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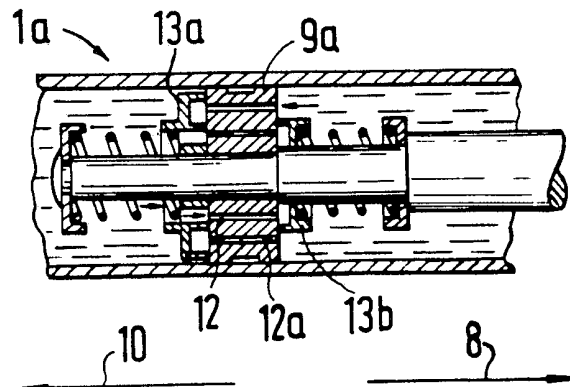
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(54) A control mechanism for a door of a motor vehicle

(57) The mechanism comprises a piston-cylinder unit pivotally connected to the door post and to the vehicle door. The unit has a piston (9a) provided with passage openings (12, 12a) for a pressure medium. A pressure-responsive, spring-loaded valve (13a, 13b) is provided on opposite sides of the piston (9a) so that an easy-motion opening and closing of the door is achieved when the door is sufficiently loaded in either direction, but the door may be arrested in intermediate positions during opening.



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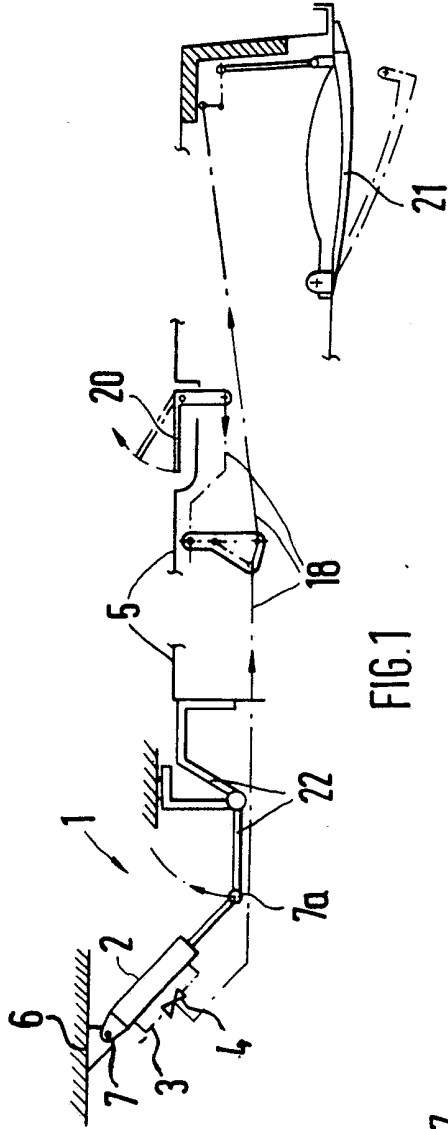


FIG. 1

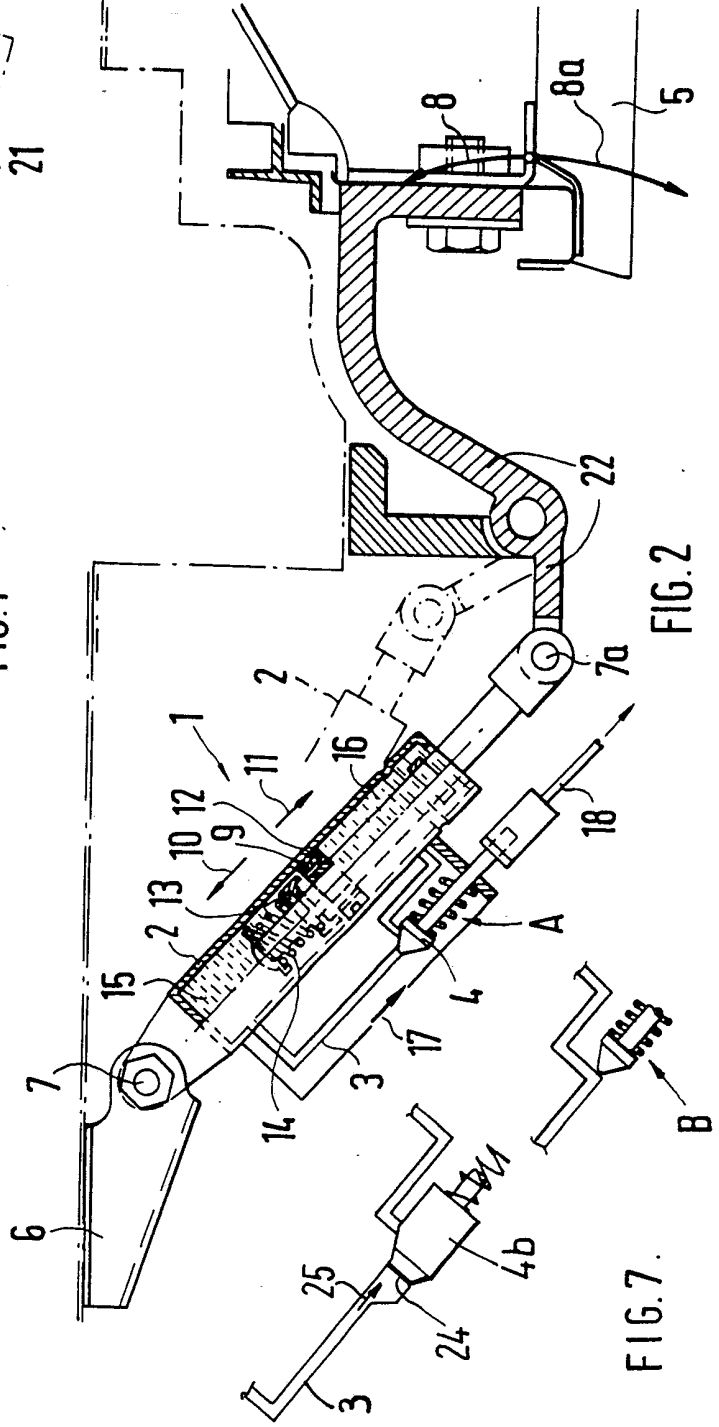


FIG. 2

FIG. 7.

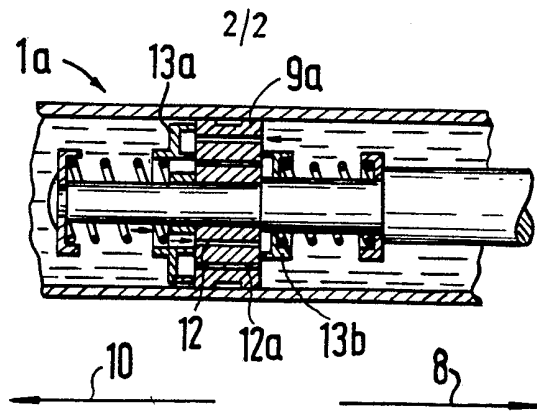


FIG. 3

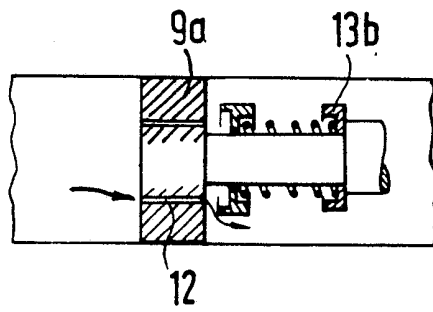


FIG. 4

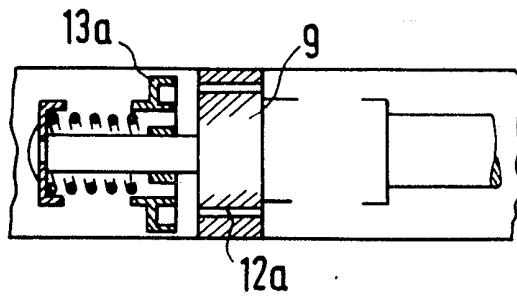


FIG. 5

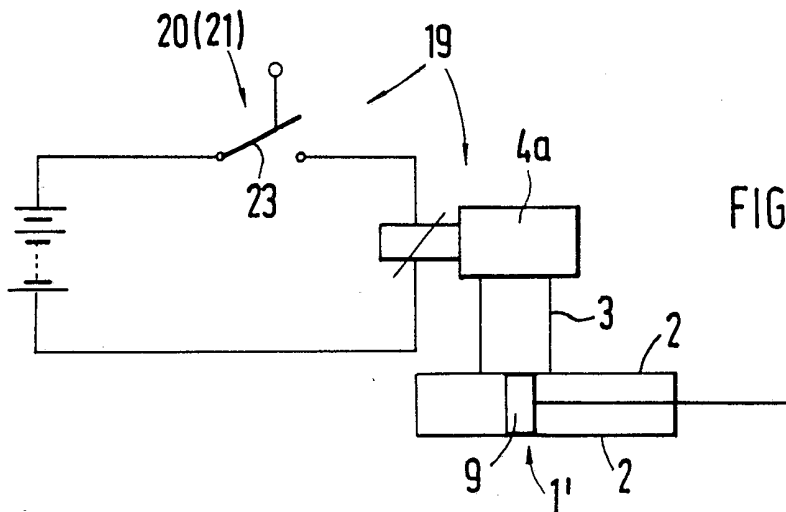


FIG. 6

SPECIFICATION

A control mechanism for a door of a motor vehicle

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This invention relates to a motor vehicle having a control mechanism for a pivotally mounted door of the vehicle.

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From DE-AS 22 55 062, an arresting mechanism having a piston-cylinder unit is known for flaps, doors and similar parts in motor vehicles. This unit has passage openings in the piston that can be closed by a cover element causing an arresting of the mechanism. It is a disadvantage in this type of design, especially when it is used for motor vehicle doors, that pressure forces affecting the flap, i.e., in the case of closing pressures, the pressure of the medium on the cover element becomes so large that this element lifts off the piston, a flow-through of the medium takes place and the flap moves. When outside forces affect the flap, door, or similar part, a required opening angle cannot be maintained by means of such a device.

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It is an object of the invention to provide a vehicle door control mechanism in which the door can be arrested in any arbitrary intermediate position, but can otherwise be opened and closed with an easy motion.

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The present invention consists in a motor vehicle having a control mechanism for a door of the vehicle, the door being pivotally mounted on a post on the side of the vehicle body and operated by an inside and outside handle, said control mechanism comprising a piston-cylinder unit arranged between the post and the vehicle door and having a piston provided with passage openings for the passage of a pressure medium therethrough, said piston interacting with an interior valve separating two working chambers of the cylinder, said mechanism also including an exterior blocking valve controlling the medium flow, said blocking valve being arranged in a control circuit connecting the two working chambers of the cylinder acting against the flow direction and *via* control means being controlled by a handle in such a way that the door can be blocked in at least one intermediate position.

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Principal advantages achieved by the present invention consist of the fact that the door, when operated by gripping an inside or outside handle, can be opened and closed with an easy motion, but that, when the grip is released, an immediate arresting of the door takes place at any opening angle. This is especially advantageous when vehicles are parked in narrow spaces so that a banging of the door against an adjacently parked vehicle is avoided. Also during a stepping-out of the vehicle, a significant pressure may be exerted on the door without any change of position. According to the known mechanism, this would result in a movement of the door

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which, however, does not take place in the case of the construction according to the invention. The reason is that a significant application of force in the opening direction on the door leaves the door unchanged in its position.

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However, when the effect of the force on the door becomes so great that damage may occur, it is provided that the blocking valve which, at the same time is designed as a safety valve, opens and a further swinging of the door becomes possible. On the other hand, closure of the door from the blocked position is possible at any time in which case the blocking valve is then opened by the handle and circulation of the medium takes place *via* the control circuit while the interior valve is closed. When the handle is not used for the closing of the door, the door can also be closed. In this case, by means of the pressure of the medium on the interior valve, this valve is opened, and the medium can flow from one chamber to the other so that closure of the door is not hindered.

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By means of mechanical and/ or electrical connection of the blocking valve with the inside and outside handle of the door, a simple actuation of the valve may be provided which operates in such a way that at the same time with the operation of the door, a control of the valve takes place so that additional switching devices are not required. The mechanical means for the adjusting may be provided by Bowden cables.

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In the accompanying drawings :

Figure 1 is a diagrammatic view of a motor vehicle door having a control mechanism according to the present invention which includes a piston-cylinder unit;

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Figure 2 is a sectional plan view of the motor vehicle door having the piston-cylinder unit shown in Figure 1 and a control circuit having an exterior blocking valve;

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Figure 3 is a sectional view of another embodiment of a control mechanism according to the present invention having a piston-cylinder unit and two interior valves;

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Figures 4 and 5 show positions of the interior valves during the opening and closing of the door according to the embodiment shown in Figure 3;

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Figure 6 is a diagrammatic view of an electric control of the exterior blocking valve in the control circuit according to Figure 2; and

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Figure 7 is a diagrammatic representation of a blocking valve in the control circuit which is constructed also as a safety valve.

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A door control mechanism 1 comprises a piston-cylinder unit 2 having a control circuit 3 in which a blocking valve 4; 4a; 4b; may be provided either inside or outside the unit 2. The unit 2 is held between a door 5 and a door post 6 on the side of the body so that it can be pivoted around vertical shafts 7, 7a and the piston rod is connected with the door

5 through a hinge 22. When the door 5 is swung in the direction of the arrow 8a (opening), a piston 9 of the unit 2 is moved in the direction of the arrow 10, and when the door 5 is swung in the direction of the arrow 8 (closing), the piston 9 is moved in the direction of the arrow 11.

As shown in Figure 2, the piston 9 of the unit 2 has passage openings 12 for a pressure medium, such as gas, hydraulic oil or a similar medium and the openings 12 are opened and closed by an interior valve 13 controlled by a spring 14 as a function of the door movement. The fluid line of the mechanism 1 forming the control circuit 3, with its inlet and outlet leads into the working chambers 15 and 16 of the cylinder which are divided by the piston 9. The blocking valve 4 is arranged in the control circuit 3 so that it acts against the flow direction 17 and can be moved into a closing position A or into a release position B as a function of the operating of a door handle 20, 21 via mechanical control means 18 or via electrical control means 19 (Fig. 6).

The blocking valve 4; 4a 4b is connected with the inside handle 20 and the outside handle 21 of the door via mechanical control means 18 which may be in the form of sheathed or Bowden cables. The blocking valve 4 can be adjusted via each handle 20 and 21 to the release position B and to the closing position A (Figure 2).

According to the embodiment shown in Figure 6, the mechanical control means 18 of Figures 1 and 2 are replaced by electrical control means 19 which via the door handles 20 and 21, actuate a switch by means of which, for example, a magnetic valve is controlled which represents the blocking valve 4a.

The blocking valve 4b shown in Figure 7 is at the same time designed as a safety valve. It has a control surface 24 which is aimed at the pressure column 25 in the control circuit 3.

In the embodiment shown in Figure 3, a spring-loaded valve 13a and 13b is provided on opposite sides of the piston 9a. These valves have the effect that during the opening of the door 5, the piston 9a moves in the direction of the arrow 10, so that the valve 13b is lifted from its seat on the piston 9a and exposes the passage openings 12 (Figure 4). When strong pressure is no longer exerted on the door 5, the door 5 is held in its opened position. An easy-motion adjustment is now no longer possible, when the passage openings 12 are closed by the valve 13b. When the door 5 is closed, the valve 13a is lifted off the piston 9 so that the passage openings 12a are exposed. By means of an adaptation of the springs to the valves 13a and 13b, an easy-motion opening and closing is achieved and it is arranged that the door is arrested in intermediate positions during open-

ing, also when subjected to pressure.

The method of operation of the mechanism shown in Figures 1, 2 and 6 is as follows. During the opening of the door 5 from the inside by the handle 20 and from the outside by the handle 21, the respective handle is pulled into the dash-dotted position. In the process, via the control means 18; 19, the blocking valve 4 is pulled from its closing position A into the release position B in the control circuit 3. As a result, the two working chambers 15 and 16 are interconnected while the medium can pass through, so that the piston 13 corresponding to the door motion moves in the direction of the arrow 10. During this process, the passage openings 12 are closed by the valve 13 and the medium is pressed from the chamber 15 via the opened control circuit 3 into the other chamber 16. When the handles 20, 21 are released, these again take up their starting positions (solid lines). As a result, the blocking valve 4; 4a; 4b is closed and the flow-through of the medium and thus further movement of the door in the opening direction is stopped. The door 5 can therefore be immediately arrested in various intermediate positions by simply releasing the handles 20, 21.

To ensure no damage occurs when the door that is in a blocked condition is opened further by force, the safety valve 4a is provided (Figure 6). In the event of a certain pressure on the door, this valve 4a opens the control circuit 3 so that a further swinging motion of the door is ensured.

For the easy closing of the door 5, the handle 20 or 21 is actuated so that the blocking valve 4, 4a is opened again and passage of the medium is made possible. An easy closing of the door 5 is also possible without actuating the handle 20 and 21. By means of the movement of the piston 9 in the direction of the arrow 11, the medium in the chamber 16 is pressed into the passage openings 12 against the valve 13. This valve 13, against the action of the spring 14, lifts off its seat on the piston 9 and opens the openings 12, so that the displaced medium can enter the other chamber 15.

CLAIMS

1. A motor vehicle having a control mechanism for a door of the vehicle, the door being pivotally mounted on a post on the side of the vehicle body and operated by an inside and outside handle, said control mechanism comprising a piston-cylinder unit arranged between the post and the vehicle door and having a piston provided with passage openings for the passage of a pressure medium there-through, wherein each side of the piston has one valve, the valves being designed so that as a function of the pressure during the opening and the closing of the door, they permit passage of the medium.

2. A motor vehicle having a door control mechanism substantially as described with reference to Figures 3 to 5, or Figure 7 of the accompanying drawings.

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