DOOR CONTROL MEANS

29 Claims, 7 Drawing Figs.

ABSTRACT: Door control means in the form of a door closer employing a single cylinder and a spring mechanism in side-by-side relation, with said cylinder, spring, door hold-open device, and bearing means for the door spindle being supported on the cover plate, and with the spindle for the door being so disposed as to permit its axis to be in alignment with the axis of any offset hanging means for the door, such as butt or pivot hinges, the door control means being easily removable for repair or replacement without having to remove the door from its hanging means.
Fig. 5

Fig. 4

Fig. 6

Fig. 7

FORCE-TORQUE GRAPH

FORCE IN POUNDS

DEGREES OF DOOR OPENING

Inventor.
William A. Czepa.

By Brann, Jackson, Bottcher & Driessen.
DOOR CONTROL MEANS

BACKGROUND OF THE INVENTION

In endeavoring to reduce building costs, designers are not only seeking lower costs in all components of the building, such as hardware items, but also in all of closures, basic structures of the buildings themselves, such as doors, with the result that doors are being made less thick. Closures thickness of doors has been reduced so much that some door control units which are floor mounted are too deep to be used. This has required new and shallower door control structures, but such shallower construction has presented problems because architects and builders still desire the durability and all of the same functions that prior door control units, such as door closure, have heretofore provided. Additionally, from the architect’s and builder’s point of view the cost of such closure should be no greater than before and hopefully even less.

Therefore, it is one important object of this invention to provide a shallow, floor mounted door control unit which can be used in doors in reduced thickness. Such a unit, when installed in a floor which has previously been formed, requires the removal of less concrete than prior, deeper units require.

It is another object to make such unit compact and durable while not only providing all desired functions but also providing them by improved structure. One example of my structure which affords compactness is in the use of a single hydraulic cylinder to provide a door checking in two directions, with that cylinder and also the supporting guide for the door operating spring being rigidly supported rather than pivotally supported as in prior devices, which prior devices required larger cases to accommodate the pivotal movement. The hydraulic cylinder has a self-contained hydraulic system.

It is another object to provide a door control unit which is removable from the floor—or if installed overhead, removable from the door frame—without removing the door from its hinged or pivoted support. To this end no part of the door control unit is located beneath the door or frame and the spindle of the unit is driven by a drive arm which is mounted on the side of the door in an unobtrusive manner. Removal of the side mounted arm from the door will then permit removal of the door control unit from the floor without removing the door from its hinged or pivoted support. This is not only a great convenience but also makes servicing of the closer much less expensive.

It is yet another object to so construct the door control unit that the spindle, while yet afforded ample support, is disposable so close to the edge of the unit that its axis is in alignment with any standard offset door hanging means, such as butt or pivot hinges. As a result no part of the door control unit needs to be disposed directly beneath the door or frame, and standard doors and frames may be used. Since no part of the unit is beneath the door, there is another advantage, namely, the ability to totally conceal the unit by covering it with floor covering material, which material, if tile, can be secured directly to the cover plate or if carpeting, can overlie the cover plate in a uniform line along the edge of the door.

A further advantage derived from my invention is that parts may be eliminated, thereby contributing to a reduction in overall cost, without impairing the full range of desired functions.

Also, parts are easily replaceable, in situ if preferred. For example, when embodied in a door closer having a cover plate, my invention permits the support from said plate of a single hydraulic dampering device with a self-contained fluid system; and resilient door operating means either of which may be independently removed for repair or replacement. Alternatively, if desired, the cover plate with attached components may be sent to the factory for repair and a substitution may be made without removing the housing along with the unit and without the necessity of removing the door from its hinged support. The ease of removal of these important operating elements will result in rapid servicing of the unit as well as reduced costs of service.

It is yet another object of my invention to provide with the aforesaid cover plate a simple, inexpensive supporting bracket by which further support for the spindle is afforded together with support for the pivots of operating linkage, or connecting means, which is operatively disposed between the spindle, on the one hand, and the resilient door operating means and the piston of the hydraulic cylinder on the other hand. This arrangement provides a distinctively advantageous unitary operating mechanism for quick installation or removal in the field or in the shop.

The housing with which the cover plate and its bracket and components are associated can serve as the cement case, thereby eliminating the usual cement case which is heavy, costly and space consuming. Preferably, the cement case is made of plastic which is lighter, more resistant to the linkage or breaking, cheaper and more corrosion resistant than the usual cast iron case. The case supports rigid anchors which, with the case, are embedded in cement in the floor. The door control unit by its rigid closure plate is connected in direct stress-transmitting relation with the rigid anchors so that stresses are borne by the cement rather than the plastic cement case when the door is opened and closed.

A further advantage of my invention resides in the operating linkage operated by the spindle which linkage provides for operation of both the piston of the hydraulic cylinder and also the resilient means. My improved linkage permits a greater throw to be afforded the piston and also permits an axial movement of the piston more closely approximating the straight line movement of a rack and pinion. Furthermore, the linkage is so designed in association with the design of the resilient means and its supporting guide as to also minimize side loading of the resilient means.

It is another object of my invention to provide an improved action of the resilient means during door opening whereby the force required to overcome the resilient means is only slightly rising after the initial door opening movement. This object is achieved by the aforementioned operating linkage. By varying the linkage I can provide variations in the force to be applied during opening and closing movement of the door.

Another object of my invention is to make available a door control unit which may have a hold-open device easily added to it if such a device is not originally incorporated in it. Such device may be carried by the same cover plate which carries other operating parts of the door control unit, and the device may be conveniently removed for repair or replacement without impairing the normal operation of the door control unit.

Another advantage of my invention is that the cover plate which supports the operating mechanism of the door control unit may be used with a plastic housing and may be sealed to it in a waterproof manner.

Other objects, uses and advantages of my invention will be apparent, or become so, when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view, taken generally on the line 1-1 of FIG. 2, of the door control unit embodying my invention, certain parts being broken away for better revealing the structure, but with the cover plate in its operative position;

FIG. 2 is a top plan of the door control unit of FIG. 1, but with the cover member not shown;

FIG. 3 is a fragmentary sectional view, on reduced scale, taken generally on the line 3-3 of FIG. 2.

FIG. 4 is a fragmentary view on small scale showing the location of the door control unit relative to a door, a door frame and one butt hinge;

FIG. 5 is a fragmentary, sectional view taken generally on the line 1-1 of FIG. 2 to show the use of a door hold-open device;

FIG. 6 is a fragmentary top plan view of the structure of FIG. 5, and
FIG. 7 is a torque graph of the force used to overcome the spring of the door control unit during different degrees of door opening.

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail an embodiment of the invention with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention. The scope of the invention will be pointed out in the appended claims.

DETAILED DESCRIPTION

Referring to FIGS. 1 and 2, a door control unit is indicated generally by the reference numeral 10, and it comprises a housing 12 indicated generally by reference numeral 112 having a cover plate 14 which is adapted to close the top of the housing and to have a sealing relationship thereto as by a gasket 16 or other appropriate sealing means. If desired, a trim plate 15 may be removably secured to cover plate 14 in the usual manner. Housing 12 may be formed of a plastic material and serves as a cement case to be embedded in the floor over which a door, indicated fragmentally at 18 in FIGS. 2 and 4, may swing in a direction indicated by the arrow. The door is pivotally supported from a door frame, indicated fragmentarily at 20, as by pivotal hinges, or butt hinges 177 (FIG. 4). It will be observed from FIGS. 2 and 4 that the entire housing 12 lies to the side of the frame 20 and no part of the housing of the door control unit 10 lies underneath the door when the door is in the closed position shown in FIGS. 2 and 4. Consequently, the door control unit may be easily removed for repair or replacement without removing the door from its support.

Anchors for the door control unit are indicated generally by the reference numeral 22 and there are four of them at four spaced apart portions of the housing. The anchors 22 are of rigid metal and are carried by the plastic housing 12, and the plastic housing, with the anchors, is adapted to be set in a recess in the floor. Cement, which is then disposed around the housing to fill the recess where it is not already occupied by the housing 12, fits about the anchors and housing. When the cement is set, the anchors are connected to and supported by the cement. The cover 14 is not secured to the housing itself but rather is secured by screws 24 which pass through openings, such as the opening 26 of FIG. 1 in the cover plate 14, and are threadedly received in sockets 28 of the anchors 22. From this it will be observed that any movement of the cover plate or any stresses exerted on the cover plate by reason of any action of the door control unit, will be transmitted through the screws 24 to the anchors 22 and thence to the cement, and such forces will not be transmitted to the plastic housing 12. The plastic housing is not compressed between the anchors 22 and cover plate 14 because upper reduced extensions 22a of the anchor extend through openings 22b into contact with the cover plate 14.

As may be best seen from FIG. 1, a support, indicated generally by the reference numeral 30 is secured by arms 32 and 34 to the underside of the cover plate 14 as by welding, riveting, screws or other suitable fastening arrangements. In its preferred form the support is a generally U-shaped channel member having a supporting base portion 36 and with the arms 32 and 34 consisting of sidewalls 38 and 40, respectively, of the channel member with each wall having an inwardly bent terminal flange 42 at which the connection is made between the support 30 and the cover plate 14.

Within the housing 12 there is disposed a hydraulic dampening device, indicated generally by the reference numeral 41, and it has a housing 46 defining an inner chamber, passageways and a piston (which are not shown), with the fluid of the hydraulic dampening device being entirely self-contained within the housing 46. A piston rod 47 extends outwardly of the housing 46, toward the right as viewed in FIGS. 1 and 2. Housing 46 at its top has three threaded sockets 48 adapted to receive screws, such as screws 50 of FIG. 1, by which the hydraulic dampening device is fixedly secured to the underside of the cover plate 14. Details of a suitable hydraulic dampening device may be seen in the copending application, Ser. No. 832,900 filed by Richard E. D'Hooge on June 13, 1969, which has the same assignee as this invention.

Referring now more particularly to FIG. 2, a resilient device for controlling the movement of the door is indicated generally by the reference numeral 52. It comprises a coil spring 54 which has one end in abutment with the sidewall 58 of the channel-shaped support member 30 and its other end abutting a circular abutment member 56 which is centrally apertured and threaded and is adjustable along the threaded end of the rod 58 which extends through the coil spring 54 and through an aperture 60 in wall 58 of the channel-shaped support 30. A guide, indicated generally by the reference numeral 62, is provided for the coil spring 54 and the guide may be seen in FIGS. 2 and 3. Said guide fits closely about the spring 54 and its abutment 56 but has an opening 64 along its length on the side opposite from the cover plate 14, which opening is wide enough to permit the rod 58 to pass through it. That portion 66 of the guide 62 which is opposite the opening 64 is slightly offset from the generally circular shape and is flat and apertured at three places, as exemplified at 67. A screw, such as screw 68 of FIG. 3, may pass through each aperture 67 for threading into a threaded hole, such as hole 69 of FIG. 3, in the cover plate for securing the guide 62 and thereby the resilient device 52 to the underside of the cover plate 14. It will be understood that the guide 62 could be secured to the underside of the cover plate by other fastening means including welding. The open side 64 of the guide serves not only to permit access to the screws 68, or for a welding tool, but also is of a width which permits the rod 58 to be moved laterally through the opening into the guide, if desired, during assembly, after which the spring 54 may be inserted into the guide and the abutment member 56 threaded onto the rod 58.

A spindle 70, having an upper exposed noncircular end 72, is supported for rotation in an upper bearing means 74 which is connected with the cover plate 14 and in a lower bearing means 76 which is carried by the bottom wall 36 of the channel-shaped support 30. Secured to the lower end of the spindle 70 are a pair of crank arms 78, aligned one above the other, which rotate with the spindle when movement of the door occurs, such movement of the door being transmitted to the spindle by means of a drive arm 79 (See FIGS. 2 and 4) which has a socket 79a fitting over the end of the spindle and an arm portion 79b secured to the side of the drive arm 79. The axis of the socket and the axis of the spindle are aligned with the axis of the hinge means 77. Vertical adjustment of the drive arm relative to the spindle 70 is easy because the drive arm is connected by bolts (not shown) to the side of the door rather than having a connection with the bottom edge of the door. For an installation fixture which will permit easy installation of the door control unit in the floor at the proper position and elevation, and to assure alignment of the axis of the spindle 79 with the axis of the hinges, see my copending application Ser. No. 763,329, filed Sept. 27, 1968.

Connecting means, indicated generally by the reference numeral 80, operatively extends between the spindle 70 and the rod 58 of the spring 54 and the piston rod 47 of the hydraulic dampening device 44. The connecting means comprises the crank arms 78 which are pivotally connected by pin 82 to a link 84 which may be formed of a double thickness of metal as shown in FIG. 2. The link 84 has three pivotal connections spaced in triangular relationship, one of which pivotal connections is by pin 82 with the crank arm 78. A second pivotal connection of link 84 is by the pin 86 with a clevis 88 which is secured on the end of the rod 58 of the resilient device 52. The third connection of the link 84 is by a pin 90 which connects with a pair of aligned short links 92 which in turn are pivotally connected by a pin 94 with the end of the piston rod 47. The piston rod 47 and links 92 may be
guided in a nonmetallic bearing 96 which is disposed in an aperture 98 (FIG. 2) in the sidewall 38 of the channel member 30. Also pivotally connected by the pin 86, which is in the clevis 88 at the end of rod 58, are a pair of control arms 100 which are pivotally supported on a fixed pivot pin 102 which pivot pin has its upper and lower ends supported in the cover plate 14 and in the base 36 of the channel-shaped support 30, respectively.

The connecting means 80 in the form of the arms and links are so disposed and proportioned as to provide a generally straight line motion of the piston rod 47 and the rod 58 of the resilient device 52 when the spindle is rotated by movement of the door. Substantially greater movement is provided for the piston rod 47 than for the rod 58. To the extent that it is necessary for rod 58 to cock slightly within spring 54 during its movement in response to door opening or closing, that is accommodated by the rod 58 passing through the aperture 60 in sidewall 38 and through the coil spring 54. The abutment member 56 which is threaded on the rod 58 also will readily move within the guide 62.

When the connecting means as illustrated, the spring force for different degrees of door opening is indicated in FIG. 7. It will be seen that upon initial door opening there is an immediate rise in the force required to compress the spring, and that after about 5° of opening the force increases but at a lesser rate throughout the remainder of the door opening operation. It will be appreciated that by changing the configuration of the various links and location of the pivot points of the structural elements it is possible to make up the connecting means 80, it is possible to vary the action of the door control unit to provide a different configuration of torque curve than that shown in FIG. 7.

In FIGS. 5 and 6 there is shown the addition to the door control unit 10 of a door hold-open device, indicated generally by the numeral 104. It includes a housing 106 which encircles the piston rod 47 of the hydraulic dampening device 44 and is secured by screws 108 to the underside of the cover plate 14 between the end of the hydraulic dampening device and the wall 38 of the bracket, or support, 30. The cam 110 which forms a part of the door hold-open device 104 is also secured on the piston rod 47 and cooperates with the internal structure of the housing 106. For details of a suitable door hold-open device of this general arrangement reference may be made to the copending application of Burke J. Crane, Ser. No. 729,239, filed June 24, 1968.

The door hold-open device 104 effects its door hold-open function by yieldably gripping the piston rod 47 and holding it against movement. If it is desired to be able to vary the position of the door at which it is held open, the housing portion 106 may be shifted to a different position on the underside of the closure plate 14 and secured thereby the screws 108 passing through other openings 112 in the cover plate 14.

It will be appreciated that the hold-open device is not required and the door control unit may be sold and used without it. However, if it is later desired it may easily be added. Likewise, it may readily be removed for repair or replacement from the door control unit by first removing the drive arm 79 and finish plate 15 and cover plate 14, which may be accomplished without the necessity of removing the door from its hinges.

It will be observed that the channel-shaped support 30 has its open ends extending toward the longer sides of the housing 12 and the cover plate 14. This permits the bearings 74 and 76 to be disposed closely adjacent the edge of the cover plate 14 and the channel-shaped support 30. As a consequence, the spindle 70 may be disposed in axial alignment with the axis of the pivotal hinges or butt hinges by which the door 18 is supported from the door frame 20. By reason of this construction, it is unnecessary to have the spindle connected to the door by a pivotal arm which must have a sliding connection with the door, as in many prior door control units. It will be observed that, when the operator arm, or drive arm, 79 is disconnected from the side of door 18 and lifted off the upper end 72 of the spindle 70, it will be possible to move the door control unit from the floor, except for housing 12, without having to take the door off of its hinges or pivotal supports. This is a distinct advantage.

Furthermore, it will be noted that all of the operating mechanism is connected to the cover plate 14 so that when the four screws 24 securing it to the anchors 22 are removed, (after the trim plate 15 is removed), all of the operating mechanism can be extracted as a unit for ready repair.

Furthermore, the hydraulic dampening device 44 and the resilient unit 52, as well as the door hold-open device 104 (if used), may be individually disconnected from the cover plate so that a replacement may be immediately installed, if desired, or repair on the particular part can be undertaken at the site. Furthermore, if it is desired to ship the operating structure of the door control unit to the manufacturer or a servicing agent, this can be done without the necessity of also shipping any housing structures.

Because of the connecting means 80 and the generally straight line movement of the piston rod 47 and rod 58, it is not necessary, as in prior structures to have either the resilient device 52 or the hydraulic dampening device 44, or both, pivotally connected by one end for swinging movement when those devices are controlling the movement of the door when it is swung open or closed. As a consequence, the two devices may be disposed side-by-side in very close relationship, thereby reducing the overall width of the housing in which they are disposed.

Having now set forth for purposes of illustration a preferred embodiment of my invention;

1 claim:
1. For use with a door mounted by hinges for pivotal movement above a floor and about the axis of said hinges, a door control unit comprising a housing adapted to be recessed in the floor with the outer wall of said housing displaced laterally from the adjacent vertical face of the door in its closed position, a removable cover plate covering an opening in the upper end of said housing, a spindle extending through said plate in direct alignment with said axis of said hinges, bearing means carried by said plate for rotatably supporting said spindle, a drive arm removably mounted on the door and having a driving connection with said spindle, whereby dismounting of said drive arm from the door permits said cover plate and spindle to be removed from said housing without removing the door from its hinges, and spring means connected to said spindle for urging the door to its closed position.
2. The structure of claim 1, wherein said spring means is operatively supported from said cover plate and removable from said housing with said cover plate.
3. For use with a door 3, on a door frame for pivotal movement above a floor and about a vertical axis, a door control unit comprising a housing adapted to be recessed in the floor with the outer wall of the said housing displaced laterally from the adjacent vertical face of the door in its closed position, a removable cover plate covering an opening in the upper end of said housing, a spindle projecting through said cover plate in alignment with said vertical axis, a drive arm detachably coupled between the door and said spindle, and spring means connected to said spindle for urging the door to its closed position, wherein said housing is a cement case and is the only housing for the door control unit.
4. The structure of claim 3 together with sealing means disposed around the periphery of the cement case at its open upper side, and wherein the cover plate closes the open upper side of the cement case in sealing engagement with said sealing means.
5. The structure of claim 3, wherein said anchor means comprises at least three anchors hanging downwardly from said upper end of said housing adjacent said opening at spaced-apart positions, said anchors having fastening means for removably mounting said cover plate.
6. In a door control unit having a spindle for the door, a cover plate for covering at least a part of the open top of the housing of the unit and a hydraulic dampening device for controlling movement of a door, the improvement wherein the hydraulic dampening device is operatively supported from said cover plate and said cover plate is removable without removing the door from its hanging means and wherein a door hold-open device is removable and operatively supported from said cover plate, and wherein the hydraulic dampening device has a piston rod which cooperates with the door hold-open device for providing a hold-open position for the door.

7. The improvement of claim 6, wherein part of the hold-open device is removably secured to said cover plate in a plurality of positions axially of the piston rod.

8. In a door control unit having a spindle for the door, a cover plate for the housing and a resilient device for controlling movement of a door, the improvement wherein the resilient device is operatively supported from said cover plate and the cover plate is removable without removing the door from its hanging means, said resilient device includes a coil spring and a guide for said spring, said guide at least partially encircling the spring, together with a hydraulic dampening device for controlling movement of the door, and wherein the guide and the hydraulic dampening device are both in fixed position relative to each other and to the cover plate when the door control unit is in operation, but the rod in said coil spring is adapted to cock relative to the guide when the door control unit is in a partially open position.

9. In a door control unit having a spindle for the door, a cover plate for the housing and a resilient device for controlling movement of a door, the improvement wherein the resilient device is operatively supported from said cover plate and the cover plate is removable without removing the door from its hanging means, said resilient device includes a coiled spring and a guide for said spring, said guide at least partially encircling said spring, wherein the guide for said spring is generally tubular but has an opening extending axially, and wherein there are means for securing the guide to the underside of the cover plate.

10. The improvement of claim 9, together with a rod disposed within the coiled spring and adapted for use in placing the spring in compression and wherein the opening of said guide is at that portion of the guide which is opposite the means for fastening the guide to the underside of the cover plate and the opening permits the passage of said rod therethrough.

11. In a door control unit having a single floor recessed housing a spindle coupled to a hinged door, a cover plate for the housing of the unit, a hydraulic dampening device for controlling movement of a door and a resilient device for controlling movement of the door, the improvement wherein the two devices are operatively supported entirely from said cover plate, and the cover plate is removable without removing the door from its hinged supports and without removing the housing from the floor.

12. In a door control unit having a spindle for the door, a cover plate for the housing of the unit, a hydraulic dampening device for controlling movement of a door and a resilient device for controlling movement of the door, the improvement wherein the two devices are operatively supported from said cover plate, and the cover plate is removable without removing the door from its hanging means, together with a door hold-open device which is removably and operatively supported from said cover plate, and wherein the hydraulic dampening device has a piston rod which cooperates with the door hold-open device for providing a held-open position for the door.

13. The improvement of claim 12, wherein the three devices are removable with said cover plate from the housing and each is adapted for ready removal from said plate.

14. In an improved door control unit having a housing, a cover member for said housing, a support carried by said cover member, said support being adjacent one end of said cover and connected thereto by a pair of spaced arms, wherein the support and arms are formed as a generally channel-shaped member the sides of which channel-shaped member have flanges connected to the underside of the cover member.

15. In an improved door control unit having a housing, a cover member for said housing, a support carried by said cover member, said support being adjacent one end of said cover and connected thereto by a pair of spaced arms, together with aligned bearings for a spindle supported by said cover member and said support, with said bearings being disposed closely adjacent an edge of said cover member and support.

16. In an improved door control unit having a housing, a cover member for said housing, a support carried by said cover member, said support being adjacent one end of said cover and connected thereto by a pair of spaced arms, wherein the support and arms are formed as a generally channel-shaped member, with the channel having its open top facing the under side of the cover member and having an open end adjacent a side of the door control unit.

17. The door control unit of claim 16, together with bearing means adapted to support a spindle which moves with movement of a door, said bearing means being disposed closely adjacent said side of the door control unit where the channel-shaped member has its open end, and being carried by said cover member and said channel-shaped member.

18. The door control unit of claim 17, together with a hydraulic dampening device and a resilient device, both devices being adapted to connect with said spindle for controlling the movement of a door.

19. The door control unit of claim 18, together with connecting means adapted to be connected between said spindle and both devices, said connecting means including a fixed pivot with said pivot means for said pivot being provided by said channel-shaped member.

20. The door control unit of claim 19, wherein the hydraulic dampening device includes a piston rod and said resilient means includes a coiled spring and a rod for placing the coiled spring in compression.

21. The door control unit of claim 20, wherein the connecting means, in response to movement of the spindle will result in said rod of the spring and the piston rod having a generally straight line movement.

22. The door control unit of claim 20, wherein the connecting means comprises a crank arm adapted to move with said spindle, a link having three pivotal connections secured in triangular relationship, one of the pivotal connections being operatively connected with said piston rod, a second pivotal connection being operatively connected with said crank arm, and the third pivotal connection being operatively connected with the rod of said coiled spring, and a pivoted control arm having said fixed pivot and also connecting with said link.

23. The door control unit of claim 22, wherein the connecting means, upon movement of said door to its open position, causes the spring to be so compressed as to provide an initial increasing force followed by a lower rate of increasing force through the remainder of the door opening movement.

24. The control unit of claim 20, wherein the connecting means is disposed within the channel-shaped member, and said channel-shaped member is apertured in a sidewall to permit connection of said connecting means with the rod of said spring and the piston rod, and wherein one end of said coiled spring abuts against said said sidewall of the channel-shaped member.

25. The control unit of claim 24, together with a nonmetallic bearing disposed in said apertured sidewall of the piston rod.

26. A door control unit for use with a door mounted on a door frame for pivotal movement above a floor and about a vertical axis comprising a casing having an enlarged opening in its upper end and adapted to be recessed in the floor, a
cover plate for covering said enlarged opening, a spindle extending upwardly through an aperture in said cover plate, bearing means for rotatably mounting said spindle in said aperture of said cover plate, spring means removably secured to the under surface of said cover plate and operatively connected to said spindle for urging said spindle to rotate in one direction to close the door, and hydraulic dampening means carried by said cover plate and operatively connected to said spindle for retarding the rotational movement of said spindle wherein said hydraulic dampening means includes a self-contained hydraulic fluid housing removably secured to said under surface of said cover plate.

27. The improvement of claim 26, wherein the resilient device includes a coil spring, means forming an apertured abutment for one end of said spring, and a rod extending through said aperture and said coil spring, said rod carrying a member adapted to abut against the opposite end of said spring, said rod and abutment member being relatively adjustable for varying the compression of the spring.

28. The improvement of claim 26, wherein the resilient device includes a coil spring and a guide for said spring, said guide at least partially encircling the spring.

29. The door control unit of claim 26, further comprising bracket means removably secured to said under surface of said cover plate, connecting means carried by said bracket means for operatively connecting said spring means and said hydraulic dampening means to said spindle, and a second bearing means carried by said bracket means for rotatably supporting the lower end of said spindle.
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,576,046 Dated April 27, 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:

On the cover sheet [73] "Rixon Inc." should read -- Rixson Inc. --.

Column 6, line 53, "door 3," should read -- door mounted.

Signed and sealed this 18th day of April 1972.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR. ROBERT GOTTSCALK
Attesting Officer Commissioner of Patents