May 23, 1939. N. J. WEISER 2,159,067

DOOR CLOSER AND CHECK

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Fig. 1.

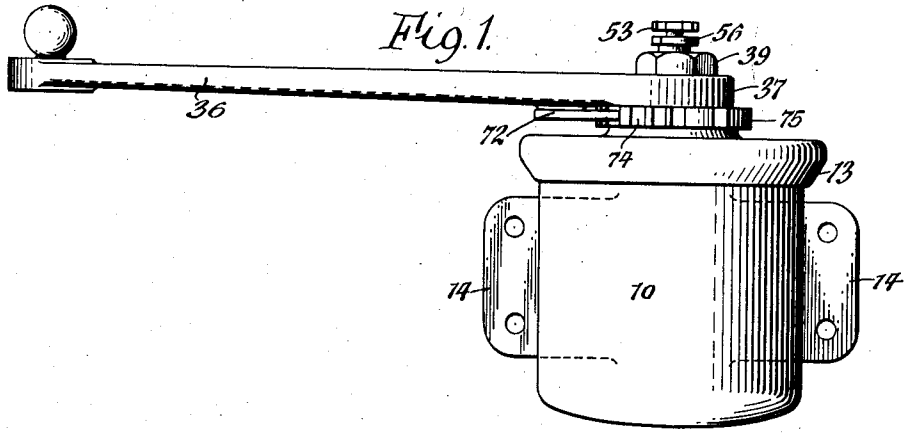
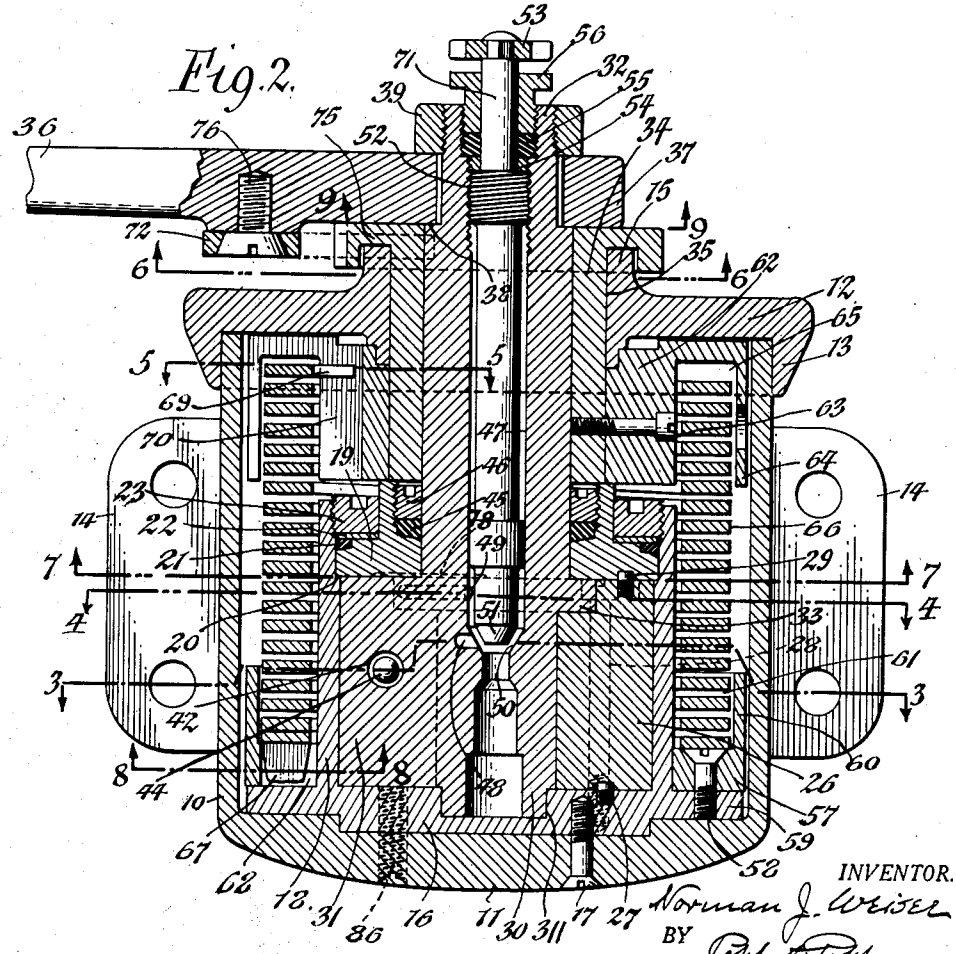



Fig. 2.




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DOOR CLOSER AND CHECK

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Fig. 3.

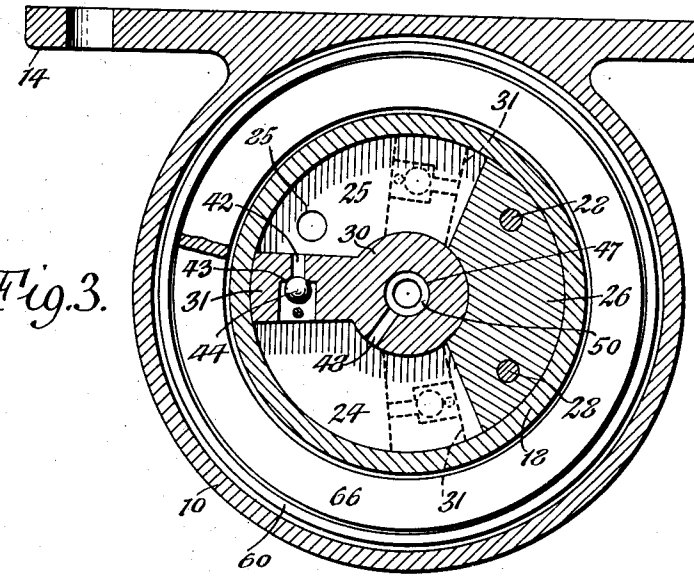
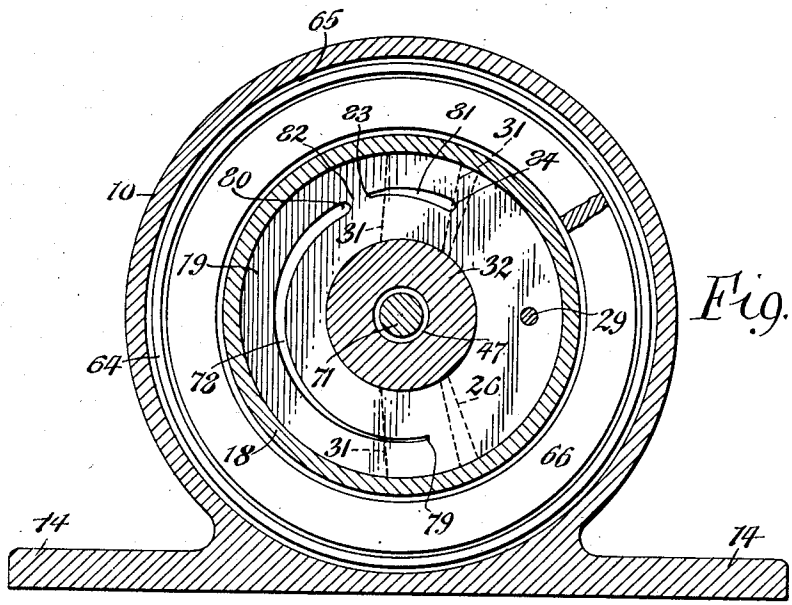



Fig. 7.




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DOOR CLOSER AND CHECK

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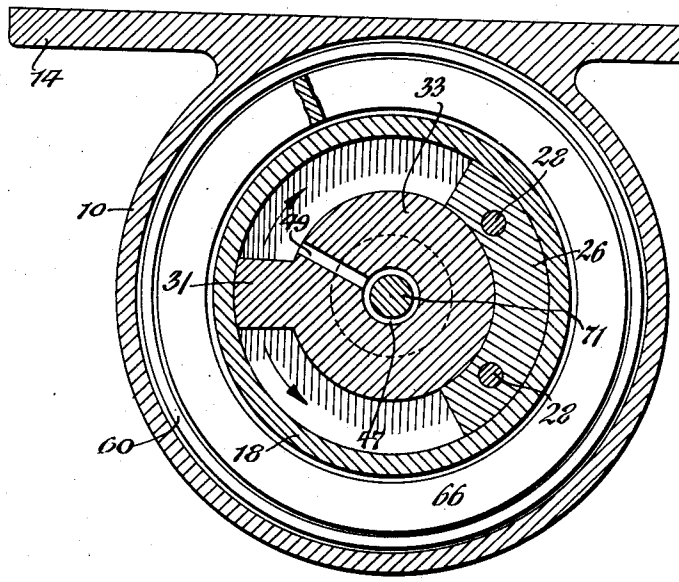



Fig. 4.

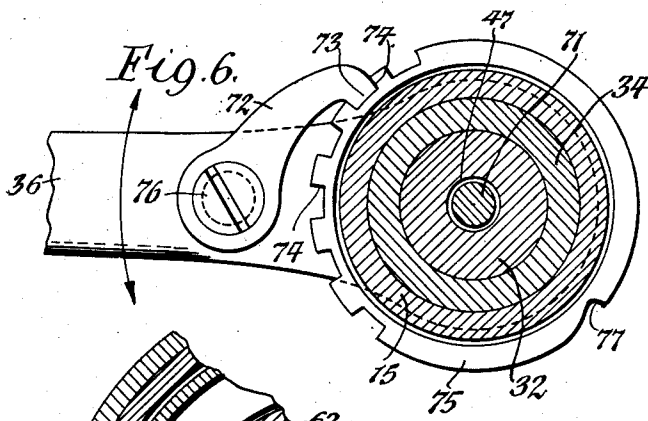



Fig. 6.

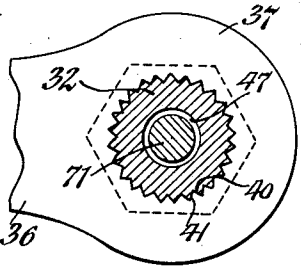



Fig. 9.

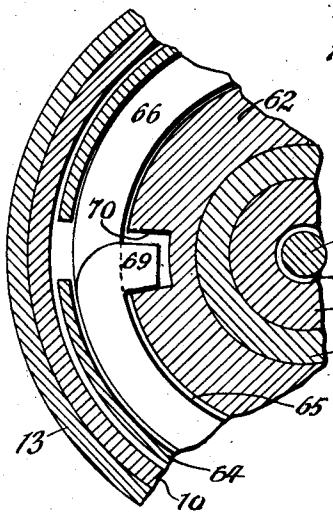



Fig. 5.

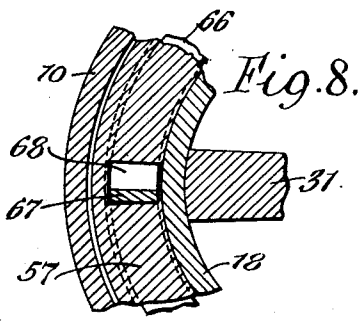



Fig. 8.

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# UNITED STATES PATENT OFFICE

2,159,067

## DOOR CLOSER AND CHECK

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Application October 26, 1937, Serial No. 171,061

9 Claims. (Cl. 16—58)

This invention relates to a hydraulic door closer and check of the type in which a spring is utilized to close a door and a liquid is employed to the closing movement of the same.

One of the objects of this invention is to provide a door closer and check of this character which is very strong, durable and compact in construction and capable of being manufactured at low cost.

Another purpose is to so organize the several parts that the door can be moved uniformly, easily and quickly into a more or less open position at the same time the return spring is wound up to increase the tension of the same, but during the subsequent closing movement of the door the latter is first only checked moderately so that it moves comparatively fast in order to reduce draft through the door to a minimum, then the door during the intermediate part of its closing movement is checked to a greater extent so as to avoid slamming the door shut, and then the checking effect on the door during the final part of its closing movement is reduced so as to permit the spring which is now weakened to fully close the door.

A further object of this invention is to assemble the several parts in such manner that the resistance liquid is protected by an air cushion against freezing during low temperatures.

A still further aim of this invention is to provide a door closer and check in which the several parts are conveniently accessible for adjustment, inspection and repairing and are not liable to get out of order under severe usage.

In the accompanying drawings:

Fig. 1 is a side elevation of a door closer and check embodying the several features of this invention.

Fig. 2 is a vertical section of the same, on an enlarged scale.

Figs. 3, 4 and 5 are horizontal sections taken respectively on lines 3—3, 4—4, and 5—5, Fig. 2 looking downwardly.

Figs. 6, 7, 8 and 9 are similar views taken on the correspondingly numbered lines in Fig. 2, looking upwardly.

In the following description similar characters of reference indicate like parts on the several figures of the drawings:

The apparatus includes an inclosing casing for some of its working parts which comprises an upright outer cylindrical wall 10, a bottom 11 which closes the lower end of the space within this wall and is preferably formed integrally therewith, and a cover 12 which closes the upper end of this space and is secured to this outer wall by an annular flange 13 depending from the cover and secured by a driving fit around the upper end of this wall, as shown in Fig. 2. The wall of this casing is provided with lugs 14 for attaching the same to a door which is hinged on a wall and the central part of the casing cover is provided with a vertical tubular hub 15.

Within the lower part of the casing is arranged a liquid pressure or working cylinder which forms part of the means whereby the resistance liquid is alternately moved in opposite directions during opening and closing of the door. This liquid pressure cylinder includes a lower head 16 resting on the bottom of the outer casing and secured thereto by a screw 17, or other suitable means, an upright cylindrical wall 18 rising from this head and preferably formed integrally therewith, and an upper head 19 which closes the upper end of the liquid cylinder wall and is detachably connected therewith, as shown in Fig. 2. The downward movement of the upper head relative to the liquid cylinder is limited by providing the latter with an internal upwardly facing shoulder 20 against which the peripheral edge of this cover is held by a packing device consisting preferably of a packing ring or gasket 21 resting on top of the marginal part of the head 19 and engaging the bore of the liquid cylinder, a washer 22 engaging the upper side of the gasket, and a presser ring or gland 23 threadingly connected with the wall of the liquid cylinder and engaging the upper side of the washer 22.

The interior of this liquid cylinder is divided to form a segmental space adapted to contain the resistance liquid of the apparatus which preferably consists of castor oil or other suitable viscous liquid, one end of this space forming a compression chamber 24 and the other end forming a non-compression chamber 25, and the length of the chamber as a whole being about 210 degrees of a circle.

The means for dividing the interior of the liquid cylinder in this manner include a segmental abutment or partition 26 which is arranged in this cylinder on one side of its center so as to engage the adjacent parts of the bore and upper and lower heads of this cylinder and held against circumferential displacement therein by a dowel pin 27 secured to the lower head of the liquid cylinder and detachably engaging with a recess in the lower end of the abutment 26, and also bolts 28 which connect the abutment with the bottom head of the liquid cylinder. The upper head of the liquid cylinder is prevented from

turning by an upper dowel pin 29 secured to the upper end of the abutment and engaging with a recess in the upper cylinder head 19. The compression chamber 24 and the non-compression chamber between the wall of the liquid cylinder and the abutment are separated from each other by the lower section or part 30 of an upright rock shaft, which turns with one side of its periphery in engagement with the side of the abutment, and an oscillating vane, wing or piston 31 extending radially from the opposite side of this part of the rock shaft and turning in engagement with the bore of the wall of the liquid cylinder, as shown in Figs. 3 and 4. The lower end of the lower section of the rock shaft is journaled in a step bearing 311 and the upper section 32 of the shaft extends upwardly from its companion lower section through the top head 19 of the cylinder and to the exterior of the casing where it is connected with the means whereby this shaft and the parts connected therewith are actuated. Between the lower and upper sections of the rock shaft the same is provided with a collar 33 which bears against the upper end of the abutment 26 and is engaged on its upper side by the upper cylinder head 19, thereby holding the shaft against vertical displacement when the parts are assembled and the apparatus is in operation. The upper section of the rock shaft is journaled in an adjusting sleeve or bushing 34 which serves as a bearing therefore and also as part of the means for operating and adjusting the spring which is strained by the opening of the door and operates to close the same. The bushing or sleeve extends through and is journaled in a cylindrical bearing opening 35 in the upper head 12 of the casing. An oscillating movement of the rock shaft and the liquid cylinder, relatively to one another is produced by connecting the rock shaft with the frame or wall upon which the door is hinged. This is preferably accomplished by means which include a rock arm 36 connected by suitable linkage with the door frame and having an eye 37 at its inner end which receives the outer end of the rock shaft and is clamped thereon between an upwardly facing shoulder 38 on the shaft and a clamping nut 39 screwed on this end of the same. The cooperating surfaces of the upper parts of the rock shaft and the inner end of the rock arm are preferably provided with interlocking serrations or ribs 40, 41, as shown in Fig. 9, so as to permit of adjusting the rock arm and rock shaft circumferentially relative to one another but hold the same reliably in place after such adjustment.

When the door is opened the rock shaft and liquid cylinder are turned relatively to each other so that the vane or wing 31 moves toward the non-compression end or chamber 25 of the liquid space in the cylinder during which time the resistance liquid is permitted to flow with comparative freedom from the non-compression chamber 25 to the compression chamber 24 of the cylinder in order to permit the door to be opened without appreciable resistance. When, however, the door is moved in the direction for closing the same the flow of resistance liquid from the compression chamber 24 to the non-compression chamber is restricted or reduced so as to check the closing movement of the door. This variation in the flow of the resistance liquid is produced by a checked by-pass 42 which is preferably formed in the vane 31 so as to communicate with the compression and non-compression chambers and having a seat 43 facing toward the compression chamber, and a check valve 44 arranged in the by-pass and movable away from said seat for opening the by-pass when the vane moves toward the non-compression chamber and thus permits free flow of liquid from the latter to the compression chamber, but when the vane moves toward the compression chamber the check valve engages its seat and closes the by-pass so that flow of liquid through the same is prevented and the movement of the vane and the parts associated therewith are at this time retarded.

Leakage of fluid is prevented through the joint between the upper cylinder head 19 and the upper section of the rock shaft by a packing ring or gasket 45 interposed between the central part of this head and the periphery of the upper shaft section 32, and a presser ring or gland 46 bearing against the top of this gasket and having a screw connection with the upper cylinder head.

Means are provided where some of the resistance liquid is permitted to flow back and forth during both the compression and non-compression strokes of vane in the cylinder which means are adjustable so as to permit the resistance of the liquid to the closing movement of the door to be regulated to suit different requirements. The liquid adjustment means for this purpose shown in the drawings are constructed as follows:

The numeral 47 represents a main longitudinal passage or opening formed axially in the sections of the rock shaft and having its lower part connected by a lower regulating port 48 with the compression chamber and by an upper regulating port 49 with the noncompression chamber, said lower port being formed in the lower section of the rock shaft, and said upper port being arranged in the thrust collar 33 above this lower port. Between the upper and lower regulating ports the main regulating passage 47 is provided with an upwardly facing valve seat 50 which is opposed by a regulating valve 51 arranged in the regulating passage. This regulating valve is adjustable toward and from the seat 50 so as to increase or decrease the freedom of flow of liquid through the main regulating passage and regulating ports back and forth between the compression and noncompression chambers. This adjustment is preferably effected by forming the regulating valve on the lower end of a valve stem 71 which is arranged within the axial opening of the rock shaft and has its upper part connected therewith by a screw joint 52 so that by turning this valve stem in one direction or the other, through the medium of a finger piece 53 on the upper end of this valve stem, the regulating valve 51 may be moved toward or from the seat 50 and thus vary the rate of flow of liquid through the regulating ports and the resistance to closing movement of the door as best suits a particular installation. A liquid tight joint is produced between the regulating valve stem and the rock shaft by a packing consisting preferably of a thrust ring 54 surrounding the upper part of the valve stem and screwed into the upper part of the bore of the rock shaft, a packing ring, or gasket 55 surrounding the valve stem and resting on the thrust ring and an upwardly facing shoulder in the bore of this rock shaft, and a gland or presser ring 56 surrounding the valve stem and engaging the top of the gasket 55 and having a screw connection with the adjacent part of the rock shaft.

During the opening movement of the door a spring device is strained so as to increase its tension and when this door is released the resili-

ence of the spring of this device serves to close the door automatically. In its preferred form this spring return device as shown in the drawings is constructed as follows:

The numeral 57 represents a lower retaining ring which surrounds the lower part of the liquid pressure cylinder 18 and is fastened by one or more screws 58 to an annular flange 59 projecting laterally from the lower end of the pressure cylinder and resting on the lower head 11 of the casing. At its outer edge this lower retaining ring is provided with an upstanding guard rim or skirt 60 which forms an annular upwardly extending channel 61 between this rim and the adjacent lower part of the cylinder wall 18. The numeral 62 represents an upper retaining ring which surrounds the lower part of the adjusting sleeve 34 and is secured thereto by a screw 63, as shown in Fig. 2. This adjusting ring 62 turns on the inner end of the hub 15 of the upper casing head and is provided on its outer edge with a depending guard rim 64 which is spaced from the upper retaining ring so as to form an annular channel 65 between the same. By thus arranging the opposite ends of the helical spring in the channels of the retaining rings, this spring is held in place and prevented from becoming distorted or out of shape and possibly rendered inefficient.

The numeral 66 represents a helical spring which surrounds the wall of the pressure cylinder and the upper retaining ring and has its lower and upper ends arranged in the lower and upper channels 61 and 65. This spring is preferably made from a flat strip of steel and coiled so that the wide faces are transverse to the axis of the spring and the narrow edges parallel therewith, as shown in Fig. 2, so that this spring can be readily wound and unwound while in use but resist lateral displacement and also permits of employing a comparatively long spring in the length of space which is available for its reception. The lower end of the spring is anchored so that the same is stationary but the upper end of the same is operatively connected with parts which turn with the operating arm 36 so that upon opening the door the spring will be wound up in order to increase its tension and when the door is released the resilience of the spring will shut the door. Although various means may be employed for fastening the opposite ends of the spring to the respective parts of the apparatus for this purpose this is preferably accomplished by providing lower end of the spring with a depending attaching lug or lip 67 which engages with a radial slot 68 formed in the lower retaining ring 57 while the upper end of the spring is provided with an inwardly projecting attaching lug or lip 69 which is arranged in a longitudinal slot or groove 70 formed in the periphery of the upper retaining ring, as shown in Figs. 2, 5 and 18. Upon moving the sleeve 32 in the direction for opening the door the spring will be wound up from its upper end and when the door is released the same will be closed by the resilience of the spring which operates to return the upper retaining ring 62, adjusting sleeve 34 and rock arm 36. Means are provided for normally causing the rock arm 36 and the adjusting sleeve 34 to turn in unison but also permit this sleeve to be adjusted relative to this arm in order to place the spring under the desired tension. This adjustment is preferably effected by the means which are shown in Figs. 1, 2, and 6 and which consist of a detent dog or pawl 72 pivoted by a screw 75 on the under side of the rock arm 36 and having a nose or beak 73 engaging with one of a plurality of ratchet-notches 74 formed in a segmental row on the periphery of a flange 75 arranged at the upper end of this adjusting sleeve.

After the door closer and check has been mounted on a door and its frame the adjusting sleeve is first turned in the proper direction while the door is closed to place an initial tension on the spring 66 and then the detent pawl is turned so as to engage its beak with the respective notch 74, whereby the rock arm and adjusting sleeve will be coupled so that the door, when opened, will increase the tension of the spring and thereby insure prompt closing of the door when the same is released. To facilitate turning of the adjusting sleeve for initially tensioning the spring the flange 75 is provided with a wrench notch 77 which is adapted to receive a suitable wrench or tool for turning the adjusting sleeve.

As shown in the drawings the parts of the door closer and check are organized for use on a left hand door but for a right hand door some parts of this device are organized in a position reverse of that shown in the drawings.

During the closing movement of the door the same is resisted by the liquid in the pressure cylinder and the rate of this movement therefore depends on the speed at which the resistance liquid flows from the compression chamber through the regulating conduits into the non-compression chamber while the check valve is closed. As the spring unwinds the same becomes weaker although resistance of the retarding fluid remains the same. In the absence of any provision to compensate for this weakening of the spring a very heavy spring would have to be employed in order to ensure the final closing of the door at which time additional power is required to overcome the resistance of the door latch. An unduly strong spring, however, is objectionable on account of the liability of slamming the door shut noisily instead of closing the same quietly. Means have therefore been provided to permit a gradually freer flow of resistance liquid from the compression chamber to the non-compression chamber as the spring becomes weaker up to the time that the door has nearly reached its closed position and thus enable the major part of this movement to be effected quickly and reduce to a minimum drafts through the doorway, then reduce the freedom of this flow of resistance liquid to quickly retard the closing movement of the door, and then restore greater freedom in the flow of this liquid so as to permit the spring to complete the closing of the door effectively but quickly. The preferred means for accomplishing this purpose are constructed as follows:

On the underside of the upper head 19 of the pressure cylinder is formed a comparatively long main liquid controlling groove or conduit 78 which is preferably of crescent form and concentric or substantially so with the axis of rock shaft and vane and extending from the place where the vane stands in the pressure cylinder when the door is in its fully opened position which is indicated at 79, to a place where the vane stands just before the door reaches its closed position which is indicated at 80 in Fig. 7. This main controlling groove begins at 79 on the flat underside of the upper cylinder head or cover 19 co-incident with the place where the vane begins its door closing stroke. At this place the

groove is of comparatively small cross-sectional area and then gradually increases in this area until it is greatest at the opposite extremity 80 of the groove which is co-incident with the place where the vane arrives when the door has nearly reached the end of its closing movement. This variation in the cross-sectional area of the main controlling groove may be obtained by making the same of uniform depth, as indicated by dotted lines in Fig. 2, and of gradually increasing width from its extremity 79 to its extremity 80, as shown in Fig. 7, or this effect may be obtained by making this groove of the same width but of varying depth, or by varying both the width and the depth of this groove the requisite extent to secure the gradual increase in its conducting capacity from this beginning 79 to the ending 80 of the same.

On its underside the upper cylinder head is also provided with a comparatively short auxiliary controlling groove 81 which is located co-incident with the place where the vane stands when the door is in its fully closed position and between this auxiliary controlling groove and the main controlling groove 78 the underside of this head is provided with an ungrooved or plane surface 82. This auxiliary groove also preferably is of gradually increasing cross-sectional area from its front end 83, which is adjacent to the large area rear end 80 of the main groove, to its rear end 84 near the termination of the compression chamber, which effect may be produced in the same manner as described with reference to the main groove 78 by making this auxiliary groove of the same depth of gradually increasing width from its front end 83 to its rear end, as shown in Fig. 7, or by forming the same otherwise to secure the same result.

Due to these controlling means the vane when beginning its stroke from the non-compression chamber to the compression chamber of the pressure cylinder during the initial part of the closing movement of the door will be opposed by the full resistance of the liquid in the pressure cylinder with the exception of that which flows through the regulating conduits inasmuch as the vane at this time covers the small extremity 79 of the main controlling groove, as shown on the lower part of Fig. 7. During the further closing stroke of the vane and up to the time the same reaches the large end 80 of the main groove, as the door effects the main part of its closing movement, the vane gradually uncovers the main groove from its small end toward its large end and thereby permits a gradually increasing amount of liquid to escape through the main groove from the compression chamber to the non-compression chamber whereby the resistance to the closing movement of the door is gradually reduced and the main part of the shutting movement is effected with progressively increasing speed notwithstanding that the spring has been reduced in strength. When the door has nearly reached its closed position the corresponding movement of the vane brings the same over the blank area 82 at which time the flow of liquid around the adjacent edge of the vane is temporarily arrested and the closing movement of the door is retarded inasmuch as resistance liquid at this time can only flow through the regulating conduits from the compression chamber to the non-compression chamber. The instant, however, that the vane in continuing its closing movement with the door passes from the blank area 82 to the auxiliary groove 81 so as to uncover the same and permit liquid to pass around the respective edge of this vane, then the reduced resistance offered by the liquid enables the spring to again operate with greater relative pressure on the door for completing the closing of the same softly and easily and causing the latch thereof to catch for holding the door shut without any harsh, sudden or abrupt action. During this final closing movement of the door and the vane the auxiliary groove 81 permits a gradually increasing amount of resistance liquid to escape around the edge of the vane from the compression chamber to the non-compression chamber and thus enable the spring to firmly close the door notwithstanding the weakened condition of the spring.

Whenever it becomes necessary to replenish the pressure cylinder with resistance liquid this can be done by first dismounting the door closer and check, turning the same down-side up and then pouring the required amount of liquid through a filling opening 85 in the bottom of the pressure cylinder until the latter is filled, this opening being normally closed by a screw plug 86.

During the last part of the closing movement of the door the lower regulating port 48 passes in front of the inner face of the abutment 26 whereby this port is covered and the liquid is trapped in the compression chamber between the vane and the respective end of the abutment and thus causes the door to close without any slamming or jarring action.

By so organizing this door closer and check that the axis of the working cylinder and vane is arranged vertically any air entering this cylinder will accumulate in the upper part thereof and therefore not cause the instrument to become air-bound and not interfere with its proper operation.

Inasmuch as the space between the sidewall 10 of the enclosing casing and the sidewall 18 of the working cylinder virtually forms a chamber containing air a temperature insulation is thus formed around the side of the working cylinder which protects the resistance liquid in the working cylinder and permits of reducing to a minimum the amount of anti-freeze solution to the resistance liquid in order to maintain it in the proper condition to work most effectively during the operation of the device and also maintain the lubricant applied to the working parts in good condition for a longer time. By locating the manually accessible part of the controlling valve on top of the instrument the same is out of the way and the public cannot readily or easily tamper with the same.

Due to the liquid flowing through the by-pass, regulating and controlling conduits which act as arteries for the fluid, less agitation and frictional action is experienced by the fluid in the reservoir formed by the compression and non-compression chambers and the fluid will therefore retain its viscosity for a longer period before requiring replenishing.

Owing to the rapidity with which the door can effect the major part of its closing movement and the arrest of this movement before the final closing action this device is particularly advantageous in installations where the door should be closed as promptly and softly as possible in order to avoid objectionable drafts of air, and noises as in hospitals, railroad terminals, public buildings and the like.

No liquid replenishing chamber is required in this device inasmuch as the liquid is always in the

lower parts of the compression and non-compression chambers and therefore in condition to retard the movement of the door.

As a whole this door closer and check is very compact in construction, its several parts are simple and capable of being readily assembled and the same are not liable to get out of order under severe usage.

I claim as my invention:

1. A door closer and check comprising a pressure cylinder containing a resistance liquid and having a compression chamber and a non-compression chamber, a vane adapted to oscillate in said cylinder between said chambers during the opening and closing movements of the door, a spring which is increasingly tensioned during the opening movement of the door and while the vane is moving toward said non-compression chamber and decreasingly tensioned while the door is closing and said vane is moving toward said compression chamber, and controlling means for controlling the movement of said vane toward the compression chamber so as to permit the resistance liquid to flow with increasing freedom from the compression chamber to the non-compression chamber until the vane has nearly reached the end of its stroke toward the compression chamber, then temporarily arrest the flow of liquid from the compression chamber to the non-compression chamber, and then permit the liquid to again flow freely from the compression chamber to the non-compression chamber during the last part of the movement of said vane toward the compression chamber.

2. A door closer and check comprising a pressure cylinder containing a resistance liquid and having a compression chamber and a non-compression chamber, a vane adapted to oscillate in said cylinder between said chambers during the opening and closing movements of the door, a spring which is increasingly tensioned during the opening movement of the door and while the vane is moving toward said non-compression chamber and decreasingly tensioned while the door is closing and said vane is moving toward said compression chamber, and controlling means for controlling the movement of said vane toward the compression chamber so as to permit the resistance liquid to flow with increasing freedom from the compression chamber to the non-compression chamber until the vane has nearly reached the end of its stroke toward the compression chamber, then temporarily arrest the flow of liquid from the compression chamber to the non-compression chamber, and then permit the liquid to again flow freely from the compression chamber to the non-compression chamber during the last part of the movement of said vane toward the compression chamber, said controlling means including a long main groove formed on the inner surface of a part of said cylinder and increasing in cross-sectional area from said non-compression chamber toward said compression chamber, a short auxiliary groove formed on said surface adjacent to the end of the stroke of the vane toward the compression chamber and increasing in cross-sectional area toward said compression chamber, and a blank area on said surface between said main and auxiliary grooves, said vane traversing said main groove, blank area and auxiliary groove successively as it sweeps from the non-compression chamber to the compression chamber of said cylinder.

3. A door closer and check comprising a working cylinder containing a resistance liquid and having a compression chamber and a non-compression chamber, a vane oscillating in said cylinder between said chambers, and a helical spring surrounding said cylinder and having one end operatively connected with said cylinder and its other end operatively connected with said vane.

4. A door closer and check comprising a working cylinder containing a resistance liquid and having a compression chamber and a non-compression chamber, a vane oscillating in said cylinder between said chambers, a spring surrounding said working cylinder and having its opposite ends operatively connected with the cylinder and vane, and a casing enclosing said spring and working cylinder and forming a protecting chamber for the resistance liquid in said working cylinder.

5. A door closer and check comprising a working cylinder adapted to contain a resistance liquid and having a compression chamber and a non-compression chamber, a vane oscillating in said cylinder between said chambers, a rock shaft connected with said vane and extending through the top of said cylinder, and a helical spring surrounding said cylinder and having its lower end operatively connected with said cylinder and its upper end operatively connected with said shaft.

6. A door closer and check comprising a working cylinder adapted to contain a resistance liquid and having a compression chamber and a non-compression chamber, a vane oscillating in said cylinder between said chambers, a rock shaft connected with said vane and extending through the top of said cylinder, a lower retaining ring secured to the cylinder, an upper retaining ring secured to said shaft, and a helical spring surrounding said cylinder and connected at its upper and lower ends to said upper and lower retaining rings.

7. A door closer and check comprising a working cylinder adapted to contain a resistance liquid and having a compression chamber and a non-compression chamber, a vane oscillating in said cylinder between said chambers, a rock shaft connected with said vane and extending through the top of said cylinder, a lower retaining ring secured to the cylinder and provided with a radial slot, an upper retaining ring connected with said shaft and provided with a longitudinal groove, and a helical spring surrounding said cylinder and provided at its lower end with a downwardly projecting lug engaging said slot and provided at its upper end with an inwardly projecting lug engaging with said groove.

8. A door closer and check comprising a working cylinder adapted to contain a resistance liquid and having a compression chamber and a non-compression chamber, a vane oscillating in said cylinder between said chambers, a rock shaft connected with said vane and extending through the top of said cylinder, a lower retaining ring secured to said cylinder and provided with an upwardly opening channel, an upper retaining ring connected with said shaft and provided with a downwardly opening channel, and a helical spring surrounding said cylinder and having its lower end arranged in said lower channel and secured to said lower ring and having its upper end arranged in said upper channel and connected with said upper ring.

9. A door closer and check comprising a working cylinder having a cylindrical wall, a lower head formed integrally with the lower end of the

wall and an upper head detachably connected with the upper end of the wall, said cylinder containing a compression chamber and a non-compression chamber adapted to hold a resistance liquid, an abutment arranged in said cylinder between said chambers and against one part of said wall, a rock shaft turning in engagement with said abutment and journaled at its lower end on the lower cylinder head and having its upper part extending through the upper cylinder head, a collar formed on said shaft and interposed between the underside of said upper cylinder head and the upper end of said abutment, and a spring surrounding said working cylinder and connected at its opposite ends with said cylinder and said shaft.

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