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(54) Hydraulic control system of floor hinge

Hydraulisches Steuersystem für Bodentürschliesser

Système hydraulique de commande pour ferme-porte

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Description

The present invention relates to a hydraulic control system of a floor hinge adapted for a right swing door, a left swing door and a biparting door.

A conventional floor hinge of the type described above comprises means for attaining a delayed action function capable of slowly closing the door from a fully open state to a certain open angle state, means for closing the door at a normal closing speed, i.e. first closing speed, from the certain open angle state of the door to an open angle close to a position where the door is completely closed and means for closing the door at a second closing speed lower than the first closing speed. Another conventional floor hinge is further provided with means for achieving a latching action capable of speedily closing the door at angles of about 2° to 3° just before the door has been closed to completely close the same. A further conventional floor hinge is provided with means for attaining a back check function for prevention of rapid opening of the door to the door with an open angle between a certain open angle to the fully open angle so as to prevent the door, a knob of the door or a wall to which the door is attached from being damaged by an accidental rapid opening of the door by an external force, for example.

In order to attain the back check function, there is provided mechanical means for increasing the door opening force to limit the rapid door opening, and a hydraulic circuit means for limiting the rapid door opening by utilising a cushioning function of the hydraulic pressure. The hydraulic circuit means includes or does not include a mechanism for minutely adjusting the hydraulic pressure attaining the cushioning function, for example, as disclosed in the Japanese Utility Model Publication No: 52-15639.

In the conventional floor hinge of the type including the mechanical back check mechanism, it is difficult to minutely adjust the back check function.

On the other hand, in the conventional floor hinge of the type utilising the hydraulic circuit means, it may be possible to adjust or control the first and second door closing speeds, the back check function, the delayed action and the latching action. However, some floor hinges of this type include no mechanism for minutely adjusting these functions or actions, or other some floor hinges of this type include mechanisms capable of minutely adjusting these functions or actions but have complicated structures for attaining these functions or actions or involve troublesome adjusting workings, involving much time and cost and, hence, being not practical.

Reference is made to US-A-3605339 describing a hydraulic control system according to the preamble of claim 1 in which the valve 122 in the passage 118 functions not only as a backcheck valve when the door is opened but also as a door speed control valve when the door is closed. Therefore, it is difficult to precisely adjust it so that the two functions (backcheck and door closing-

speed control) are properly or desirably performed.

Reference is also made to US-A-3042957 in which the oil control system is adapted for a door which can open in both directions and mainly latching operation is disclosed, and three oil passages 102, 124, 118 are independently formed. However, the centre short passage 124 is independently formed for the latching operation.

SUMMARY OF THE INVENTION

An object of the present invention is to substantially eliminate the defects or drawbacks encountered to the prior art described above and to provide a hydraulic control system of a floor hinge including a hydraulic circuit means for easily and minutely achieving various functions such as first and second door speed adjusting functions, back check function in suitable combination thereof to thereby attain the ideal door opening and closing action.

This and other objects can be achieved according to the present invention by providing a hydraulic control system of a hinge provided with a hinge case in which is formed a cylinder portion in which a piston is linearly moved by a door opening action against an urging force of a return spring the cylinder portion being sectioned into a piston front chamber and a piston rear chamber by the location of the piston and the door being then automatically closed by accumulated returning force of the spring the system comprising check valve means for restricting flow of a hydraulic oil when the door is opened and closed, a back check adjusting valve means for adjusting speed of the piston in a door open angle region ranged from a predetermined door open angle position to a door fully open angle position, a speed adjusting valve means for adjusting speed of piston in a door close angle region ranged from a door close angle position to a door almost close angle position, characterised in that the hinge is a floor hinge and that the system is further comprising a latching action means for increasing speed of the piston from the door almost close angle position to a door fully closed position, and that first and second oil passages extending longitudinally on a side wall of the cylinder portion are independently formed so as to communicate with the rear and front chambers, said first oil passage comprises a front passage formed at a front portion thereof, a rear passage formed at a rear portion thereof and two front and rear intermediate passages formed between the front and the rear passages, a first check valve of said check valve means for permitting the hydraulic oil to flow only from the front chamber into the rear chamber is provided between the two intermediate passages in the first oil passage, said back check adjusting valve means is provided in the front passage of said first oil passage, said latching action means operates when the rear passage communicates with the rear intermediate passage of the first oil passage said second oil passage comprises a front passage formed

at a front portion thereof, a rear passage formed at a rear portion thereof, and a rear intermediate passage formed near the rear passage, a second check valve for permitting the hydraulic oil to flow only from the rear chamber into the front chamber is disposed in the front passage of the second oil passage, and said speed adjusting valve means has two speed adjusting valves, one of which is a first speed adjusting valve disposed in the rear intermediate passage located near the rear passage of the second oil passage so as to adjust speed of the piston from a door fully opened position to a predetermined door close angle position and the other of which is a second speed adjusting valve disposed in the rear passage of the second oil passage so as to adjust the speed of the piston from the predetermined door close angle position to the door almost close angle position.

In preferred embodiments according to the present invention, a latching action adjusting valve is provided in the rear intermediate passage.

A delayed action adjusting valve may be disposed in the second oil passage for adjusting the quantity of the displacement of the hydraulic oil moved from the piston rear chamber to the piston front chamber in the door closing region at a time when the piston displaces from the door fully open angle position to the first door close angle position.

The latching action adjusting valve and the delayed action adjusting valve may be incorporated commonly in the hydraulic circuit means in addition to the back check adjusting valve and the first and second speed adjusting valves.

According to the hydraulic control system of the floor hinge of the character described above, in response to the door opening action, the piston moves linearly towards the piston rear chamber while compressing the return spring and, the door is opened to a position of a predetermined open angle.

In a case where the door is opened from the fully closed position (0°) to a predetermined open angle position (70°, for example), the hydraulic oil filled up in the piston front chamber freely moves into the piston rear chamber through the first oil passage and the check valve. At this moment, the check valve in the second oil passage is closed by the hydraulic oil, so that the hydraulic oil does not move into the second oil passage.

Next, in a case where the door is opened to the fully open angle position from the predetermined open angle position (70°, for example), the hydraulic oil in the piston front chamber moves into the piston rear chamber through the back check adjusting valve in the first oil passage and the check valve. At this moment, the quantity of the displacement of the hydraulic oil can be minutely adjusted by the back check valve arranged in the first oil passage, whereby an accidental rapid door opening which may be caused by a strong wind or external force can be restricted.

In a case where the door is closed from the door

fully open angle position to the predetermined door close angle position (70°, for example) the hydraulic oil in the piston rear chamber moves into the piston front chamber through the second oil passage while opening the check valve. At this moment, the quantity of the displaced hydraulic oil is adjusted by the first and second speed adjusting valves disposed in the second oil passage. In this operation, in a case where the delayed action adjusting valve is further disposed in the second oil passage, the hydraulic oil in the piston rear chamber moves into the piston front chamber through the first and second speed adjusting valves and the delayed action adjusting valve while opening the check valve. At this moment, the quantity of the displaced hydraulic oil can be minutely adjusted by the first and second speed adjusting valves and the delayed action adjusting valve disposed in the second oil passage. The hydraulic oil in the piston front chamber flows in the intermediate portion of the first oil passage, but the check valve in the first oil passage is closed by the hydraulic oil, so that the hydraulic oil does not flow into the piston front chamber through the first oil passage.

Next, in a case where the door is closed in the first door close speed range from the predetermined close angle position (70°, for example) to an open angle close to a position where the door is completely closed, the hydraulic oil in the piston rear chamber moves into the piston front chamber through the first and second speed adjusting valves at a time when the oil passage in which the first speed adjusting valve of the second oil passage is disposed is closed at the piston seal surface. At this moment, the quantity of the displaced hydraulic oil is minutely adjusted by the speed adjusting valve disposed in one of opened oil passages in two branched oil passages of the second oil passage in which the first and second speed adjusting valves are disposed. However, in an ordinal operation, the first speed is preset to be faster than the second speed, the quantity of the displaced hydraulic oil can be minutely adjusted by the first speed adjusting valve in the first speed region.

When the door is closed in the second speed region, the hydraulic oil in the piston rear chamber moves into the piston front chamber through the second oil passage and the second speed adjusting valve. At this moment, the quantity of the displaced hydraulic oil can be minutely adjusted by the second speed adjusting valve.

In addition, in a case where the latching action adjusting valve is disposed in the first oil passage, the hydraulic oil in the piston rear chamber moves into the (piston front chamber through the first oil passage and the latching action adjusting valve by opening a portion of the oil passage at which the latching action adjusting valve is disposed at the piston seal surface. Accordingly, the door closing speed is made speedup just before the door closing, thus surely closing the door.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention and to show how the same is carried out in effect, reference is now made, by way of preferred embodiments, to the accompanying drawings, in which:

Fig. 1 is a longitudinal section of a floor hinge which does not incorporate the present invention but is incorporated to aid understanding of the invention;
Fig. 2 is an elevational section of the floor hinge shown in Fig. 1;

Figs. 3, 4, 5, 6, 7 and 8 are sectional views taken along the lines III-III, IV-IV, V-V, VI-VI, VII-VII, and VIII-VIII shown in Fig. 1, respectively;

Fig. 9 is a longitudinal section showing a part of a first embodiment of a floor hinge according to the present invention;

Figs. 10 and 11 are sectional views taken along the lines X-X and XI-XI shown in Fig. 1;

Fig. 12 is a longitudinal section showing a part of a second embodiment;

Figs. 13 and 14 are sectional views taken along the lines XIII-XIII and XIII-XIII, respectively in Fig. 12;
Fig. 15 is a cross section of a part of a third embodiment;

Figs. 16 and 17 are sectional views taken along the lines XVI-XVI and XVII-XVII respectively in Fig. 15; and

Fig. 18 is a view representing the relationship between the door opening angles and the respective functions of the hydraulic adjusting system of the floor hinge in the door opening and closing region.
Figs. 1 to 8 represent a floor hinge provided with a first and a second speed mechanism for controlling door closing speed and a back check mechanism for opening a door slowly.

Figs. 1 and 2 show longitudinal section and elevational section of the whole structure of the floor hinge, in which the floor hinge is provided with a hinge case 8 as a hinge body having a cylinder portion 9 formed at the right-hand end as viewed.

The cylinder portion 9 of the hinge case 8 has one open end which is closed by a plug 12 and the other end which is liquid-tightly closed but provided with an opening 8a at the upper portion of the closed end which is liquid tightly closed by a lid 29. In such a structure, the interior of the cylinder portion 9 is divided into a piston front chamber A located leftside a piston 7 and a piston rear chamber B located rightside the piston 7.

In the piston front chamber A, a main shaft 1 is supported by a bottom of the hinge case 8 and the lid 29 through bearings 31 and 31 to be rotatable with one end of the shaft 1 extending outwardly. A cam 32 of approximately a heart shape is secured to the main shaft 1. In addition, in the piston front chamber A, a pair of sliding plates 3 and 3 are arranged with the cam 32 vertically

sandwiched therebetween, and three rollers 2, 2' and 2'' are journaled between the sliding plates 3 and 3.

A connecting rod 5 is connected at one end thereof to one ends of the sliding plates 3 and 3 by means of screws 4 and 4, and the other end of the connecting rod 5 extending towards the cylinder portion 9 is connected to the piston 7 in the cylinder portion 9 through a piston pin 6.

A return spring 11 for urging a door 30 in a door closing direction is disposed between a spring shoe 33 arranged at substantially the longitudinally intermediate portion of the front chamber A and the end face of the piston 7.

Hydraulic oils 10 and 10' are filled up in the piston front chamber A and the piston rear chamber B.

The cylinder portion 9 is provided with a side wall 9a to which a first oil passage 34 and a second oil passage 35 are independently formed so as to communicate with the front chamber A and the rear chamber B, respectively, as shown in Fig. 1 and Figs. 3 to 8.

The first oil passage 34 has one end, as shown in Figs. 1 and 4, at which a front oil passage 17 and a front intermediate oil passage 13 are formed with a predetermined space in the moving direction of the piston 7 in the cylinder portion 9 so as to communicate with the front chamber A. The other end of the first oil passage 34 communicates with the rear chamber B through a rear oil passage 15.

As shown in Figs. 4 to 8, on the side of the front oil passage 17 of the first oil passage 34 is located a back check adjusting valve 18 so as to minutely adjust an oil passing amount. A check valve 14 is arranged between the front intermediate oil passage 13 and the rear oil passage 15 in the first oil passage 34 as shown in Figs. 1 and 4. As shown in Fig. 4, the check valve 14 is composed of a valve seat 14a formed in the first oil passage 34 and a ball member 14b and a screw-type lid 14d is screw-engaged with an opening 34a of the first oil passage 34 in a liquid-tight manner so as to prevent the ball member 14b from being removed.

The check valve 14 acts so that the hydraulic oil 10 in the front chamber A freely flows into the rear chamber B through the first oil passage 34 when the door is opened and the hydraulic oil 10' in the rear chamber B does not flow into the front chamber A when the door is closed.

On the other hand, as shown in Figs. 1 and 3, the second oil passage 35 has one end communicating with the piston front chamber A through a front oil passage 25 and the other end communicating with the piston rear chamber B through a rear intermediate oil passage 19 and a rear oil passage 20 formed with a predetermined space in the moving direction of the piston 7.

As shown in Fig. 3, on the side of the front oil passage 25 of the front chamber A of the second oil passage 35 is located a check valve 23, which acts so that hydraulic oil 10' in the rear chamber B freely flows into the front chamber A through the second oil passage 35

when the door is closed and the hydraulic oil 10 in the front chamber A does not flow into the rear chamber B when the door is opened. The check valve 23 is composed of a valve seat 23a and a ball member 23b.

A first speed adjusting valve 21 and a second speed adjusting valve 22 are disposed close to the rear intermediate and rear oil passages 19 and 20 on the side of the front chamber B of the second oil passage 35, as shown in Figs. 3, 5 and 6, so as to minutely adjust the oil passing amount.

Figs. 9 to 11 represent a part of a floor hinge according to the present invention which is provided with mechanisms for attaining the latching action function for increasing the door closing speed just before the door is completely closed in addition to a first and second speed functions and a back check function.

Referring to Figs. 9 to 11, the first oil passage 34 has one end to which a front oil passage 17, a front intermediate oil passage 13, and a rear intermediate oil passage 28 are formed with predetermined spaces in the moving direction of the piston 7 so as to communicate with the piston front chamber A. A back check adjusting valve 18 and a latching action adjusting valve 27 are disposed on the side of the front oil passage 17 and on the side of the rear intermediate oil passage 28, respectively, so that the oil passing amount can be adjusted. In this arrangement, a check valve 14 is further located between the front intermediate oil passage 13 and the rear intermediate oil passage 28 in the first oil passage 34. The check valve 14 of the invention acts in substantially the same manner as that described with reference to Figs. 1 to 8. A press pin 14c is incorporated in the first oil passage 34 so as to hold a ball member 14b of the check valve 14 at a predetermined portion in a floating manner so as not to disturb the smooth flow of the hydraulic oil 10.

The construction of the floor hinge of Figures 9 to 11 is substantially the same as that of Figs. 1 to 8, so that the detail thereof is now omitted herein.

Figs. 12 and 13 represent a part of the floor hinge according to a second embodiment of the present invention which is provided with mechanisms for attaining the delayed action function for decreasing the door closing speed in addition to the first and second speed functions and the backcheck function.

Referring to Figs. 12 and 13, a front oil passage 25 and a front intermediate oil passage 26 are formed on the side of the front chamber A of the second oil passage 35 in place of the rear oil intermediate passage 28 of the second embodiment. In addition, a delayed action adjusting valve 24 is further located on the side of the front oil passage 25, as shown in Fig. 13, so as to minutely adjust the oil passing amount.

The other construction of the floor hinge of the second embodiment is substantially the same as that of Figures 1 to 8, so that the detail thereof is now omitted herein.

Figs. 15 to 17 represent a part of the floor hinge ac-

cording to a third embodiment of the present invention which is provided with mechanisms for attaining the delayed action function and the latching action as well as the first and second speed functions and the back check function.

Referring to Figs. 15 and 17, a front oil passage 17, an intermediate front oil passage 13, and a rear intermediate oil passage 28 are respectively formed on the side of the front chamber A of the piston 7 in the first oil passage 34. A back check adjusting valve 18 is located on the side of the front oil passage 17 and a latching action adjusting valve 27 is further located on the side of the rear intermediate oil passage 28, respectively.

On the side of the front chamber A in the second oil passage 35 are respectively formed front and front intermediate oil passage 25 and 26, and on the side of the front oil passage 25 are arranged a check valve 23 and a delayed action adjusting valve 24. The check valve 23 acts in substantially the same manner as that described with reference to Figures 1 to 8.

The other construction of the floor hinge of the third embodiment is substantially the same as that of Figures 1 to 8, so that the detail thereof is now omitted herein.

The floor hinges operate in the manner described hereunder.

Figs. 1 and 2 show the closed state of the door 30, and the lower end of the door 30 is fixed to the main shaft 1 of the floor hinge through an arm member and the like, not shown. As illustrated, the piston 7 is held in a position where the piston 7 is moved on the side of the rear chamber B by the return spring 11, and the rollers 2 and 2' contact to minimum diameter portions of the cam 32.

Now supposing that the door 30 is opened counterclockwise as shown in Fig. 18, the main shaft 1 of the floor hinge is rotated into the counterclockwise as viewed in Fig. 1 together with the cam 32, so that the sliding plates 3 are moved leftwardly as viewed through the rollers 2 and 2' abutting against the cam 32. Accordingly, the piston 7 moves linearly towards the side of the front chamber A while compressing the return spring 11 through the connection rod 5, whereby the piston returning force, i.e. door closing force, is accumulated in the return spring 11.

Referring to Fig. 18, it is supposed that the opened angle of the door is to be 120° in which the door opening and closing angle ranged from 70° to 120° is referred to as back check region (BC region), the angle ranged from 120° to 70° is referred to as delayed action region (DA region), the angle ranged from 70° to 20° is referred to as first speed region, the angle ranged from 20° to 0° is referred to as second speed region and the angle ranged from 5° to 0° is referred to as latching action region (LA region).

In this supposition, when the door 30 shown in Fig. 18 is opened counterclockwise by angles for 0° to 70° with a hang base O being the center of the rotation of the door 30, the hydraulic oil 10 in the front chamber A

shown in Fig. 1 or 2 freely flows into the rear chamber B through, as shown in Figs. 1, 4 and 7, the front intermediate oil passage 13, the first oil passage 34, the check valve 14 and the rear oil passage 15.

When the door 30 is opened with the angle of the BC region in Fig. 18, the front intermediate oil passage is closed with a piston seal surface 16, so that the hydraulic oil 10 in the front chamber A moves into the rear chamber B through the front oil passage 17 of the first oil passage 34, the check valve 14 and the rear oil pas-
 sage 15. At this moment, the door 30 is subjected to the back check function because of the location of the back check adjusting valve 18 on the side of the front oil pas-
 sage 17 of the first oil passage 34.

The quantity of the displaced hydraulic oil 10 at this moment is minutely adjusted by the back check adjusting valve 18, so that the rapid opening of the door due to strong wind or strong external force, for example, can be restricted.

When the door 30 is closed from the fully opened condition, the check valve 14 in the first oil passage 34 is closed by means of the hydraulic oil 10' in the rear chamber B and, hence, the hydraulic oil 10' in the rear chamber B passes the second oil passage 35 without passing the first oil passage 34. Namely, the hydraulic oil 10' in the rear chamber B flows into the front chamber A through the rear intermediate oil passage 19, the rear oil passage 20 in the second oil passage 35, the check valve 23, and the front oil passage 25. At this moment, the quantity of the displaced hydraulic oil 10' can be minutely adjusted by the first speed adjusting valve 21 and the second speed adjusting valve 22 disposed in the second oil passage 35. That is, when the door is closed, the door is closed at a first speed in the region from 70° to 20° by controlling the first and second speed adjusting valves 21, 22 and then closed at a second speed in the region from 20° to 5° by controlling the second speed adjusting valve 22.

In a case where the floor hinge is provided with the latching function as described with reference to the first embodiment shown in Figs. 9 to 11, the hydraulic oil 10' in the rear chamber B flows into the front chamber A through the oil passage 15, latching action adjusting valve 27 and the rear intermediate oil passage 28 in the first oil passage 34 in addition to the second oil passage 35 when the door is closed to its complete close position. Accordingly, when the door 30 is closed with door closing angles ranged in the LA region in Fig 4, the rear intermediate oil passage 28 is opened from the seal surface 16a of the piston 7 and the door closing speed is increased and, hence, the door 30 can be surely closed.

In a case where the floor hinge is provided with the delayed action function as described with reference to the second embodiment shown in Figs. 12 to 14, when the door 30 is closed from the door fully opened state with door closing angles ranged in the DA region, the hydraulic oil 10' in the rear chamber B flows into the front chamber A, through the rear intermediate oil passage

19, the rear oil passage 20, the first speed adjusting valve 21, the second speed adjusting valve 22, the check valve 23, the delayed action adjusting valve 24, and the front oil passage 25, all disposed in the second oil passage 35, as shown in Figs. 12 and 13.

At this moment, in the DA region, the quantity of the displaced hydraulic oil 10' can be minutely adjusted by the first speed adjusting valve 21, the second speed adjusting valve 22 and the delayed action adjusting valve 24. In this operation, however, in a case where the opening degree of the delayed action adjusting valve 24 is wider than those of the first and second speed adjusting valves 21 and 22, i.e. where the delayed action function is not attained, the quantity of the hydraulic oil 10' can be minutely adjusted by the first speed adjusting valve 21. The door opening angle region which can be adjusted by the first speed adjusting valve 21 is from 120° to 20° shown in Fig. 18. When the door is closed to a position of 70°, the front oil intermediate passage 26 is opened with the delayed action adjusting valve 24 being in a non operational condition.

With reference to the third embodiment of the floor hinge shown in Figs. 15 to 17, the operation will be carried out in a manner totally combined by those described above with reference to Figures 1 to 14 and, accordingly, the detail of the operation of the third embodiment is omitted herein.

According to the illustrated embodiment of the present invention, the ideal door opening and closing action can be achieved in suitable combination of the respective functions of the hydraulic circuit means of the hydraulic control system of the floor hinge.

Claims

1. A hydraulic control system of a hinge provided with a hinge case (8) in which is formed a cylinder portion (9) in which a piston (7) is linearly moved by a door opening action against an urging force of a return spring (11), the cylinder portion (9) being sectioned into a piston front chamber (A) and a piston rear chamber (B) by the location of the piston (7), and the door (30) being then automatically closed by accumulated returning force of the spring (11), the system comprising check valve means (14, 23) for restricting flow of a hydraulic oil when the door (30) is opened and closed, a back check adjusting valve means (18) for adjusting speed of the piston (7) in a door open angle region ranged from a predetermined door open angle position to a door fully open angle position, a speed adjusting valve means (21, 22) for adjusting speed of piston (7) in a door close angle region ranged from a door close angle position to a door almost close angle position, characterised in that the hinge is a floor hinge and that the system is further comprising a latching action means (15, 27, 28) for increasing speed of the pis-

ton (7) from the door almost close angle position to a door fully closed position, and that first and second oil passages (34, 35) extending longitudinally on a side wall (9a) of the cylinder portion (9) are independently formed so as to communicate with the rear and front chambers (A, B), said first oil passage (34) comprises a front passage (17) formed at a front portion thereof, a rear passage (15) formed at a rear portion thereof and two front and rear intermediate passages (13, 28) formed between the front and the rear passages (17, 15), a first check valve (14) of said check valve means for permitting the hydraulic oil to flow only from the front chamber (A) into the rear chamber (B) is provided between the two intermediate passages (13, 28) in the first oil passage (34), said back check adjusting valve means (18) is provided in the front passage (17) of said first oil passage (34), said latching action means operates when the rear passage (15) communicates with the rear intermediate passage (28) of the first oil passage (34), said second oil passage (35) comprises a front passage (25) formed at a front portion thereof, a rear passage (20) formed at a rear portion thereof and a rear intermediate passage (19) formed near the rear passage (20), a second check valve (23) for permitting the hydraulic oil to flow only from the rear chamber (B) into the front chamber (A) is disposed in the front passage (25) of the second oil passage (35), and said speed adjusting valve means has two speed adjusting valves, one of which is a first speed adjusting valve (21) disposed in the rear intermediate passage (19) located near the rear passage (20) of the second oil passage (35) so as to adjust speed of the piston (7) from a door fully opened position to a predetermined door close angle position and the other of which is a second speed adjusting valve (22) disposed in the rear passage (20) of the second oil passage (35) so as to adjust the speed of the piston (7) from the predetermined door close angle position to the door almost close angle position.

2. A hydraulic control system according to Claim 1, wherein said second oil passage (35) further comprises a front intermediate passage (26) provided near the front passage 25 in front of the rear intermediate passage (19).
3. A hydraulic control system according to Claim 1, wherein said check valve (14) disposed in the first oil passage (34) comprises a valve seat (14a), a ball (14b) and a press pin (14c) incorporated in the first oil passage (34) so as to hold the ball member (14b) in a floating manner.
4. A hydraulic control system according to Claim 1, wherein a latching action adjusting valve (27) is provided in the rear intermediate passage (28).

5. A hydraulic control system according to Claim 1, wherein said check valve (23) in the second oil passage (35) comprises a valve seat (23a) and a ball (23b).

Patentansprüche

1. Hydraulisches Steuersystem für einen Türschließer mit einem Türschließergehäuse (8), in dem ein Zylinderabschnitt (9) ausgebildet ist, in dem ein Kolben (7) durch einen Türöffnungsvorgang entgegen der Spannkraft einer Rückstellfeder (11) linear bewegt wird, wobei der Zylinderabschnitt (9) durch die Anordnung des Kolbens (7) in eine vordere Kolbenkammer (A) und eine hintere Kolbenkammer (B) unterteilt ist, und die Tür (30) dann automatisch durch die gespeicherte Rückstellkraft der Feder (11) geschlossen wird, wobei das System eine Rückschlag-Ventilvorrichtung (14, 23) zur Beschränkung des Flusses des Hydrauliköls, wenn die Tür (30) geöffnet und geschlossen wird, eine Rückschlageinstell-Ventilvorrichtung (18) zum Einstellen der Geschwindigkeit des Kolbens (7) in einem Türöffnungswinkelbereich zwischen einer vorbestimmten Türöffnungswinkelposition und einer vollständig geöffneten Türwinkelposition und eine Geschwindigkeitseinstell-Ventilvorrichtung (21, 22) zum Einstellen der Geschwindigkeit des Kolbens (7) in einem Türschließwinkelbereich zwischen einer Türschließwinkelposition und einer annähernd geschlossenen Türwinkelposition aufweist, dadurch gekennzeichnet, daß der Türschließer ein Fußboden-Türschließer ist, daß das System desweiteren eine Einschnappvorgang-Vorrichtung (15, 27, 28) zur Erhöhung der Geschwindigkeit des Kolbens (7) von der annähernd geschlossenen Türwinkelposition zu einer vollständig geschlossenen Türposition aufweist und daß ein erster und zweiter Ölkanal (34, 35), die längs auf einer Seitenwand (9a) des Zylinderabschnitts (9) verlaufen, unabhängig ausgebildet sind, so daß sie mit der hinteren und der vorderen Kolbenkammer (A, B) kommunizieren, wobei der erste Ölkanal (34) einen vorderen Kanal (17), der in einem dortigen vorderen Abschnitt ausgebildet ist, einen hinteren Kanal (15), der in einem dortigen hinteren Abschnitt ausgebildet ist, sowie einen vorderen und einen hinteren Zwischenkanal (13, 28) aufweist, die zwischen dem vorderen und dem hinteren Kanal (17, 15) ausgebildet sind, wobei ein erstes Rückschlagventil (14) der Rückschlag-Ventilvorrichtung, das einen Hydraulikölfluß nur von der vorderen Kammer (A) in die hintere Kammer (B) gestattet, zwischen den beiden Zwischenkanälen (13, 28) in dem ersten Ölkanal (34) vorgesehen ist und die Rückschlageinstell-Ventilvorrichtung (18) in dem vorderen Kanal (17) des ersten Ölkanals (34) vorgesehen ist, wobei die Ein-

schnappvorgang-Vorrichtung wirksam ist, wenn der hintere Kanal (15) mit dem hinteren Zwischenkanal (28) des ersten Ölkanales (24) kommuniziert, wobei der zweite Ölkanal (35) einen vorderen Kanal (25), der in einem dortigen vorderen Abschnitt ausgebildet ist, einen hinteren Kanal (20), der in einem dortigen hinteren Abschnitt ausgebildet ist, und einen hinteren Zwischenkanal (19) aufweist, der nahe dem hinteren Kanal (20) ausgebildet ist, wobei ein zweites Rückschlagventil (23), das einen Hydraulikölfluß nur von der hinteren Kammer (B) in die vordere Kammer (A) gestattet, in dem vorderen Kanal (25) des zweiten Ölkanales (35) vorgesehen ist und wobei die Geschwindigkeitseinstell-Ventilvorrichtung zwei Geschwindigkeitseinstellventile besitzt, von denen eines ein erstes Geschwindigkeitseinstellventil (21) ist, das in dem hinteren Zwischenkanal (19) nahe dem hinteren Kanal (20) des zweiten Ölkanales (35) angeordnet ist, um so die Geschwindigkeit des Kolbens (7) von einer vollständig geöffneten Türposition zu einer vorbestimmten Türschließwinkelposition einzustellen, und von denen das andere ein zweites Geschwindigkeitseinstellventil (22) ist, das in dem hinteren Kanal (20) des zweiten Ölkanales (35) angeordnet ist, um so die Geschwindigkeit des Kolbens (7) von einer vorbestimmten Türschließwinkelposition zu einer annähernd geschlossenen Türwinkelposition einzustellen.

2. Hydraulisches Steuersystem nach Anspruch 1, dadurch gekennzeichnet, daß der zweite Ölkanal (35) desweiteren einen vorderen Zwischenkanal (26) aufweist, der nahe dem vorderen Kanal (25) vor dem hinteren Zwischenkanal (19) vorgesehen ist.
3. Hydraulisches Steuersystem nach Anspruch 1, dadurch gekennzeichnet, daß das Rückschlagventil (14), das im ersten Ölkanal (34) angeordnet ist, einen Ventilsitz (14a), eine Kugel (14b) und einen Druckstift (14c) aufweist, der in den ersten Ölkanal (34) eingebaut ist und die Kugel (14b) in einem schwebenden Zustand hält.
4. Hydraulisches Steuersystem nach Anspruch 1, dadurch gekennzeichnet, daß ein Einschnappvorgang-Einstellventil (27) in dem hinteren Zwischenkanal (28) angeordnet ist.
5. Hydraulisches Steuersystem nach Anspruch 1, dadurch gekennzeichnet, daß das Rückschlagventil (23) in dem zweiten Ölkanal (35) einen Ventilsitz (23a) und eine Kugel (23b) aufweist.

Revendications

1. Un système de commande hydraulique pour un fer-

me-porte pourvu d'un boîtier de ferme-porte (8) dans lequel est formée une partie en cylindre (9) où un piston (7) est déplacé linéairement par une action d'ouverture de porte, à l'encontre de la force de rappel d'un ressort de retour (11), la partie en cylindre (9) étant subdivisée en une chambre de piston avant (A) et une chambre de piston arrière (B) par l'emplacement du piston (7), et la porte (30) étant ainsi automatiquement fermée par la force de retour accumulée du ressort (11), le système comprenant des moyens à clapet de non-retour (14, 23) pour limiter l'écoulement d'une huile hydraulique lorsque la porte (30) est ouverte et fermée, un moyen à vanne de régulation de freinage de fin d'ouverture (18) pour réguler la vitesse du piston (7) dans une région d'angle d'ouverture de porte allant d'une position d'angle d'ouverture de porte prédéterminée jusqu'à une position d'angle de pleine ouverture de porte, des moyens à vannes de régulation de vitesse (21, 22) pour ajuster la vitesse du piston (7) dans une région d'angle de fermeture de porte allant d'une position d'angle de fermeture de porte jusqu'à une position d'angle de porte presque fermée, caractérisé en ce que le ferme-porte est un ferme-porte de sol, en ce que le système comprend en outre des moyens à action de verrouillage (15, 27, 28) pour augmenter la vitesse du piston (7) à partir de la position d'angle de porte presque fermée jusqu'à la position de porte complètement fermée, et en ce que des premier et second passages d'huile (34, 35) s'étendant longitudinalement dans une paroi latérale (9a) de la partie en cylindre (9) sont formés indépendamment de manière à communiquer avec les chambres avant et arrière (A, B), ledit premier passage d'huile (34) comprenant un passage avant (17) formé en sa partie avant, un passage arrière (15) formé en sa partie arrière et deux passages avant et arrière intermédiaires (13, 28) formés entre les passages avant et arrière (17, 15), un premier clapet anti-retour (14) desdits moyens à clapet anti-retour pour permettre à l'huile hydraulique de s'écouler uniquement de la chambre avant (A) vers la chambre arrière (B) étant prévu entre les deux passages intermédiaires (13, 28) dans ledit premier passage d'huile (34), ledit moyen à vanne de régulation de freinage de fin d'ouverture (18) étant prévu dans le passage avant (17) dudit premier passage d'huile (34), lesdits moyens à action de verrouillage fonctionnant lorsque le passage arrière (15) communique avec le passage arrière intermédiaire (28) du premier passage d'huile (34), ledit second passage d'huile (35) comprenant un passage avant (25) formé en sa partie avant, un passage arrière (20) formé en sa partie arrière et un passage arrière intermédiaire (19) formé près du passage arrière (20), un second clapet de non-retour (23) pour permettre à l'huile hydraulique de s'écouler uniquement de la chambre arrière (B) vers la chambre

avant (A) étant disposé dans le passage avant (25) du second passage d'huile (35), et lesdits moyens à vannes de régulation de vitesse comportant deux vannes de régulation de vitesse, dont l'une est une première vanne de régulation de vitesse (21) disposée dans le passage arrière intermédiaire (19) se trouvant près du passage arrière (20) du second passage d'huile (35) afin d'ajuster la vitesse du piston (7) à partir d'une position de porte complètement ouverte jusqu'à une position d'angle de fermeture de porte prédéterminé, et dont l'autre est une seconde vanne de régulation de vitesse (22) disposée dans le passage arrière (20) du second passage d'huile (35) afin d'ajuster la vitesse du piston (7) à partir de la position d'angle de fermeture de porte prédéterminé jusqu'à la position d'angle de porte presque fermée.

2. Un système de commande hydraulique selon la revendication 1, dans lequel ledit second passage d'huile (35) comprend en outre un passage avant intermédiaire (26) prévu près du passage avant (25), en avant du passage arrière intermédiaire (19).
3. Un système de commande hydraulique selon la revendication 1, dans lequel ledit clapet de non-retour (14) disposé dans le premier passage d'huile (34) comprend un siège de clapet (14a), une bille (14b) et une broche d'arrêt (14c) incorporée dans le premier passage d'huile (34) afin de retenir la bille (14b) de façon flottante.
4. Un système de commande hydraulique selon la revendication 1, dans lequel une vanne de régulation d'action de verrouillage (27) est prévue dans le passage arrière intermédiaire (28).
5. Un système de commande hydraulique selon la revendication 1, dans lequel ledit clapet anti-retour (23) dans le second passage d'huile (35) comprend un siège de clapet (23a) et une bille (23b).

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FIG. 1

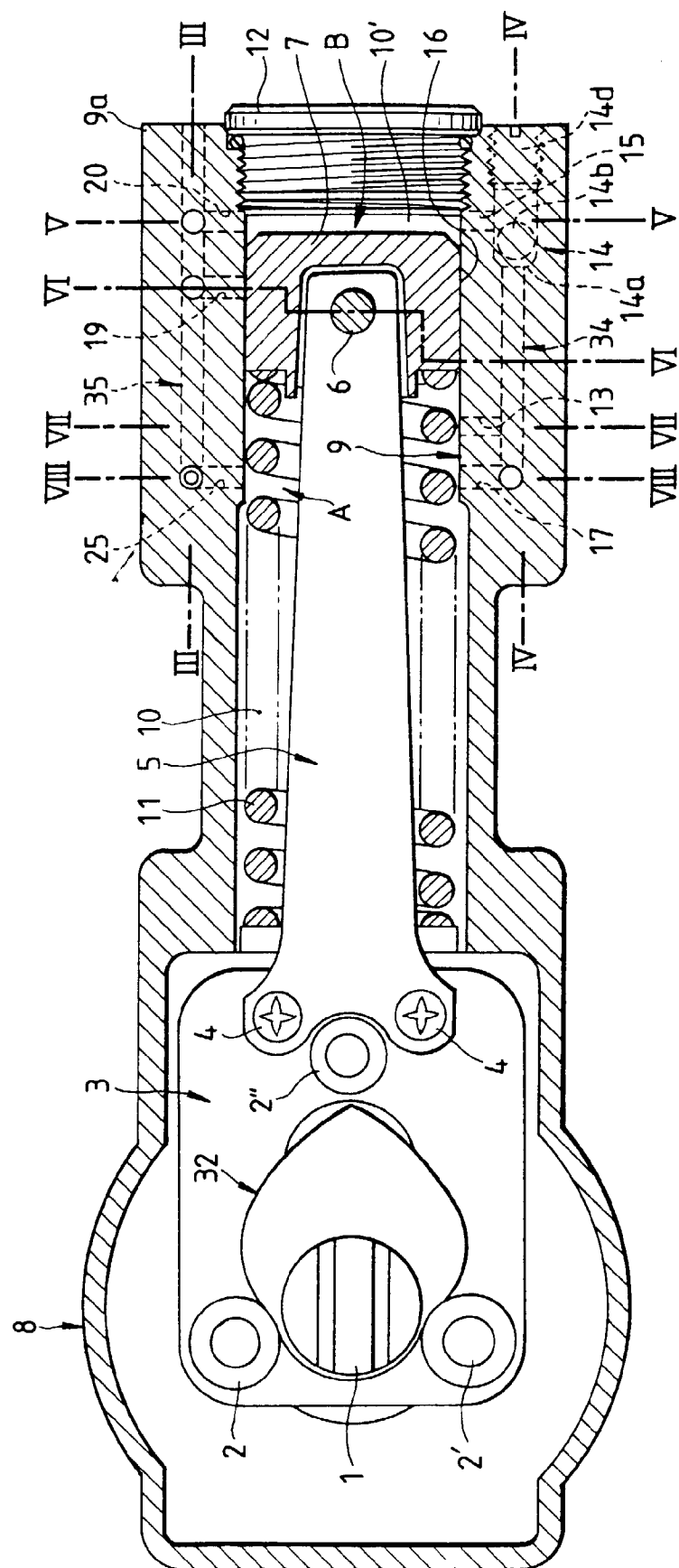


FIG. 2

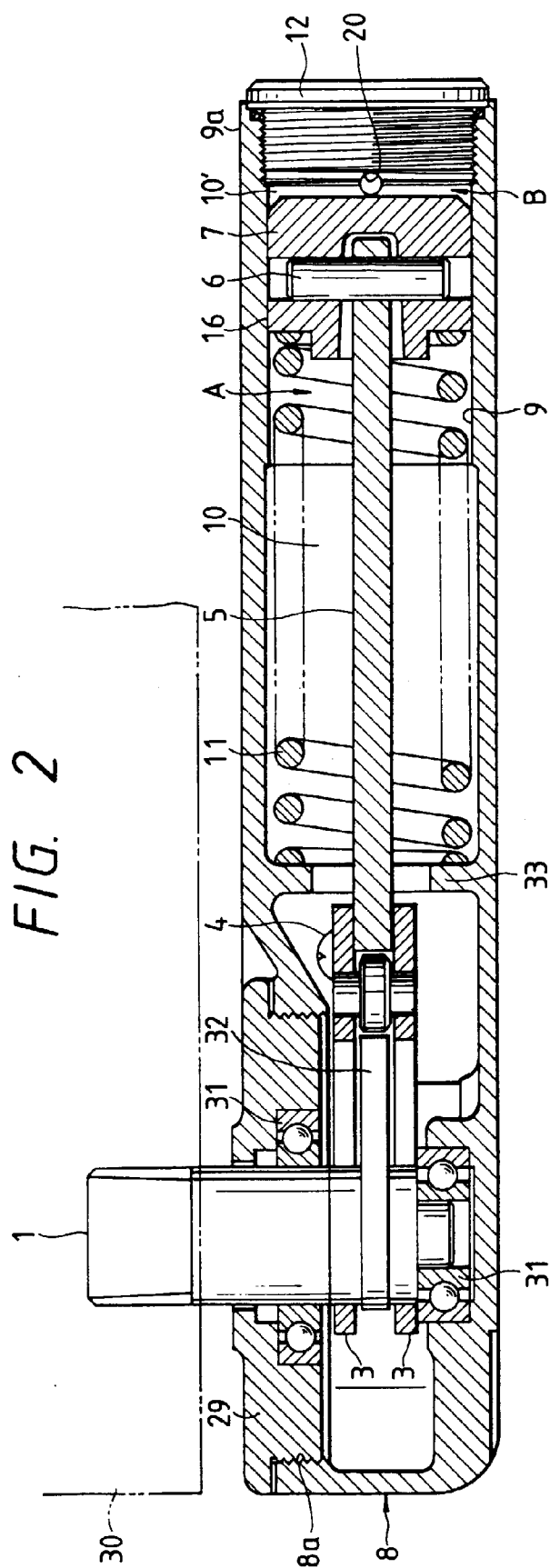


FIG. 4

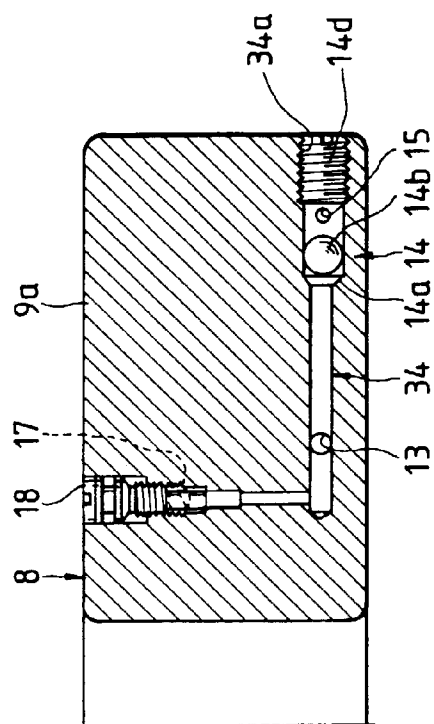


FIG. 3

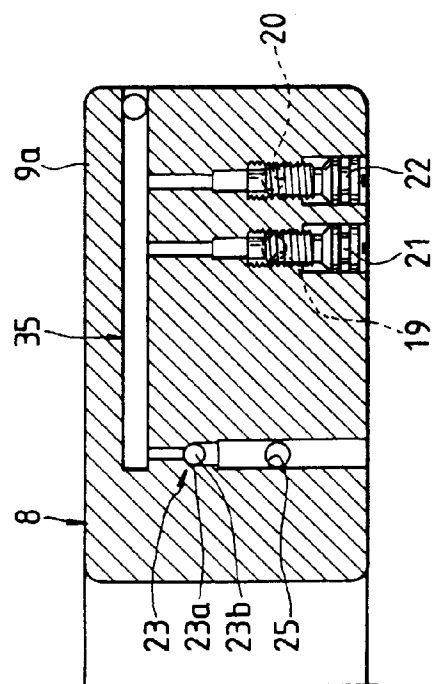


FIG. 5

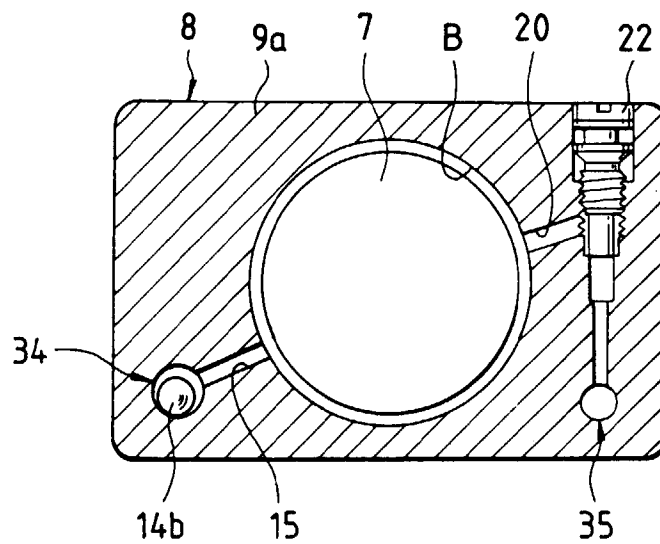


FIG. 6

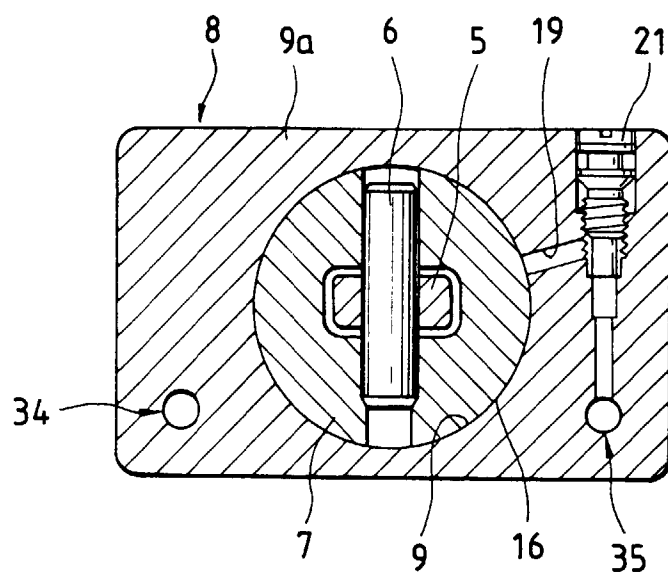


FIG. 7

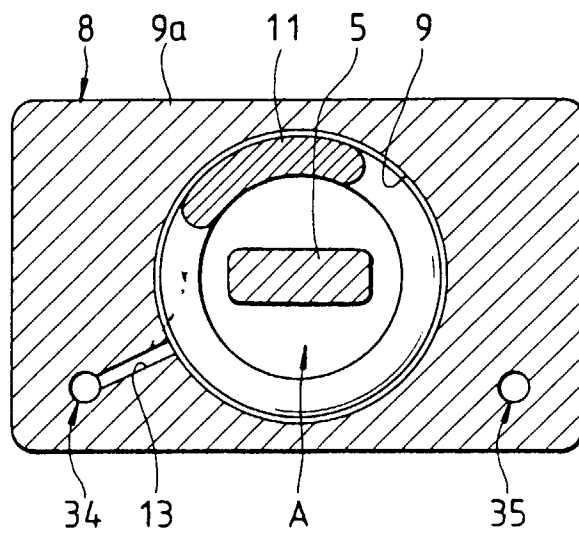


FIG. 8

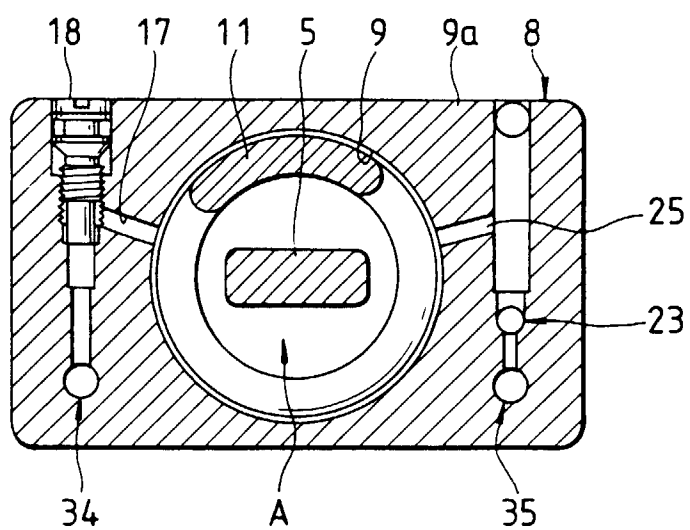


FIG. 9

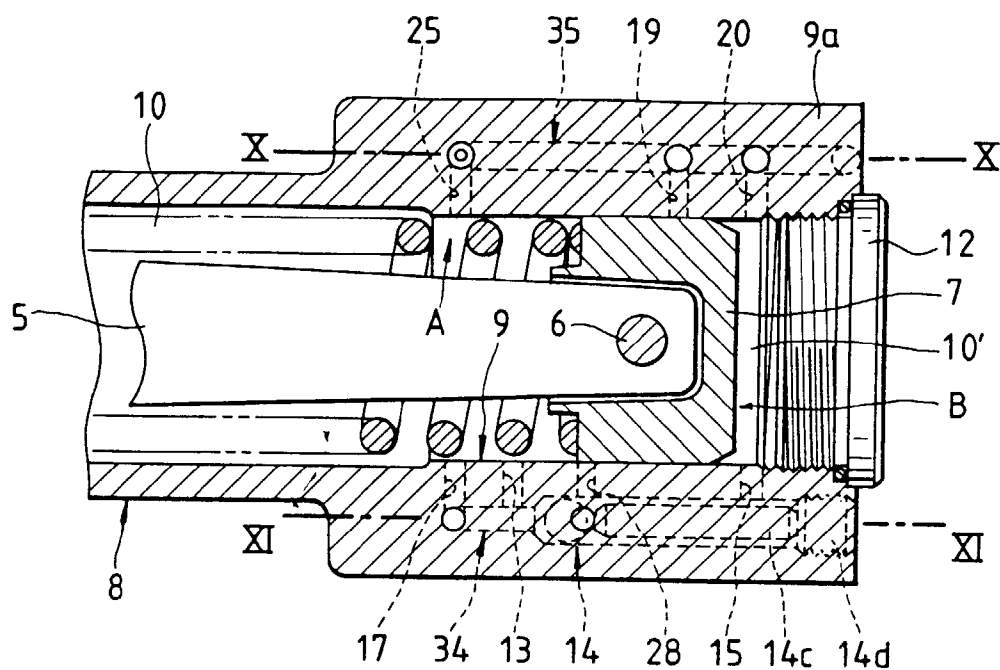


FIG. 10

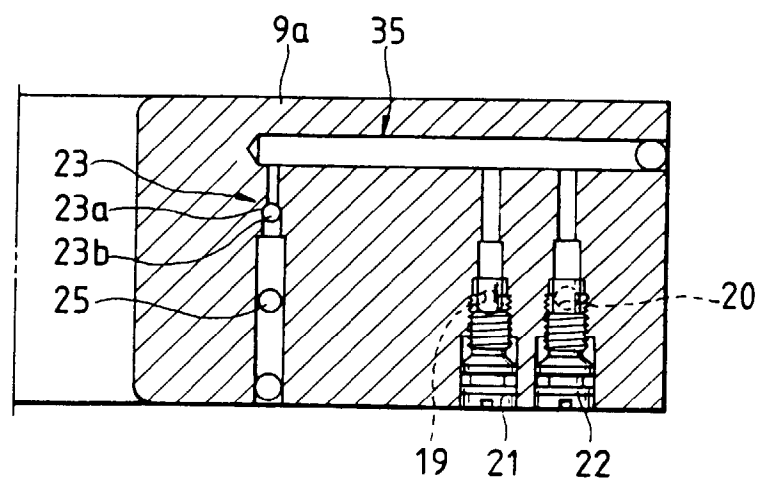


FIG. 11

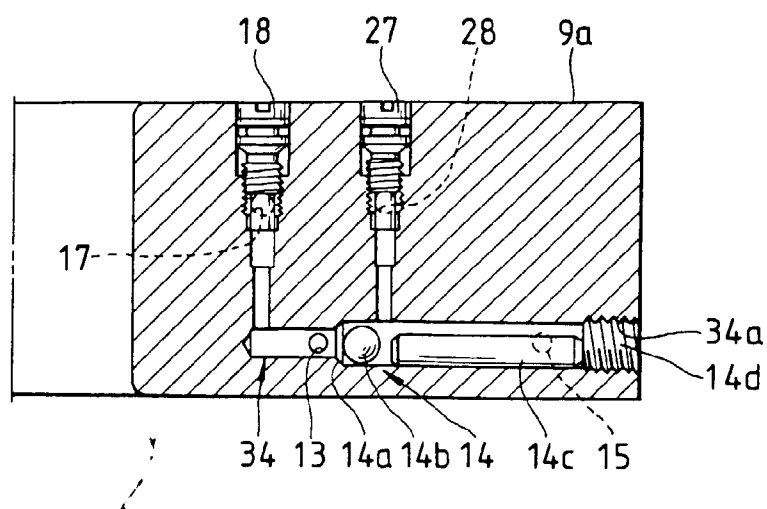


FIG. 12

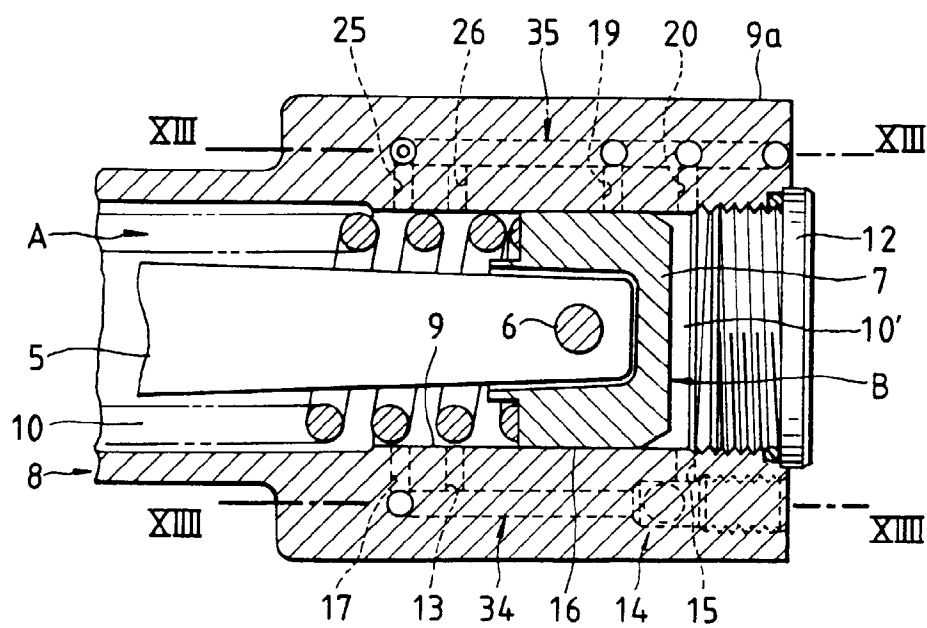


FIG. 13

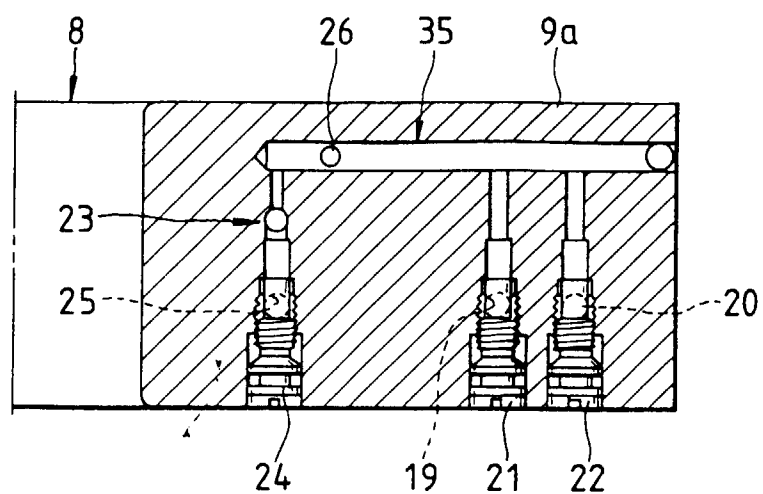


FIG. 14

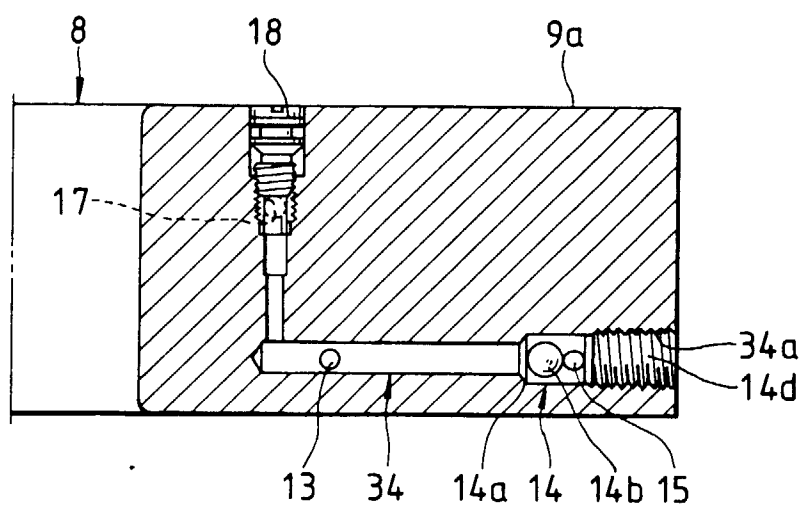


FIG. 15

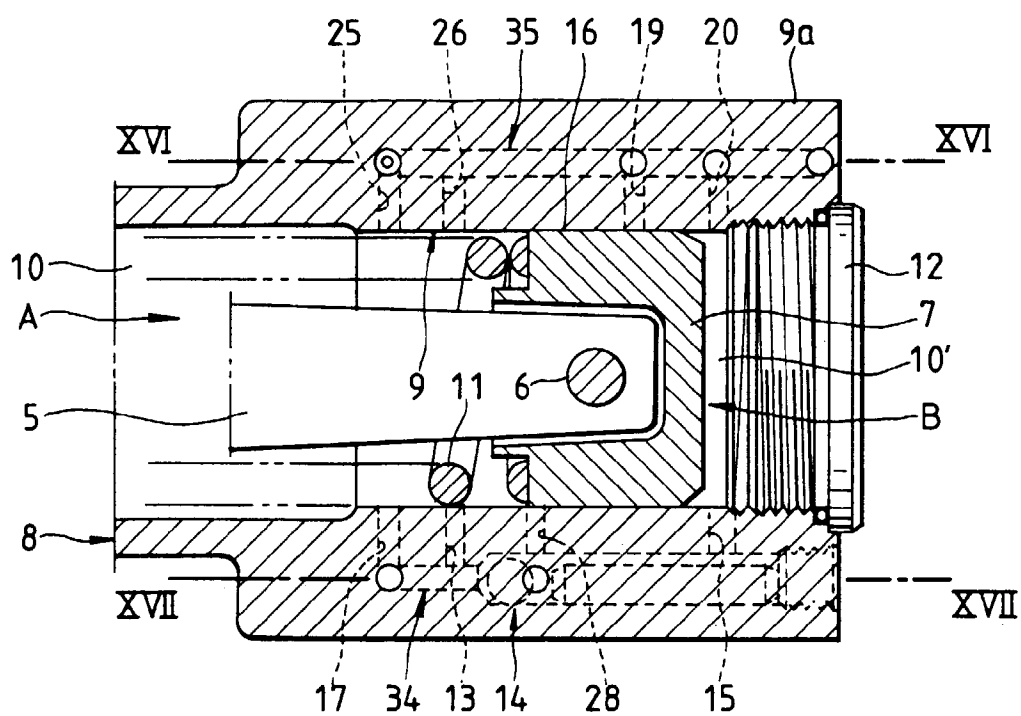


FIG. 16

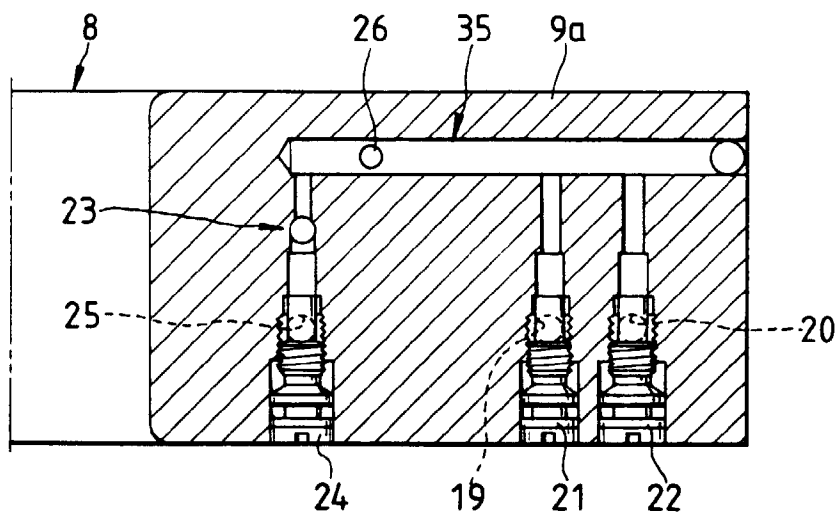


FIG. 17

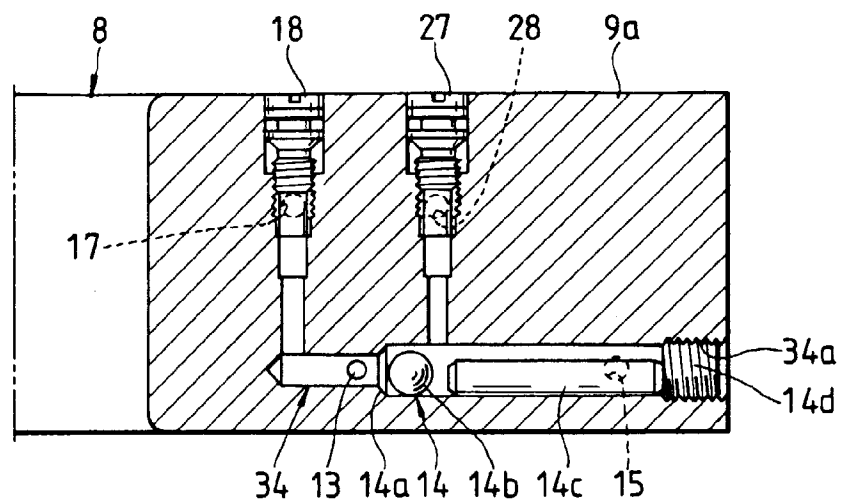


FIG. 18

