E. S. COFFMAN.

DOOR CONTROLLING DEVICE.

APPLICATION FILED NOV. 6, 1909. RENEWED JAN. 16, 1920.

1,353,218. **Patented Sept. 21, 1920.**

2 SHEETS—SHEET 1.

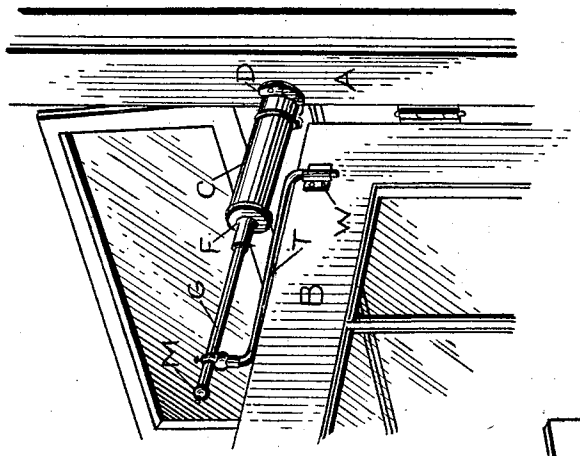


Fig. 3

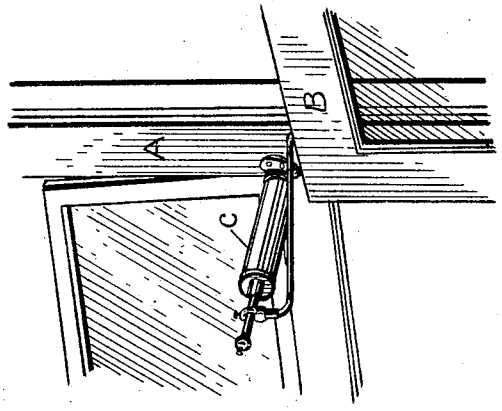


Fig. 2.

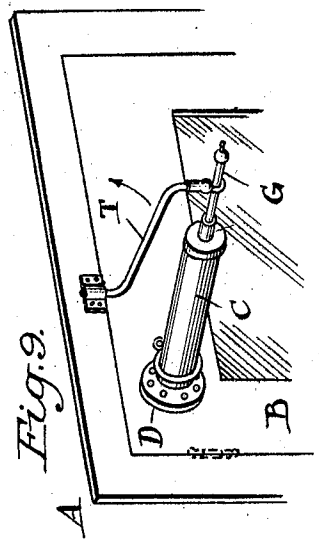


Fig. 9.

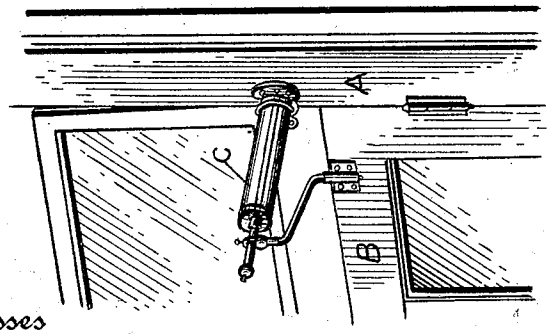


Fig. 1

Witnesses

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2 SHEETS—SHEET 2.

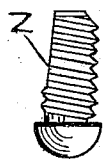


Fig. 8

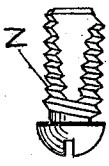


Fig. 7

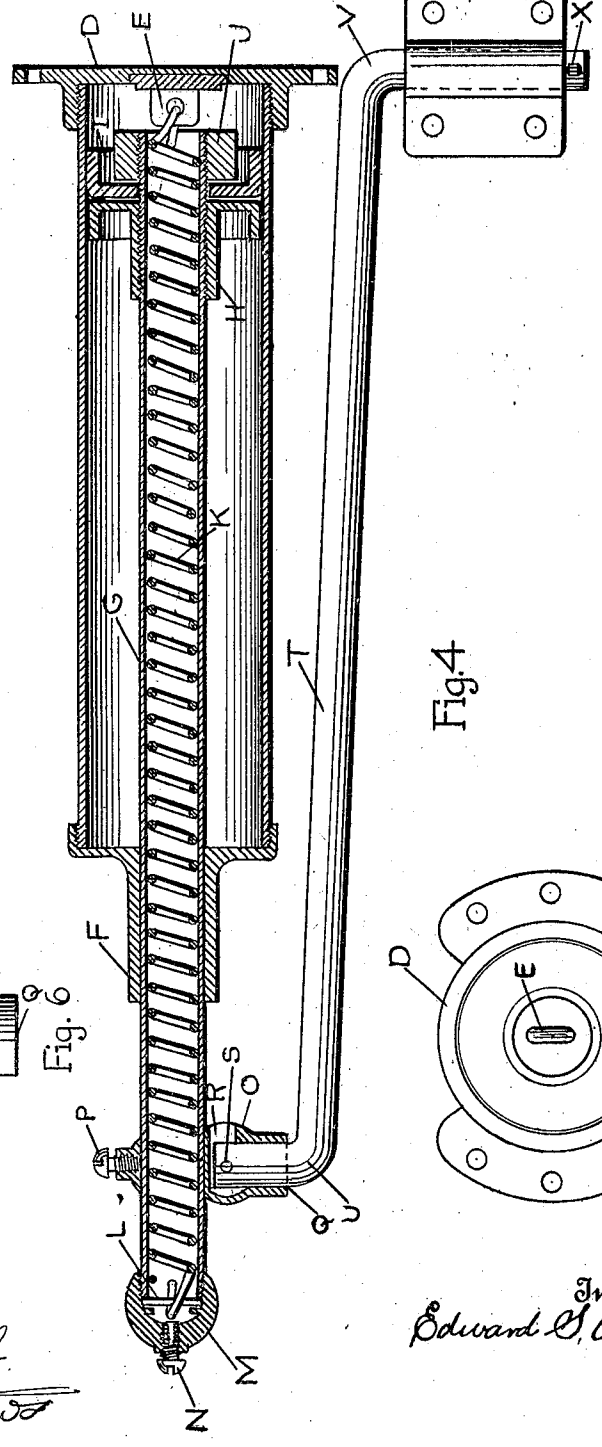


Fig. 4

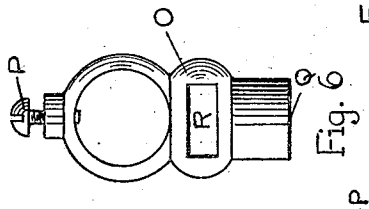


Fig. 6

Fig. 5

Witnesses

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UNITED STATES PATENT OFFICE.

EDWARD S. COFFMAN, OF CLIFTON FORGE, VIRGINIA, ASSIGNOR TO FRANK E. STEBBINS, OF WASHINGTON, DISTRICT OF COLUMBIA.

DOOR-CONTROLLING DEVICE.

1,353,218. Specification of Letters Patent. Patented Sept. 21, 1920.

Application filed November 6, 1909, Serial No. 526,602. Renewed January 16, 1920. Serial No. 351,915.

To all whom it may concern:

Be it known that I, EDWARD S. COFFMAN, a citizen of the United States, residing at Clifton Forge, in the county of Alleghany and State of Virginia, have invented certain new and useful Improvements in Door-Controlling Devices, of which the following is a specification.

The object of my invention is the provision of an improved door controlling device which, generally, shall close and cushion or retard the closing movement of a door after it has been opened and released; which, when so desired and properly located for the purpose, shall hold the door open after it has been opened beyond a certain position; and which shall cushion the door when opening after it has passed a determinate position.

A further object is the production of a device having the functions substantially as above set forth wherein the hollow body member or cylinder forming part of the device and push rod or operating arm interchangeably may be applied to a casing and a door.

My invention consists in certain novelties of construction and combinations of parts as herein set forth and claimed.

The accompanying drawings illustrate an example of the physical embodiment of the invention constructed according to the best mode of procedure I have so far devised for the purpose.

Figure 1 is a perspective view of part of a door and casing with my controller in operative position in connection therewith, the door being closed.

Fig. 2 is a similar view showing the door swung open through an arc of approximately 180°.

Fig. 3 is a similar view with the door swung open through an arc of about 90°.

Fig. 4 is a vertical longitudinal section with the push rod or operating arm in elevation.

Fig. 5 is a plan of the base.

Fig. 6 is a view of the adjustable slide.

Figs. 7 and 8 are views of the adjustable escapement screw on enlarged scales.

Fig. 9 shows the device as it appears when the hollow body member or cylinder is secured to the door and the rod or operating arm is secured to the casing.

Referring to the figures, the letter A designates a door casing, and B a hinged door.

C is a metallic tube exteriorly threaded at the ends; D, a metallic base having flanges at the sides with holes for screws, an eye E integral with or brazed to the base as shown, and a flange interiorly threaded to receive one end of the tube; F, a cylinder head with a long perforated bearing or a hollow piston rod and a flange interiorly threaded to receive the outer threaded end of the tube; G, a hollow piston rod exteriorly threaded at the ends; H, a flanged plunger with a threaded hole therethrough through which passes the threaded end of the piston rod, the plunger being screwed on the rod so the rod will project some distance; I, a packing with a central hole through which the piston rod is passed and having a circular bearing flange; J, a threaded nut on the end of the rod confining the packing in place; K, a coiled spring located within the hollow piston rod, having eyes at each end, one of which is secured to the eye E on the base; L, a bar or pin passed through the eye at the opposite end of the spring and bearing against the metal at the end of the hollow rod; M, a cap with a threaded hole therethrough and a flange interiorly threaded, said cap being screwed upon the end of the piston rod and clamping the bar or pin L in place; N, an adjustable threaded escapement screw in the hole of the cap, one side of the shank of the screw being cut away to have a beveled surface so when the screw is partly seated there will be an opening for the passage of air from and to the hollow piston rod and to the space below the packing; O, an adjustable slide with a hole through which the piston rod is passed; P, a set-screw; Q, a hole for the turned up end of a push rod or operating arm, said end being perforated; R, a slot or opening in the side of the slide; S, a pin in the hole at the end of the push rod or operating arm to hold the rod in place and allow it to turn, the pin being adjusted by the insertion of the same through the slot R when the hole in the push rod or operating arm is in line with the slot so that when the rod is turned to operative position the pin is confined and cannot work out through the slot; T, the push rod or operating arm; U, the outer rectangular bent end of the push rod or operating arm;

V, the inner rectangular bent end of the push rod or operating arm; W, a bearing or plate with a hole for the inner end of the push rod or operating arm, said bearing having perforated flanges to receive screws; and X is a cotter pin for securing the bent end of the push rod or operating arm in the bearing.

The method of assembling the parts is obvious from the drawings. However, the spring should be slightly expanded when in normal position with the piston at the base of the tube, so when the piston rod is drawn out the spring will have contractile energy sufficient to entirely close the door.

When the door is opened the push rod, piston rod and piston are moved outwardly, the spring expanded and when the door has been opened, for instance, through the arc of 90 degrees or to a dead center, further movement of the door in either direction allows the spring to contract and force the door fully open or to close the same, the piston, when present, acting to check the movement in either direction.

If the door is to open 180°, the hollow body member or cylinder is to be attached directly above the vertical line of the hinges of the door, and the bearing on the door or the plate located approximately seven inches, more or less, from the line of the hinges. This latter distance determines the travel of the piston.

If the door is to open approximately 90°, the cylinder should be located on the casing about midway between the vertical line of the hinges and the bearing or plate on the door.

However, the hollow body member or cylinder may be disposed otherwise relative to the door so the door, when opened, will not be held open, but will always close under the contractile energy of the spring. I have specified two only of the several possible locations of the cylinder relative to the door. The essential feature of the mode of operation in the two examples of the embodiment of the invention illustrated is: That the rod or operating arm move in a plane parallel with the plane of the cylinder. The rod or operating arm may or may not pass from side to side of the cylinder when the door is opened. Obviously, when the rod or operating arm does not pass the longitudinal axis of the cylinder the door will not be held open.

Obviously, the controller can be applied to a door opening either toward the left or toward the right without changes. Further, the cylinder may be secured to the door and the push rod or operating arm pivoted to the casing as shown by Fig. 9 without any change in the construction of the device or substantial difference in the mode of operation. In some cases the piston may be omitted as a cushioning device and the spring only used especially with very light doors.

The operation is as follows:

In opening the door the piston rod is drawn out of the tube, air escaping between the cylinder head and piston rod and entering the space below the packing by way of the hole in the cap partly closed by the adjustable escapement screw, or air may pass between the tube and packing to the space beneath the same. The push rod or operating arm turns and moves in a plane parallel with the bracket. When the bearing plate on the door has passed the vertical plane of the bracket the spring retracts the piston and rod and opens the door to the limit of its travel, the door at the same time being cushioned and held open by the spring. In closing the door the operation is the same. The adjustment of the escapement screw will control the speed with which the door moves under the action of the spring.

It will be seen that I have produced a door controlling device having the functions set forth as the object of my invention, and one in which the tensile or contractile energy of the spring is utilized, and the spring itself out of sight within the piston rod.

What I claim is:

1. The combination with a door and casing, of a retarding device and a single operating arm attached thereto; said retarding device comprising telescopic outer and inner members, the inner member having an extension beyond the end of the other, a substantially air-tight packing between said members, a contractile helical spring under tension its longitudinal axis in line with the axis of the outer member and its opposite ends connected one to the outer member and the other to the inner member, an air chamber of variable capacity in operative connection with the members, and a valve for allowing the gradual variation of the quantity of air in the chamber to secure a retarding effect; the retarding device and operating arm being attached respectively, and one of them pivotally, to the door and casing.

2. The subject-matter of claim 1 when the retarding device and operating arm are pivotally connected together.

3. The subject-matter of claim 1 when the retarding device and operating arm are pivotally connected together and the operating arm pivoted to the door, the retarding device being located on the casing.

4. The subject-matter of claim 1 when the operating arm at one end is pivoted to the inner member of the retarding device and at the other end to the door.

5. The combination with a door and casing, of a retarding device and a single operating arm, said retarding device compris-

ing telescopic inner and outer members, the inner member having an extension beyond the other, a substantially fluid-tight packing between said members, a contractile helical spring under tension inside the retarding device and its ends secured one to the outer and the other to the inner member, a fluid chamber of variable capacity in operative connection with the members, and means for allowing a gradual variation of the quantity of fluid in the chamber; the retarding device and operating arm being connected and both attached respectively, and one of them pivotally, to the door and casing.

6. The subject-matter of claim 5 when the retarding device and operating arm are pivotally connected together.

7. The subject-matter of claim 5 when the retarding device and the operating arm are pivotally connected together and the operating arm pivoted to the door and the retarding device located on the casing.

8. The subject-matter of claim 5 when the operating arm at one end is pivoted to the inner member of the retarding device and at the other end to the door.

9. The combination with a door and casing, of a retarding device and a single operating arm, said retarding device comprising telescopic inner and outer hollow body members the inner member having an extension beyond the other, a substantially fluid-tight packing between said members, a contractile helical spring within the inner member and its ends secured one to the outer member and the other to the inner member, a fluid chamber of variable capacity formed by said members and the said packing, and means for allowing a gradual variation of the quantity of fluid in the chamber; the retarding device and operating arm being connected and both attached respectively, and one of them pivotally, to the door and casing.

10. The subject-matter of claim 9 when the retarding device and operating arm are pivotally connected together.

11. The subject-matter of claim 9 when the retarding device and operating arm are pivotally connected together and the operating arm pivoted to the door, the retarding device being located on the casing.

12. The subject-matter of claim 9 when the operating arm at one end is pivoted to the inner member of the retarding device and at the other end to the door.

13. The combination with a door and casing, of a retarding device and a single operating arm, said retarding device comprising a hollow cylinder, a reciprocating piston and piston rod in the cylinder, a contractile helical spring having its ends secured respectively to the cylinder and piston rod for telescoping the members together when they have been telescoped apart, a fluid chamber of variable capacity within the cylinder, and means for allowing a variation of the quantity of fluid in the said chamber to secure a retarding effect; the operating arm being pivoted to the piston rod in a plane at one side of the longitudinal axis of the cylinder, and said retarding device and arm secured respectively, and one of them pivotally, to a door and casing.

14. The subject-matter of claim 13 when the retarding device is secured to the casing and the operating arm pivoted to the door.

15. The subject-matter of claim 13 when the cylinder is secured at one end to the casing so as to project outwardly, and the operating arm pivoted to the door.

16. The subject-matter of claim 13 when the cylinder is rigidly secured at one end to the casing so as to project outwardly and the operating arm pivoted to the door at an angle to the cylinder so the arm and pivotal means on the door can move in a plane parallel with the longitudinal axis of the cylinder and from side to side of said axis.

17. A device of the class described comprising in combination a cylinder, means for attaching said cylinder to a casing, a piston and rod operating in the cylinder, a contractile spring secured to the cylinder and piston rod, a single arm horizontally swinging relative to the cylinder, means for pivotally connecting the inner end of the arm to a door, and means for pivotally connecting the outer end of the horizontally swinging arm to the piston rod.

18. A device for attachment to a movable door and casing comprising an operating arm, a pivotal bearing in connection with one end of the arm said bearing having means for its attachment, a hollow cylinder with means for its attachment, a bearing for the outer end of the arm said bearing being supported by the cylinder and so constructed that the arm can turn in a plane substantially parallel with the plane of the cylinder, and a spring suitably supported to act against the arm and expand when the door is opening, said device as a whole when in place operating when the door is partly open and then released to close the door, and when the door is opened beyond a certain position to hold the door open.

19. The combination of a hollow cylinder having means at one end for attaching it in position, a hollow piston rod mounted to reciprocate within the cylinder, a helical spring within the hollow piston rod one end attached to the base of the cylinder and the other end attached to the piston rod, and an operating arm provided with means at one end for pivotally attaching the same in position and at the other end provided with means for adjustably pivoting the same to the piston rod.

20. The combination with a door and casing, of a controlling device comprising a hollow body member, a piston and piston rod, and a single operating arm; means for attaching the body member to a door or casing; means for attaching the operating arm to a door or casing; means for pivoting one end of the operating arm to the piston rod; and an expansible spring located in the hollow body member and the piston rod; the operating arm turning in a plane parallel with the plane of the hollow body member when the door is opened and closed.

21. In a door controller, the combination of a hollow cylinder, means at one end of the cylinder for securing the same to a door or casing so it will project substantially at right angles thereto, a hollow piston rod mounted in the said cylinder, a piston, and a spring within the piston rod having its inner end secured to the cylinder and its outer end to the outer end of the piston rod; and a single operating arm adapted to be pivotally connected to a door or casing at one end, and the other end pivotally connected to the piston rod.

22. The combination of telescoping inner and outer members to form a variable fluid chamber, the end of one member being extended beyond the other, a helical spring within and its opposite ends connected respectively to the opposite members normally holding them together, means for controlling the quantity of fluid in the chamber, an operating arm in pivotal connection with one of the members, and means for connecting the other member and the arm, one pivotally and the other rigidly, to a door and casing.

23. A door controlling device including tubular body members telescopically mounted one within the other, heads closing the outer ends of the body members, a spring connecting said heads, an air valve carried by one of the heads, an annular packing ring secured upon the inner end of the inner body member, and means for attaching the outer ends of the body members to a door and door casing.

24. The combination in a door controlling device and with a door and casing, of a bearing on the door for an operating arm; a hollow member provided with means for attaching the same to the casing; a movable element supported by the hollow member; a single operating arm pivotally connected with the said movable element and also pivotally connected to said bearing on the door; and a spring supported by the hollow member adapted to be expanded by the movement of the operating arm when the door is opening; said operating arm being so supported that it can move in a plane substantially parallel with the plane of the hollow member and under the action of the spring close the door.

25. The combination in a door controlling device and with a door and casing, of a bearing on one of said elements, a hollow member secured to the other element, a reciprocating member supported by the said hollow member, an operating arm pivotally connected to said bearing and at the other end pivoted to said reciprocating member, and a spring suitably supported to act against the operating arm; the operating arm being adapted to move in a plane parallel with the plane of the said hollow member and at one side thereof when the door is being opened and closed.

26. The combination with a door and casing, of a hollow member secured to the door casing above the door and extending outwardly relative to the same when the latter is closed, a piston and rod operatively mounted in the hollow member, a spring to actuate the piston rod to cause the inward movement of the same, and an operating arm pivotally connected to the outer end of the piston rod and to the door and located in a plane below the plane of the hollow member so as to swing below the hollow member, the inner pivot of the said operating arm being arranged to swing in the arc of a circle relative to said hollow member in the opening and closing movements of the door.

27. The combination in a door controlling device, of a hollow member, means at one end for securing the same to a door casing, a piston and piston rod mounted to move within the hollow member, an operating arm pivotally connected at one end to the piston rod and provided at the other end with means for pivotal attachment to a door or casing, a helical spring having one end fixedly anchored and the other end secured so as to move with the piston rod, and means for retarding the inward movement of the piston and piston rod; the said spring acting by contractile energy to hold the said piston and rod within the hollow member normally and said operating arm adapted to move in a plane at one side of the hollow member.

In testimony whereof I affixed my signature, in the presence of two witnesses.

EDWARD S. COFFMAN.

Witnesses:

EUGENE MATHEWS,

W. D. BAKER.