Nov. 9, 1937. D. R. LASIER 2,098,501

DOOR CLOSING AND CHECKING DEVICE

Filed Feb. 19, 1934 2 Sheets-Sheet 1

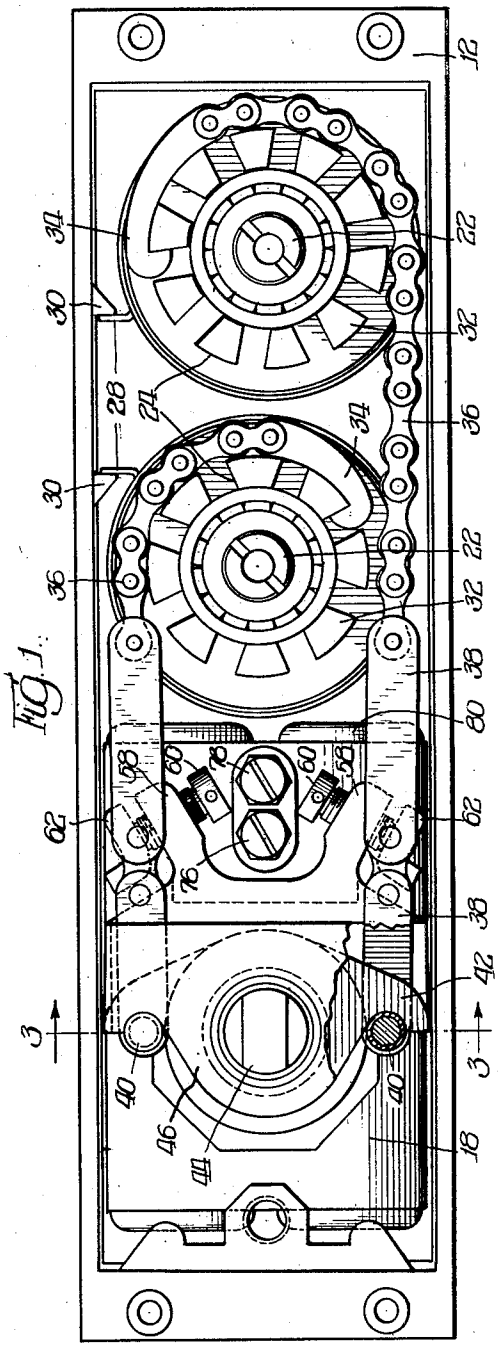


Fig. 1.

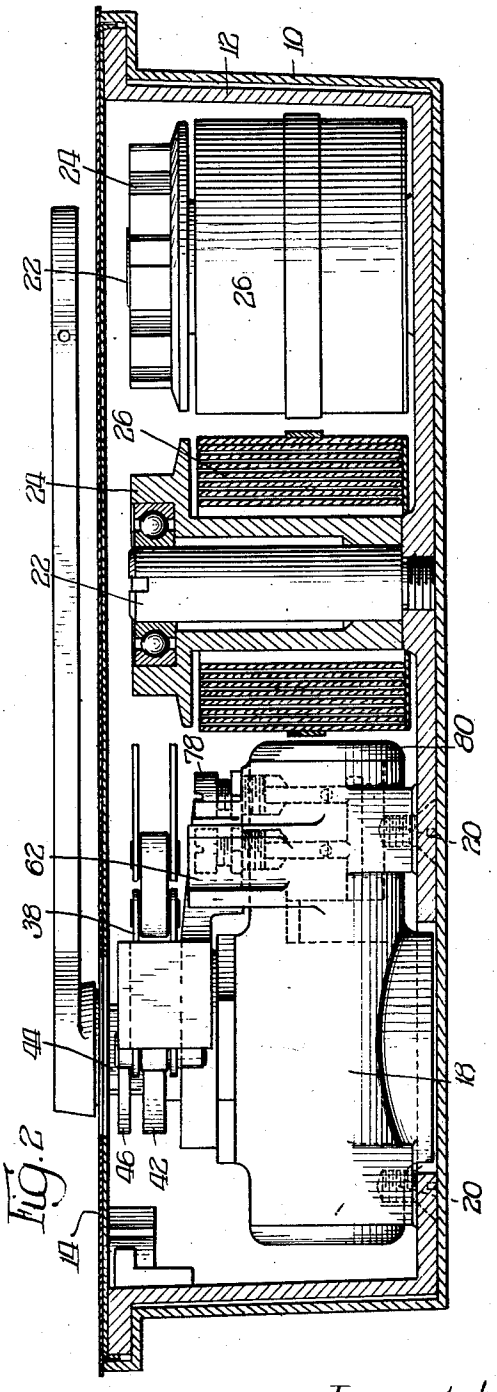


Fig. 2.

Inventor:
David R. Lasier;
By Wilkinson Huxley Byron & Knight
Attys.

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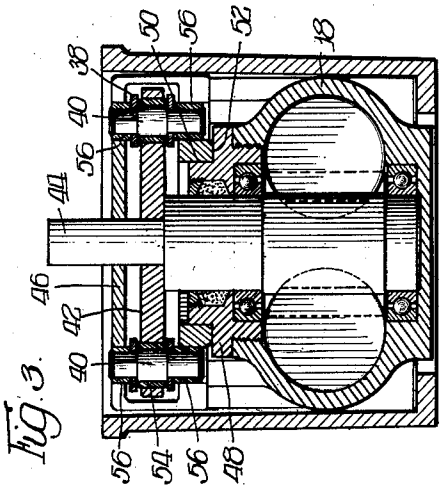


Fig. 3.

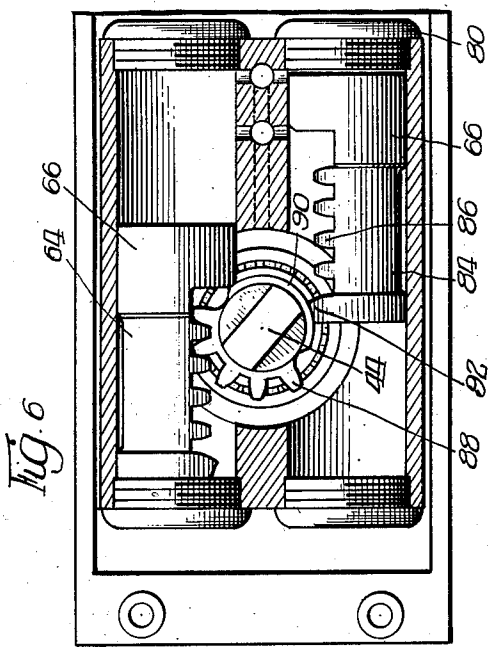


Fig. 6.

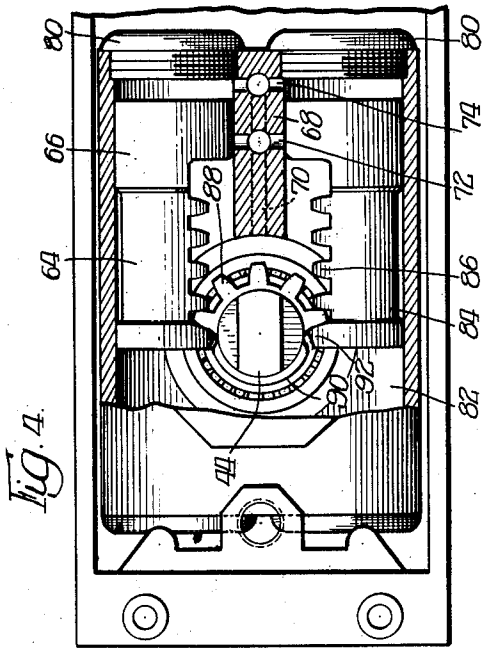


Fig. 4.

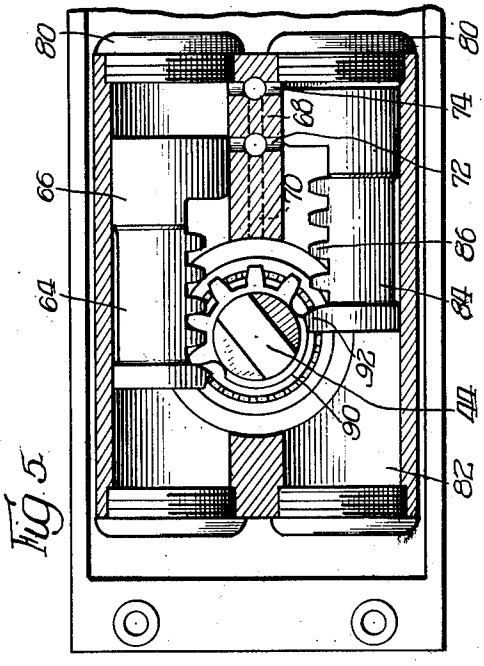


Fig. 5.

Inventor:
David R. Lasier,
By Wilkinson, Huxley, Byron & Knight
attys

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UNITED STATES PATENT OFFICE

2,098,501

DOOR CLOSING AND CHECKING DEVICE

David R. Lasier, Chicago, Ill., assignor to Norton-Lasier Company, Chicago, Ill., a corporation of Illinois

Application February 19, 1934, Serial No. 711,909

14 Claims. (Cl. 16—55)

This invention relates to improvements in door closing and checking devices particularly of the type that is adapted to be concealed in the floor and which is double acting in order that the door closing and checking device may be used to control a door which is mounted to swing in either direction from its closed position.

It is an object of the present invention to provide a door closing and checking device of the double acting type including independent springs which act to close the door in either direction and in which means is provided for properly centering the door in its closed position.

It is further an object of the present invention to provide a double acting door closing and checking device including a double checking cylinder having a pair of pistons therein, each piston being adapted to check the closing movement of the door in one direction only and in which during the greater portion of the door swinging movement only one of the pistons is moving so that the pistons are moving in opposite directions only for a short distance throughout a short swing of the door adjacent its closed position.

A further object of the present improvements is to provide a double acting door checking device including a pair of independently movable pistons and a mutilated pinion gear for selectively actuating the pistons including means for holding one of the pistons in its extreme checking position while the other piston is being moved away from its checking position.

Further objects and advantages of my improvements will be more readily apparent from the following description taken in connection with the attached drawings, in which—

Figure 1 is a plan view of the interior of the door closing and checking device;

Figure 2 is a longitudinal sectional elevation of the door closing and checking device;

Figure 3 is a cross section on the plane indicated 3—3 in Figure 1;

Figure 4 is a broken sectional view of the checking cylinder showing the pistons for door closed position, and

Figures 5 and 6 are views similar to Figure 4 but showing, respectively, the piston positions for partial open and fully open door positions.

The device disclosed includes an outer box-shaped casing 10 and an inner box-shaped casing 12. Cover plates 14 enclose the mechanism in a plane flush with the floor level. Within the box 12 is mounted a double checking cylinder 18 fastened by screws 20 to the inner box 12. Spaced spindles 22 are mounted in the box 12 and constitute supports for ratchet sleeves 24 which are connected to the inner ends of the coil spring units 26, the outer ends 28 of the springs being engaged with stop lugs 30 on the box 12.

As shown in Figure 2 the springs 26 are so arranged that one will be placed under tension by rotation in a clockwise direction and the other will be placed under tension by rotation in a counter-clockwise direction. The ratchet sleeves 24 have lugs 32 adapted to be adjustably engaged by the dogs 34 at the ends of flexible chains 36. The opposite ends of the chains 36 are connected to spaced links 38, connected at their ends by pins 40 which extend above and below the links 38. The pins 40 are adapted to be engaged between the links 38 by a double arm rockable pick-up member 42 which is keyed to the shaft 44 of the checking device. Rollers 54 may be mounted on the pins 40 for contact with member 42. A yoke member 46 is rockably mounted on the nut member 48 at the upper side of the checking cylinder 18. The yoke member 46 is centered by a bearing surface 50 against the nut 48 and is supported in a vertical direction by a bearing surface 52 on the nut 48. The yoke member 46 is adapted to engage the upper and lower ends of the pins 40 through rollers 56 and to act as an anchor therefor.

It will be understood that when the pick-up member 42 is rotated from its normal position, one of the pins 40 and chain 36 will be picked up and moved, thereby rotating one of the ratchet sleeves 24 and placing one of the springs under tension while the other pin 40 and chain 36 will remain in anchored position on the yoke 46, thereby holding the other spring member under a slight tension.

In order to properly balance the force of the oppositely acting springs and to center the door in its closed position, it is necessary to provide for adjustment of the yoke member 46. As shown in Figure 1 the yoke member 46 has arms 58 carrying adjustable screws 60, which bear against lugs 62 formed integral with the upper side of the checking cylinder 18. By adjusting the screw 60 the yoke 42 may be rotated with respect to the checking cylinder.

The checking cylinder 18 includes parallelly disposed spaced cylinders 64, having mounted therein pistons 66. The cylinders are separated by a dividing wall 68 having a fluid passage 70 communicating through openings 72 and 74 with the interior of each cylinder 64. An adjusting screw 76 controls the passage of the fluid through the openings 72 and a second adjusting screw 78

controls the fluid flow through the openings **74**, which openings are nearer the closed ends **80** of the cylinders. In back of the pistons **66** the casing **18** forms a reservoir **82** for the fluid. Each piston includes a rack **84** having rack teeth **86**. The pistons are operated by the shaft **44** which is formed into a mutilated pinion gear **88**. The portion of the gear **88** which is not occupied by gear teeth is formed into a cylindrical surface **90** which is adapted to engage the first tooth **92** of each piston, as shown in detail in Figures 5 and 6.

In Figure 4 the checking device is shown in its normal position with the door in its closed position. The pistons **66** are then in balanced relation adjacent the openings **74**. As the door is moved in an opening direction, the pistons will move in opposite directions for a short distance, bringing one of the pistons to its extreme checking position, at which time the cylindrical surface **90** of the mutilated gear **88** will engage the tooth **92**, as shown in Figure 5, and hold the corresponding piston against retractive movement, while the other piston continues to move to enlarge the cylinder with which it cooperates. Figure 6 shows the shaft **44** rotated to the extreme open position of the door. It will be seen that as the door moves towards its closed position, the checking action will be gradual until after the piston has passed the opening **72** and then the checking action will increase up to the closed position of the door and for a short distance beyond the closed position of the door as the door tends to swing to the other side.

From the foregoing it will appear that the applicant's invention provides for a checking action on the part of each of the pistons, respectively, (depending on the direction of swing), during the closing movement of the door and in addition therebeyond for a short distance during the opening movement in the opposite direction. Thus one piston checks the swinging movement of the door from its open position on one side of the sill to its neutral closed position, and therebeyond, for a short arc of swing, and the other piston controls the closing movement of the door for a corresponding arc of swing in the other direction. Hence the controlling action of the pistons overlap each other.

I claim:

1. Door checking mechanism for a double swinging door comprising a double cylinder containing a checking fluid, a pair of pistons therein, a spindle adapted to be operatively connected to the door and with said pistons and means for moving either of said pistons through a portion only of the door swinging movement according to whether the door is moved in one or the other direction from the closed position thereof.

2. Door checking mechanism for a double swinging door comprising a fluid containing casing having a pair of cylinders therein, a door operated spindle extending into said casing, a pair of pistons in said casing cooperating with said cylinders and means including said spindle for transmitting movement to each of said pistons through a portion only of the complete swinging movement of the door from extreme operative position on one side of neutral to extreme operative position on the opposite side of neutral.

3. Door checking mechanism comprising a fluid containing casing having a pair of cylinders therein, a door operated spindle extending into said casing, a pair of pistons in said casing cooperating with said cylinders, rack teeth formed on said pistons and a mutilated gear associated with said spindle for engaging the rack teeth on said pistons for moving said pistons in opposite directions as the door swings for a short distance from its normal closed position and for continued movement of only one of said pistons as the door continues to swing towards its extreme open position.

4. Door checking mechanism comprising a fluid containing casing having a pair of cylinders therein, a door operated spindle extending into said casing, a pair of pistons in said casing cooperating with said cylinders, means on said spindle for operatively engaging said pistons to transmit movement thereto in opposite directions as the door swings for a short distance in either direction from its closed position, said means releasing one of said pistons to produce continued movement of the other of said pistons as the door swings beyond a predetermined open position.

5. Door checking mechanism comprising a fluid containing casing having a pair of cylinders therein, a door operated spindle extending into said casing, a pair of pistons in said casing cooperating with said cylinders, means on said spindle for operatively engaging said pistons to transmit movement thereto in opposite directions as the door swings for a short distance in either direction from its closed position, said means releasing one of said pistons to produce continued movement of the other of said pistons as the door swings beyond a predetermined open position and means for holding said released piston stationary as the other piston continues to move.

6. Door checking mechanism comprising a fluid containing casing having a pair of cylinders therein, a door operated spindle extending into said casing, a pair of pistons in said casing cooperating with said cylinders and means effective through a portion of the swinging movement of the door to move one of said pistons and to hold the other of said pistons stationary in its extreme checking position.

7. Door checking mechanism comprising a fluid containing casing having a pair of cylinders therein, a door operated spindle extending into said casing, a pair of pistons cooperating with said cylinders, means for transmitting movement from said spindle to at least one of said pistons when the door swings from its normal closed position to its extreme open position, said means being simultaneously effective during the initial stage of the opening movement to move the other of said pistons in a checking direction and means for holding said other piston stationary as the door swings from beyond its initial stage towards the extreme open position.

8. Door closing and checking mechanism for a double swinging door comprising a door operated spindle, fluid checking means acting on said spindle to check the closing movement of the door in either direction, a pair of door closing springs each of which is adapted to close the door in one direction, an integral anchoring member mounted for concentric adjustment with respect to said spindle and having a pair of opposed stops thereon, flexible means connected to each of said springs and in abutment respectively against said opposed stops of said anchoring member when said door is in closed position and a pick-up member connected to said spindle for rotation therewith, said pick-up member being adapted upon rotation to pick up one of said flexible means to tension one of said springs when the door is moved from its closed position.

9. Door closing and checking mechanism for a

double swinging door comprising a door operated spindle, fluid checking means acting on said spindle to check the closing movement of the door in either direction, a pair of door closing springs each of which is adapted to close the door in one direction, a yoke-shaped integral anchoring member mounted for concentric adjustment with respect to said spindle having a pair of opposed stops thereon, flexible means connected to each of said springs and in abutment respectively against said opposed stops of said anchoring member when said door is in closed position and a pick-up member received within said anchoring member connected to said spindle for rotation therewith, said pick-up member being adapted upon rotation to pick up one of said flexible means to tension one of said springs when the door is moved from its closed position.

10. Door closing and checking mechanism for a double swinging door comprising a fluid checking cylinder, a door operated spindle mounted in said cylinder and extending upwardly therefrom, a pair of door closing springs, each of which is adapted to close the door in one direction, an adjustable anchoring member rotatably mounted on said checking cylinder concentric with said spindle, adjusting means mounted on said cylinder engaging said anchoring member to hold said anchoring member in adjusted position relative to said cylinder, a pair of flexible connecting members, each of which is connected at one end to one of said springs and at the other end is held by the tension of said spring in anchoring engagement with said anchoring member when said door is in closed position and a pick-up member conected to said spindle for rotation therewith, whereby rotation of said spindle will bring about engagement of said pick-up member with one of said connecting members to tension one of said springs as the door is moved from its closed position.

11. Door closing and checking mechanism for a double swinging door comprising a casing adapted to be mounted in a recess beneath the door, a fluid containing casing positioned in said first casing, said second casing having a pair of checking cylinders and a pair of checking pistons in said casing cooperating with said cylinders, a door operated spindle extending into said casing, means within said casing for transmitting movement from said spindle to said pistons, an integral anchoring member having a pair of opposed stops thereon and mounted for adjustable rotation on said second casing concentric with said spindle, adjustable means for rotating said anchoring member relative to said casing and for holding said anchoring member in adjusted position, a pick-up member fixed to said spindle, a pair of door closing springs mounted in said first casing to one side of said second casing, a pair of flexible chains each of which is adjustably connected at one end to one of said door closing springs and in normal closed position of the door is in engagement at the other end with said stops of said anchoring member, said pick-up member upon rotation by said spindle being adapted to pick up one of said tension chains to tension one of said springs while the other spring is anchored through the other chain upon said anchoring member.

12. In combination with a door, a door checking mechanism comprising, a fluid containing casing having a cylinder therein, a door-operated spindle extending into said casing, a piston in said casing cooperating with said cylinder and means for transmitting movement from said spindle to said piston, said means exerting a controlling action on said spindle during the closing movement of said door in one direction from its maximum open position to its closed position and continuously beyond its closed position for a limited distance in the opening direction on the opposite side of its closed position.

13. In combination with a door, a door checking mechanism comprising, a fluid containing casing having a pair of cylinders therein, a door-operated spindle extending into said casing, a pair of pistons in said casing cooperating with said cylinders and means for transmitting movement from said spindle to said pistons, said means exerting the controlling action of one of said pistons on said spindle during the closing movement of said door in one direction from its maximum open position to its closed position and continuously beyond its closed position for a limited distance in the opening direction on the opposite side of its closed position, and exerting the controlling action of the other of said pistons on said spindle during the closing movement of said door in the other direction from its maximum open position to its closed position and continuously beyond its closed position for a limited distance in the opening direction on the opposite side of its closed position.

14. In combination with a double swinging door, spring means effective to close the door in either direction of swinging movement, and fluid checking means effective to check the closing movement of the door in either direction of swinging movement and including means which in either case continues to check the movement of the door beyond its neutral closed position and during the initial opening movement of the door on the opposite side of the closed position of said door.

DAVID R. LASIER.