROY) 3 July 2002 (2002-07-03) abstract; figure 8 paragraphs '0053!, '0054! -----	1, 10-12
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Further documents are listed in the continuation of Box C.

See patent family annex.

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- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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INTERNATIONAL SEARCH REPORT

International application No
PCT/HR2005/000061

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/HR2005/000061

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