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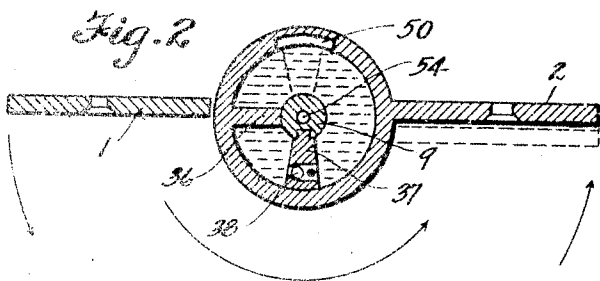
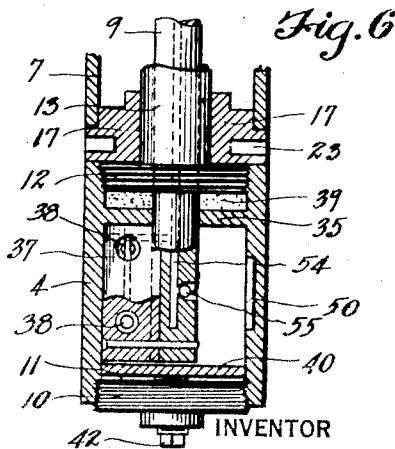
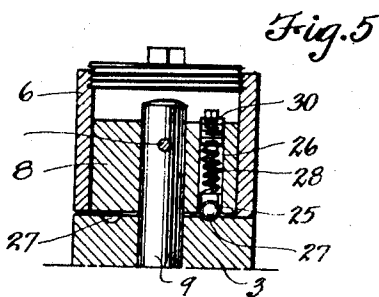
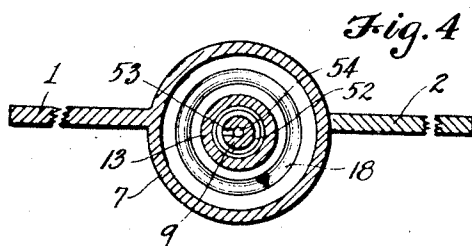
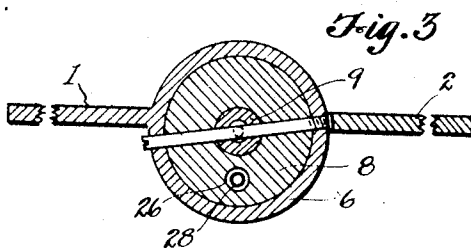
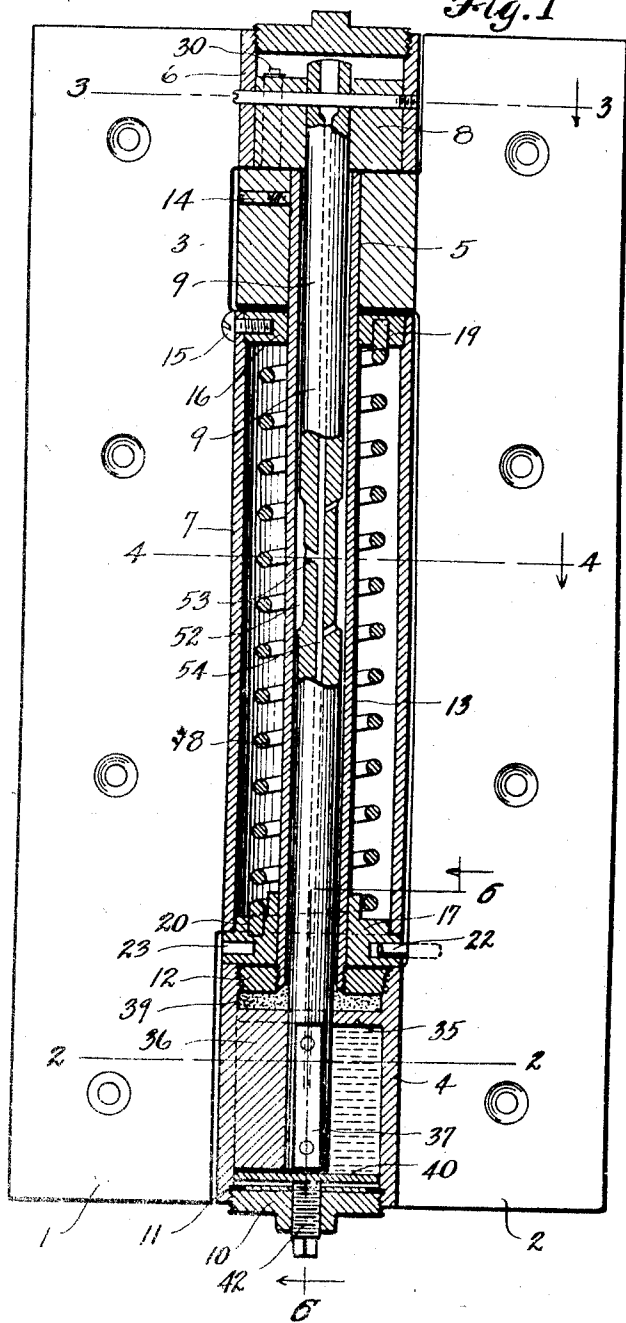
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1,701,022

DOOR HINGE

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Fig. 1



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DOOR HINGE.

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This invention relates to improvements in hinges and more particularly to a combination hinge and check suitable for use on heavy office or residence doors, it being the principal object of the invention to provide a door hinge of strong and durable character embodying a spring whereby the door, after being opened, will be brought back to closed position. Also, embodying a liquid check whereby its closing movement is retarded so as to prevent slamming of the door.

It is also an object of the invention to provide means for releasing the liquid check just prior to the door reaching its closed position so that the full force of the spring will act to latch the door.

Another object is to provide yieldable means for holding the door at certain open positions.

Still another object is to provide an adjustable means for varying the flow of liquid in the liquid check mechanism so that the rate of closing of the door may be varied as desired.

In accomplishing these and other objects, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Figure 1 is a hinge embodied by the present invention showing it in section longitudinally of the pintle.

Figure 2 is a horizontal section, taken on the line 2—2 in Figure 1, illustrating the liquid check mechanism.

Figure 3 is a horizontal section taken on line 3—3 in Figure 1.

Figure 4 is a horizontal section taken on line 4—4 in Figure 1.

Figure 5 is a sectional detail of the upper end portion of the hinge showing the ball and socket brake for yieldably retaining the door at certain open positions.

Figure 6 is a sectional detail taken in line 6—6 in Figure 1.

Referring more in detail to the drawings—

The hinge comprises the two complementary leaves 1 and 2 that are adapted to be fixed respectively to a door and to its casing. The leaf 2 is provided near its upper end with an integrally cast circular lug 3 and, at its lower end, with an integrally formed cylinder 4 that is in coaxial alinement with a hole 5 that is bored in the lug 3. The leaf 1 is cast integral with a short cylindrical portion 6 at its upper end that is adapted to seat coaxially

upon the upper face of the lug 3, and with an elongated cylindrical portion 7 adapted to be disposed coaxially between the lug 3 and cylinder 4. A bushing 8 is fitted within the cylindrical portion 6 and a pintle 9 extends coaxially through the bushing 8, lug 3 and into the cylinder 4 to pivotally join the leaves.

The lower end of the cylinder 4 is closed by a plug 10 that is threaded thereinto against a washer 11 and its upper end is closed by a plug 12 having a tapered thread which permits the plug to be tightened sufficiently to preclude any leakage from the cylinder. A tube 13 encloses the pintle and is threaded at its lower end into the plug 12 and at its upper end is fitted tightly in the hole 5 through lug 3 and is held by a set screw 14.

Fixed within the upper end of the cylindrical portion 7 of the leaf 1 by means of a set screw 15 is a ring 16 revolvably fitted about the tube 13, and revolvably fitted about the tube, between the lower end of cylindrical portion 7 and the cylinder 4, is a ring 17. A coiled spring 18 is enclosed within the cylinder 7 about the tube and this is seated at its ends in sockets 19 and 20, respectively, in the rings 16 and 17. Operative connection between the ring 17 and the leaf 2 is provided by means of a stud 22 that may be projected into any one of a plurality of sockets 23 in the ring so that its outer end will engage with the inner edge of the leaf. The tension of the spring may be adjusted as is desired by turning this ring and the tension then held by the stud. When the door is opened, then released, the spring tension swings the door to closed position.

In Figure 5, I have illustrated a ball and socket brake for holding the door in open positions. This consists of a ball 25 that is contained in a hole 26 in the plug 8 and is adapted to seat in sockets 27 in the upper face of the lug 3. The ball is pressed downwardly by means of a coiled spring 28 retained in the upper portion of the hole 26 by a plug 30. The sockets 27 are so located as to receive the ball when the door is at certain desired positions and the tension of the spring is so adjusted as to yieldably hold it seated to retain the door against movement by the spring 18 except when the door is given some starting pressure or when it has some momentum.

In order to retard the closing movement of the door so as to prevent its slamming, I have provided the liquid check mechanism as disclosed best in Figures 1, 2 and 6. The

cylinder 4, as shown, is provided across its upper end with a horizontal partition wall 35 and extending downwardly from this to near the lower end of the cylinder, is a vertical partition wall 36 which closes off the cylinder at one side of the pintle. Fixed to the pintle is a piston 37 provided with one or more back check valves 38, as shown in Figure 2, which open as the hinge is moved toward open position but which close during closing movement of the hinge. The cylinder is filled with a suitable liquid, such as oil, and this is retained by suitable packing 39 between the partition 35 and plug 12. Fitted within the lower end of the cylinder is a plate 40 that may be adjusted from and away from the end of the pintle and piston by means of an adjusting screw 42 threaded upwardly through the plug 10. This adjustment is provided in order that the rate of closing of the door may be varied as is desired by permitting a passage of more or less oil past the piston. There is also provided in the cylinder wall, a by-pass channel 50 which provides for a fast flow of oil past the piston as it crosses the by-pass and when the hinge is almost closed. This is provided in order that the retarding effect will be released and the full force of the spring utilized to latch the door as it closes.

In the event that oil from the cylinder should leak past the packing into the tube 13, this will be caught in a restricted portion 52 of the pintle and drained back through channels 53 into a bore 54 centrally of the pintle leading into the cylinder, through a back check valve 55 shown in Figure 6.

Assuming the device to be so constructed, it will be seen that when the door is swung open the pintle is rotated with the swinging leaf of the hinge and this causes the piston 37 to swing in the cylinder 4 and the oil trapped between it and the partition wall 36 to be forced past the check valves 38 and between the lower ends of partition 36 and the piston and the plate 40 to the other side of the piston. Then when the door is released the spring 18 acts to close the hinge but the closing action is much retarded since the valves 38 will close as soon as the closing action starts and movement is limited by the rate of flow past the lower end of the piston, but when the piston reaches the by-pass 50, the checking or holding effect ceases and the door is snapped shut by the spring.

Such hinges may be made in various sizes, various types of valves may be used and various details of construction may be varied to suit conditions, and for these reasons, I do not wish to confine my claims only to the device as herein shown.

Having thus described my invention, what

I claim as new therein and desire to secure by Letters-Patent, is:

1. A hinge comprising complementary leaves, a pintle pivotally connecting the leaves and fixed relative to one, a liquid container fixed relative to the other leaf, resilient means for moving the hinge from open to closed position and a piston fixed to the pintle and movable against liquid in the container to retard the closing movement; said pintle having a channel leading from its upper end into the liquid container through which the latter may be filled.

2. A hinge comprising complementary leaves, a liquid container fixed relative to one of the leaves, a pintle pivotally connecting the leaves and fixed to rotate with the other leaf and extended into said liquid container, a piston fixed to the pintle for movement against liquid in the container to retard closing movement of the hinge and a valve in the piston adapted to open with opening movement of the hinge; said pintle having a channel leading from its upper end and opening laterally into the liquid container, and a back check valve in said channel.

3. A hinge comprising complementary leaves, a pintle pivotally connecting the leaves and fixed relative to one, a liquid containing cylinder fixed relative to the other and coaxially receiving one end of the pintle, a partition wall in the cylinder at one side of the pintle, a piston fixed to the pintle, back check valve means in the piston adapted to open during opening movement of the hinge, a by-pass in the cylinder for relieving pressure against the piston as the hinge nears closed position, and a spring acting against the hinge leaves for urging the hinge toward closed position.

4. A hinge comprising complementary leaves, a pintle pivotally connecting the leaves, means fixing the pintle relative to one of said leaves, a liquid containing cylinder formed integral with the other leaf and receiving the lower end of the pintle coaxially therein through a packed gland, resilient means for closing the hinge, a piston fixed on the pintle and spaced from the lower end of the cylinder, a partition wall in the cylinder at one side of the pintle and a back check valve in the piston, a tube enclosing the pintle and opening into the cylinder; said pintle having oil receiving ports and a drainage channel therein leading into the cylinder for carrying back oil that passes into the tube through the packed gland, and a back check valve in said channel.

Signed at Tacoma, Washington, this 30 day of September, 1926.

DAVID W. THORNTON