Feb. 16, 1971 W. A. CZAPAR 3,562,848

DEAD STOP DEVICE FOR DOORS

Filed Sept. 30, 1968 2 Sheets-Sheet 1

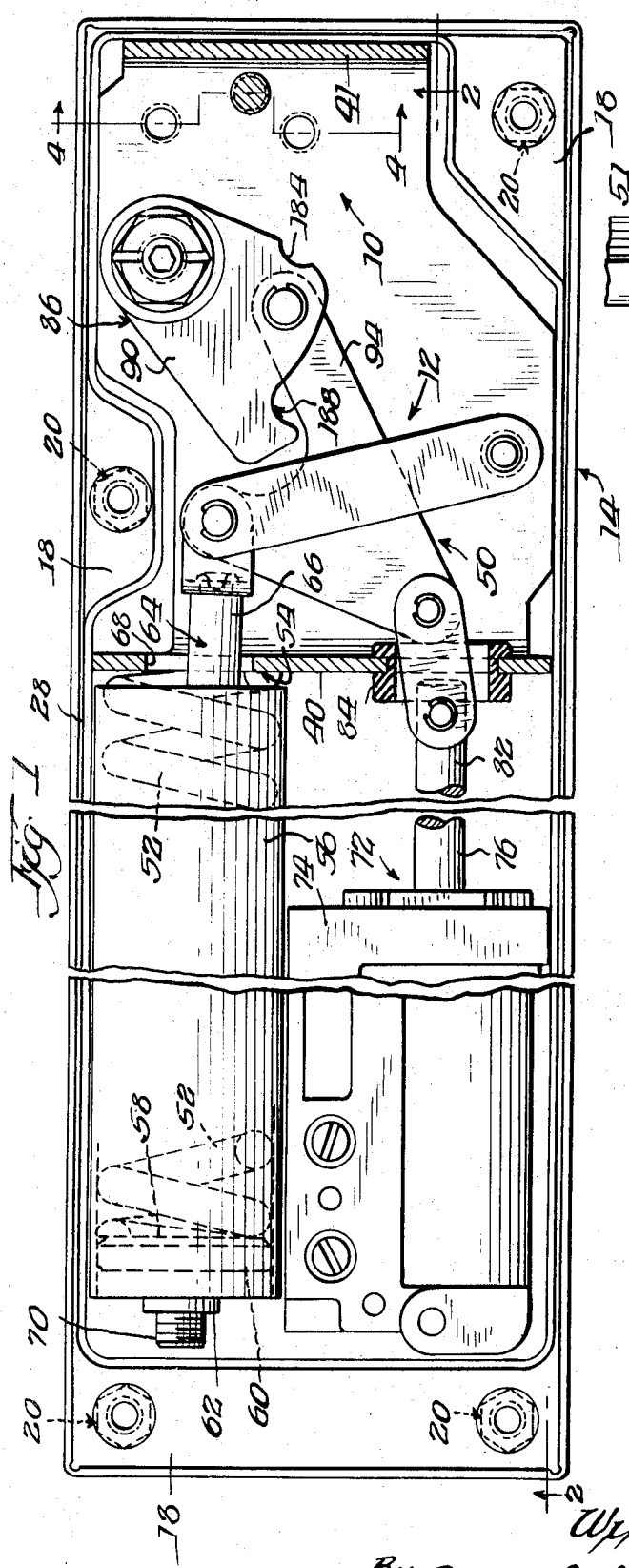


Fig. 1

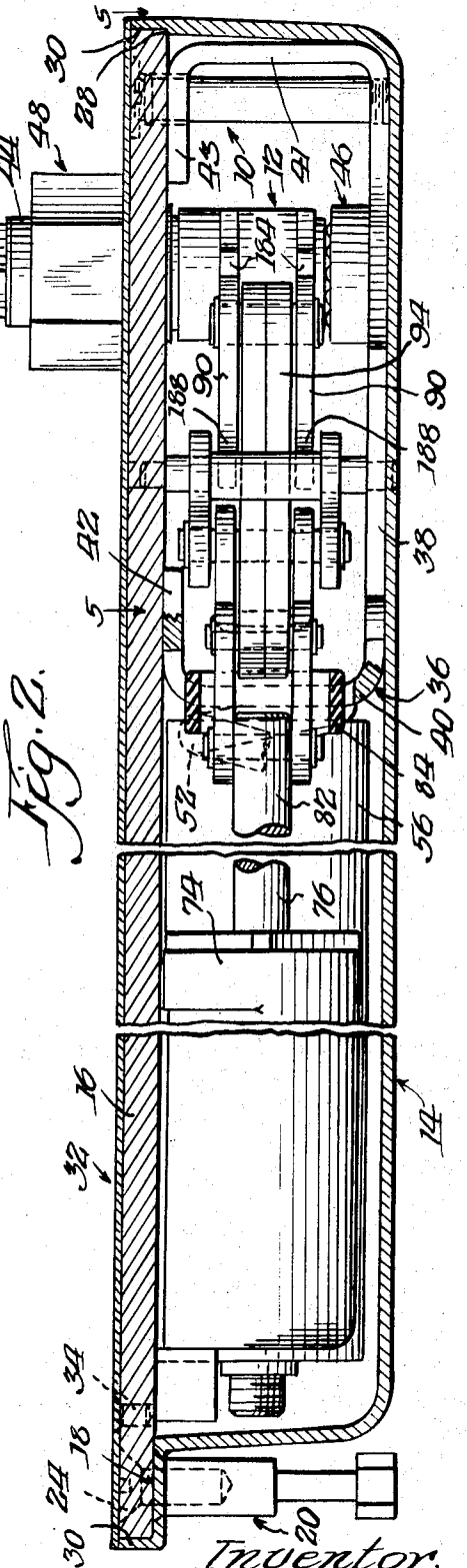


Fig. 2.

Inventor.
William A. Czapar.
By Brown, Jackson, Boettcher & Dienner
Attys

Feb. 16, 1971 W. A. CZAPAR 3,562,848

DEAD STOP DEVICE FOR DOORS

Filed Sept. 30, 1968 2 Sheets-Sheet 2

Fig. 3

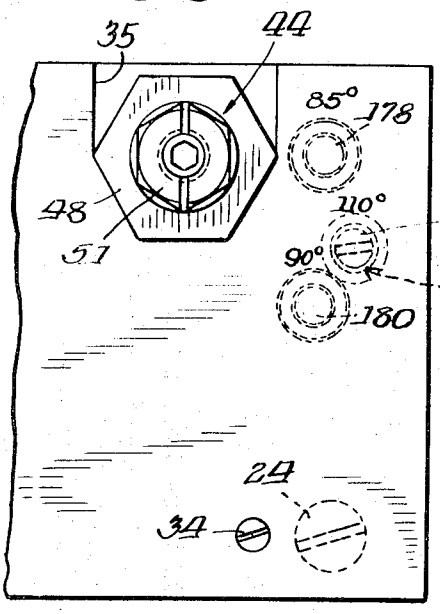


Fig. 4

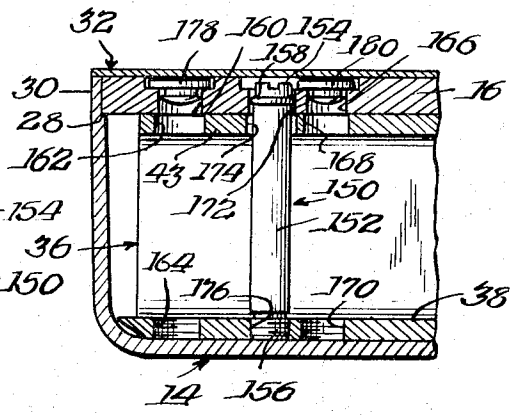


Fig. 6

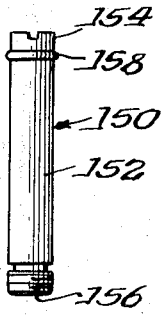
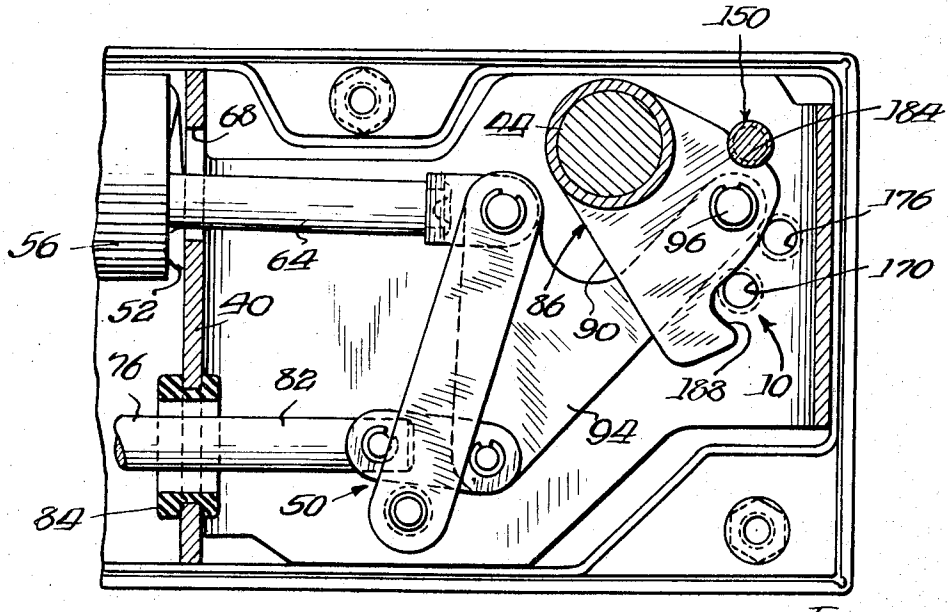


Fig. 5



Inventor.
William A. Czapar.
By Brown, Jackson, Boettcher & Dienner
Attys

United States Patent Office 3,562,848 Patented Feb. 16, 1971

3,562,848

DEAD STOP DEVICE FOR DOORS

William A. Czapar, Niles, Ill., assignor Rixson Inc., Franklin Park, Ill., a corporation of Illinois

Filed Sept. 30, 1968, Ser. No. 775,569
Int. Cl. E05f 3/20
U.S. Cl. 16—55 9 Claims

ABSTRACT OF THE DISCLOSURE

The dead stop device is designed for a door which rotates with spindle means and which is adjusted to be operatively associated with a door control device such as a door closing mechanism which tends to return the door to a preselected position. Crank means rotatable with the spindle means has at least one abutment surface and also constitutes a part of the door closing mechanism. The abutment surface is adapted to abut against stop means in order that the movement of the door may be stopped. The spindle means and the stop means are supported such that the stop means may be selectively positioned in any one of a plurality of positions in order that the door may be stopped in its movement at any selected one of a plurality of positions.

BACKGROUND OF THE INVENTION

This invention pertains to a dead stop device for a door. More particularly it pertains to a dead stop device which is designed to be combined with a door control device. For purposes of illustration the door control device is shown as a spindle-operated door closing mechanism, or "closer," but it will be understood that the dead stop device is not limited to being associated with a closer.

Many devices for controlling the opening and closing of doors are of the type having a spindle with which the door is operatively associated such that movement of the door effects rotation of the spindle. Spring mechanism, spring-and-dashpot mechanism, or other suitable mechanism operated by the rotatable spindle tends to return the door to a preselected, usually closed position. Usually, the spindle-operated device is mounted in the floor, with the spindle either engaged with and turned by a lever arm fastened to the pull side of the door or fitted into and turned by a socket mounted in the bottom of the door itself, depending upon the type of hinges or other pivotal supports that are used. Often the spindle-operated device is mounted in cement or concrete or in other seamless flooring, and the door closing mechanism is enclosed by a waterproof case which is embedded in grout or the like in a hole in the floor. Accordingly, overhead elbow devices and other unsightly attachments are eliminated, and, as a result, the door is permitted to have a pleasing uncluttered appearance.

Heretofore many dead stop devices used in aid of spindle-operated door closers have had parts which must be attached to the door itself and parts which must be attached to the door frame, to the floor, or to an adjoining wall. When such dead stop devices are used, the otherwise pleasing uncluttered appearance of the door, door frame and floor is marred.

To eliminate the aforementioned attachments, it is desirable that the dead stop device be incorporated with the spindle-operated door closer for enclosure with the door closing mechanism in the same waterproof case to be embedded in the floor.

OBJECTS AND ADVANTAGES OF THE INVENTION

It is a general object of this invention to provide an improved dead stop device for a door.

It is a more particular object of this invention to provide an improved dead stop device for a door which has a portion which rotates with the spindle means and which is operatively associated with a door control device such as a door closing mechanism tending to return the door to a preselected position.

It is another more particular object of this invention to provide an improved dead stop device, a part of which is incorporated in the recessed housing of a door-control device of the aforementioned type.

A further object of this invention is to provide a dead stop device with which there is no need to attach any visible parts to the door, or floor, or wall.

An additional object of this invention is to provide a dead stop device which may be selectively adjusted to stop the door in its movement at any one of a plurality of positions.

It is a further important object of the invention to provide a concealed dead stop device which may be adjusted to provide a plurality of different stop positions without the necessity of dismounting the door.

A dead stop device embodying the principles of this invention generally comprises a member operatively associated with the door and movable therewith when the door is swung toward an open position, stop means for blocking movement of the member and thereby of the door, and a fixed support for the stop means. The support has a pair of spaced walls between which the stop means extends in the path of movement of the member.

In its preferred form, the dead stop device is incorporated with and built into a door control device such as a spindle-operated door closer in such a way that the stop means may be selectively positioned in any one of a plurality of positions to stop the door in its movement at any one of said plurality of positions. Some of the basic elements of the door closer also form a basic part of the dead stop device, thereby reducing the total number of parts which are needed. The dead stop device is enclosed with the door closing mechanism in the same waterproof case to be embedded in the floor and therefore is not visible. Nevertheless it may be adjusted without dismounting the door or having to remove the door control device from its case.

These and other objects, features, and advantages of this invention may be understood best from the following description of the presently preferred embodiment of the invention, taken in conjunction with the attached drawings in which the dead stop device is shown in cooperation with a door closing mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a plan view, with some portions in section for clarity, of a dead stop device incorporated with a spindle-type door closer in accordance with the principles of this invention with the cover of the door closer and certain upper portions of the dead stop device omited to expose the internal mechanism;

FIG. 2 is a sectional elevational view, taken substantially along section line 2—2 of FIG. 1 looking in the direction of the arrows;

FIG. 3 is a plan view of a portion of the cover of the dead stop device and door closer;

FIG. 4 is a sectional view taken substantially along section line 4—4 of FIG. 1 looking in the direction of the arrows;

FIG. 5 is a fragmentary plan view, partially in section, related to FIG. 1, showing certain parts of the mechanism in changed positions; and

FIG. 6 is a detail view of the stop means of the dead stop device.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Introduction

FIGS. 1 and 2 illustrate a dead stop device **10**, which constitutes the presently preferred embodiment of this invention. The dead stop device **10** is combined with a door control device such as a spindle-type door closing mechanism, indicated generally by the reference numeral **12**, for enclosure in the same waterproof outer case **14**. Although the construction of door closer **12** is described in some detail herein in order that the invention may be understood in a proper setting, the closer is shown solely by way of example.

In addition to the outer case **14**, the door closer **12** comprises a removable cover plate **16** from which the mechanism of the door closer **12** is carried. The outer case **14** has a plurality of anchor-supporting flange portions **18**. Anchors **20**, which are designed to anchor the door closer **12** in cement or concrete in other seamless flooring, are associated with flange portions **18**. The cover plate **16** is removably fastened to the anchors **20**, and thereby to the outer case **14**, by a plurality of countersunk screws **24**. Support for the cover plate **16** is provided by the flange portions **18** and by an inner shoulder **28** around the perimeter of the outer case **14**. An upstanding rim **30** is provided at the perimeter of the outer case **14** entirely around the edge of the cover plate **16**. A thin decorative plate **32**, which may be made of brass or the like, is removably fastened to the cover plate **16**, over both the cover plate **16** and the upper edge of the lip **30**, by means of a plurality of countersunk screws **34**. Plate **32** has a recess **35** in its margin fitting around the upper bearing means **48** for the spindle **44**.

A bracket **36**, which has a flat bottom portion **38** and two upstanding end portions respectively **40** and **41**, is riveted or otherwise suitably fastened to the underside of the cover plate **16** by mounting flanges **42** and **43** extending from the respective end portions **40** and **41**. In addition to being associated with the door closer **12**, the bracket **36** forms part of the dead stop device **10**.

A rotatable vertical spindle **44**, which passes through suitable openings (not shown) in the cover plate **16** and in the superposed plate **32**, is journalled in lower bearing means **46**, which is carried on the bracket **36**, and in upper bearing means **48**, which is carried on the cover plate **16**. The upper bearing means **48** extends through an opening in the plate **32** and is sealed at its upper end against penetration of moisture and dust. The spindle **44** has a crank means **86** which turns with the spindle and the crank means is associated with operating linkage, described below, for actuating the door closing mechanism. The exposed upper portion **51** of the spindle **44** is hexagonal in section and thereby is adapted to be either engaged with and turned by a lever arm (not shown) which is fastened to the pull side of a door (not shown) or fitted into and turned by a socket (not shown) which is located at the bottom of the door itself, depending upon the type of hinges or other pivotal supports to be used with the door. Suitable connections of the spindle **44** to the door are well known in the art and are not a part of this invention.

Door control device

The door control device in the form of a door closing mechanism **12** includes an elongated coiled compression spring **52** and a dampening device or dashpot **72** both of which are operatively associated with the spindle **44** by a linkage which is indicated generally by the reference numeral **50**. Spring **52** bears by its first end **54** against the end portion **40** of the bracket **36** and is guided by a tube **56**, which is suitably mounted to the underside of the cover plate **16**. The second end **58** of the spring **52** bears against an annular disk **60**, which freely fits within the tube **56** and has an internally threaded hub **62**. An elongated rod **64** passes through the spring **52** and is

threaded to the hub **62** by the rod's threaded end **70**. The rod has its other end **66** extending through an enlarged aperture **68** in end portion **40** of the bracket **36** and into the confines of the bracket **36** for connection with linkage **50**. The spring **52** may be selectively preloaded by suitable adjustment of the axial position of the hub **62** along the threaded end **70** of the rod **64**.

The damping mechanism or dashpot **72**, which preferably is of the hydraulic type, is supported from the underside of the cover plate **16** adjacent to the tube **56** by its housing **74** which is suitably mounted in place. Details of the construction of a suitable hydraulic damping mechanism are not needed for an understanding of this invention. It is sufficient for purposes of the present disclosure to understand that the hydraulic damping mechanism **72** controls the movement of an elongated rod **76**, which is connected to a piston (not shown) by one end and is connected by its other end **82** with the linkage **50**. When the rod **76** is substantially fully drawn out of the damping mechanism **72**, the end **82** of the rod **76** extends through a bearing structure **84** in the end portion **40** of the bracket **36**.

It should be understood that the foregoing combination of the compression spring **52** and the hydraulic damping mechanism **72** is described solely by way of example and that other mechanism for controlling the opening and closing of doors may be used.

Linkage **50** connects with crank means **86** which comprises horizontal upper and lower crank member **90**, which are suitably connected to the spindle **44** to turn therewith. In addition to forming part of the door closer **12**, the crank means **86** also forms part of the dead stop device **10**, which will be described next.

Dead stop device

The dead stop device **10** comprises stop means **150** for blocking movement of the pair of crank members **90** of the crank means **86** and thereby blocking opening movement of the door. The stop means **150** is shown alone in FIG. 6. It comprises an elongated cylindrical stop pin **152** with a slotted end **154** and a threaded lower end **156**. The slotted upper end **154** fits the blade of a conventional screw driver. A conventional resilient O-ring sealing gasket **158** is seated in a groove (not shown) near the upper end **154** of the pin.

The stop means **150** may be mounted selectively in any of three positions, with the bracket **36** providing a fixed support for the stop means **150** in each position. The mounting flange **43** and the opposed bottom portion **38** of the bracket **36** provide respective spaced walls, between which the stop means **150** in each position extends in the path of movement of the crank members **90** of the crank means **86**. When the stop means **150** is mounted in its first position, which corresponds generally to 85° opening of the door, the upper end **154** of the stop pin **152** is disposed in a counterbored aperture **160** in the cover plate **16** and extends, with clearance, through an aperture **162** in the mounting flange **43** of the bracket **36**. The lower end **156** of the pin is threaded into a threaded aperture **164** in the bottom portion **38** of the flange **36**, which aperture is axially aligned with aperture **160** above it. The aperture **160** is sealed by the O-ring sealing gasket **158** of the pin.

When the stop means **150** is mounted in its second position, which corresponds generally to 90° opening of the door, the upper end **154** of the stop pin **152** is disposed in a counterbored aperture **166** in the cover plate **16** and extends, with clearance, through an aperture **168** in the mounting flange **43** of the bracket **36**. The lower end **156** of the pin is threaded into a vertically aligned aperture **170** in the bottom portion **38** of the flange **36**, which aperture is axially aligned with aperture **166** above it. The aperature **166** is sealed by the O-ring sealing gasket **158**.

When the stop means **150** is mounted in its third position, which corresponds generally to 110° opening of the

door, the upper end **154** of the stop pin **152** is disposed in a counterbored aperture **172** in the cover plate **16** and extends, with clearance, through an aperture **174** in the mounting flange **43** of the bracket **36**. The lower end **156** of pin **152** is threaded into a threaded aperture **176** in the bottom portion **38** of the flange **36**, which aperture is axially aligned with aperture **172** above it. The aperture **172** is sealed by the O-ring sealing gasket **158**. FIGS. 1 through 4 show the stop means **150** mounted in its third (110°) position, and FIG. 5 shows the stop means **150** mounted in its first (85°) position, as described. From FIGS. 1 and 5, with the aid of FIG. 3, it may be understood that the stop means **150** is at the same radial distance from the spindle **44** in its second (90°) and third (110°) positions, but that it is at a shorter radial distance from the spindle **44** in its first (85°) position. While this is not an essential arrangement, it is preferred for a reason which will be pointed out below.

It is evident that the slotted upper end **154** of the stop pin **152** may be reached through the associated apertures in the cover plate **16** for threading and unthreading the threaded lower end **156** thereof from the aligned aperture in the bottom portion **38** of the bracket **36**. It is only necessary to remove the screws **34** (FIG. 3) by which the decorative plate **32** is secured to the cover plate **16** and then to slide the plate sideways away from the spindle bearing **48** to gain access to the pin **152**. Unlike prior devices it is not necessary to dismount the door or to extract the door closer from its case. When the stop means **150** has been mounted in selected aligned apertures the openings in the cover plate **16**, which exist because of the other two unused pairs of aligned apertures for the pin **152**, are closed against water and dust by closure means comprising a pair of similar removable resilient plugs **178** and **180** which are pressed into the unused apertures in the cover plate **16**. See FIG. 4. The plugs **178** and **180** are enlarged at either end to insure tight sealing. The counterboring of the apertures in the cover plate **16** permits the plugs **178** and **180** to be used without interfering with the aforementioned decorative plate **32**.

The crank members **90** of the crank means **86** have respective vertically aligned first abutment surfaces **184** and respective vertically aligned second abutment surfaces **188**. From FIGS. 1 and 5, it will be seen that the first and second abutment surfaces **184** and **188** on the respective crank members **90** lie along different radii from the axis of spindle **44** on the crank members **90** and also at different radial distances from said axis. The first abutment surfaces **184**, which are radially inward of the respective second abutment surfaces **188**, lie at the correct radial distance from the spindle **44** to engage the stop means **150**, when the stop means **150** is in its first (85°) position, upon 85° opening of the door with conjoint rotation of the spindle **44** and the crank members **90**. See FIG. 5. The second abutment surfaces **188**, which are radially outward of the respective first abutment surfaces **184**, lie at the correct radial distance from the spindle **44** to engage the stop means **150** either, when the stop means **150** is in its second (90°) position, upon 90° opening of the door with conjoint rotation of the spindle **44** and the crank members **90**, or when the stop means **150** is in its third (110°) position, upon 110° opening of the door with conjoint rotation of the spindle **44** and the crank members **90**. Again see FIG. 5.

Provision of the opening for the various positions of the stop means 150 on different radii and at different radial distances from the spindle **44** permits compact arrangement of the various elements of the dead stop device **10** near one corner of the door closer's housing **14** without interference with adjacent elements of the door closer. Thus, in the present embodiment, when the stop means **150** is in its first (85°) position, it is fully clear of the bell crank lever **94** of the operating linkage **50**. Also the arrangement shown permits first and second stop positions (85° and 90° openings, respectively) to be provided without having the respective aligned apertures for those positions interfering with each other. That is, if all aligned pairs of apertures were to be located at the same radial distance from the axis of the spindle, the radial distance would have to be greater than that shown for the second and third positions of pin **152**, or the pin would have to have a smaller diameter, so that the aligned pairs of apertures for the first and second positions could be spaced from each other. In that event the casing **14** and bracket **36** would need to be elongated.

While the crank means **86** in the illustrated preferred form of the structure comprises two crank members **90**, it will be understood that crank means comprising a single crank member may be used instead.

In the embodiment herein described and illustrated the stop pin **150** is of relatively small diameter whereby the sockets into which the pin is selectively mounted may be disposed relatively closely to each other and thereby the advantage of compactness is gained.

The pin, though of relatively small diameter, is capable of sustaining the pressure put upon it by the stop arm **90** because it is supported by and below the area of its engagement by the said stop arm and is stressed substantially like a beam supported at both ends or where the supporting surfaces are relatively close together in double shear.

Thereby the position of the stop inside the casing is easy to adjust from the outside and yet the structure is surprisingly simple, compact, and powerful.

I claim:

1. A dead stop device for a door which is pivotally supported on and rotates with spindle means and which is operatively associated with door closing mechanism tending to return the door to a preselected position, said dead stop device comprising crank means rotatable with the spindle means, said crank means having at least one abutment surface and also constituting a part of the door closing mechanism, stop means against which said surface abuts whereby the movement of the door is stopped, structure for supporting the spindle means, said structure also providing means for supporting the stop means selectively in a plurality of positions whereby the door may be selectively stopped in its movement at one of a plurality of positions.

2. The dead stop device of claim **1** wherein the door closing mechanism and dead stop device are disposed in a common housing and wherein the stop means is adapted to be supported selectively at a plurality of stop positions, which positions are located adjacent a corner of the housing.

3. The dead stop device of claim **1** wherein the crank means has at least two abutment surfaces and they are disposed at different distances radially from the axis of the spindle.

4. The dead stop device of claim **1** wherein the means for supporting the stop means selectively in a plurality of positions comprises a pair of spaced walls disposed to one side of the spindle with apertures in each of said walls aligned in pairs on axes generally parallel to that of the spindle, and wherein the stop means has portions disposed in an aligned pair of apertures and extends therebetween.

5. The device of claim **4** wherein two pairs of aligned apertures are disposed at different distances radially from the axis of the spindle and wherein the crank means has two abutment surfaces and they are disposed at different distances radially from the axis of the spindle, with the radial distances of said abutment surfaces corresponding to the radial distances of said pairs of aligned apertures.

6. The dead stop device of claim **4** together with a cover plate through which the spindle extends and which is connected to said supporting structure, said plate having a plurality of spaced apertures in overlying position with the pairs of aligned apertures for the stop means.

7. The dead stop device of claim **6** wherein one aperture of each aligned pair is threaded, and wherein the stop

means comprises a pin which is threaded by one end into said threaded aperture of the pair, the opposite end having means reachable through the aligned aperture of the plate by which said pin may be unthreaded from the supporting structure.

8. The mechanism of claim 7 together with closure means for closing those apertures of the plate in which the stop means is not disposed, and wherein said opposite end of the pin extends into an aperture of the plate below its exposed surface and has a gasket which seals the aperture in the cover plate.

9. In a door control device having a casing, a cover plate for the casing, a bracket attached to and depending from the cover plate and providing a bottom portion below and substantially parallel to the cover plate, a spindle extending through and having a bearing in said cover plate, said spindle having a bearing at its lower end supported by said bracket, a stop arm mounted on said spindle, spring means in said casing connected to the spindle for returning the spindle to a predetermined and adjustable stop means cooperating with said stop arm to limit the extent of angular motion of the spindle in an

outward direction, said adjustable stop means comprising a stop pin, there being a plurality of sockets formed partly in the cover plate and partly in the bracket for mounting the stop pin, each of said sockets being adapted to receive and support the stop pin with its axis substantially parallel to the axis of the spindle, and within the radius of movement of the stop arm for engagement therewith, said pin being insertable selectively into each socket and removable therefrom from the top of the cover plate and said pin when it is disposed in a selected socket being supported by the cover plate and bracket above and below the area of engagement of the stop arm with the pin.

References Cited

UNITED STATES PATENTS

2,660,750	12/1953	Wallen	16—49
2,752,627	7/1956	Carlson	16—55
2,971,212	2/1961	Vöster et al.	16—55

DONALD A. GRIFFIN, Primary Examiner

PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,562,848 Dated February 16, 1971

Inventor(s) William A. Czapar

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 7, line 20, after "predetermined" insert

-- position --.

Signed and sealed this 1st day of June 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

WILLIAM E. SCHUYLER,
Commissioner of Paten