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Maynard, Jr. et al.

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[54] **DOOR COORDINATOR ASSEMBLY**

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[73] Assignee: **Door Controls Incorporated,** Ann Arbor, Mich.

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[52] **U.S. Cl.** **49/367;** 16/82; 292/333

[51] **Int. Cl.**[2] **E05C 7/05**

[58] **Field of Search** 49/367, 366, 368, 369; 16/82; 292/232, 333

[56] **References Cited**

UNITED STATES PATENTS

2,015,996	10/1935	Eichacker	49/366
3,822,506	7/1974	Fishback	49/367

FOREIGN PATENTS OR APPLICATIONS

582,993	8/1933	Germany	49/367

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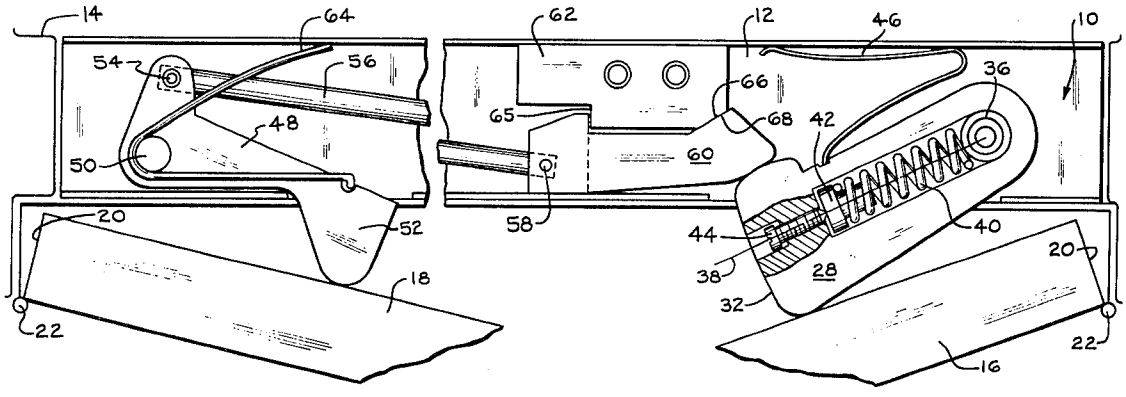
[57] **ABSTRACT**

A door coordinator assembly which includes a door stop lever engageable with the active door in a pair of independently movable companion doors for both preventing untimely closing of the active door and providing a yieldable shock absorbing stop for the door. The lever is movably mounted on a fixed pivot so that it can move with respect to the pivot to thereby change the effective length of the lever, and the lever is hollow having an internal spring that urges the lever toward a position of maximum length. The spring is compressible to allow the door stop lever to be pivotally moved to a recessed position in response to an abnormally high closing force of the door. A trigger member, actuated by the inactive door, cooperates with a specially constructed body member that engages the door stop lever to normally keep the door stop lever in a position preventing closing of the active door ahead of the inactive door.

7 Claims, 2 Drawing Figures



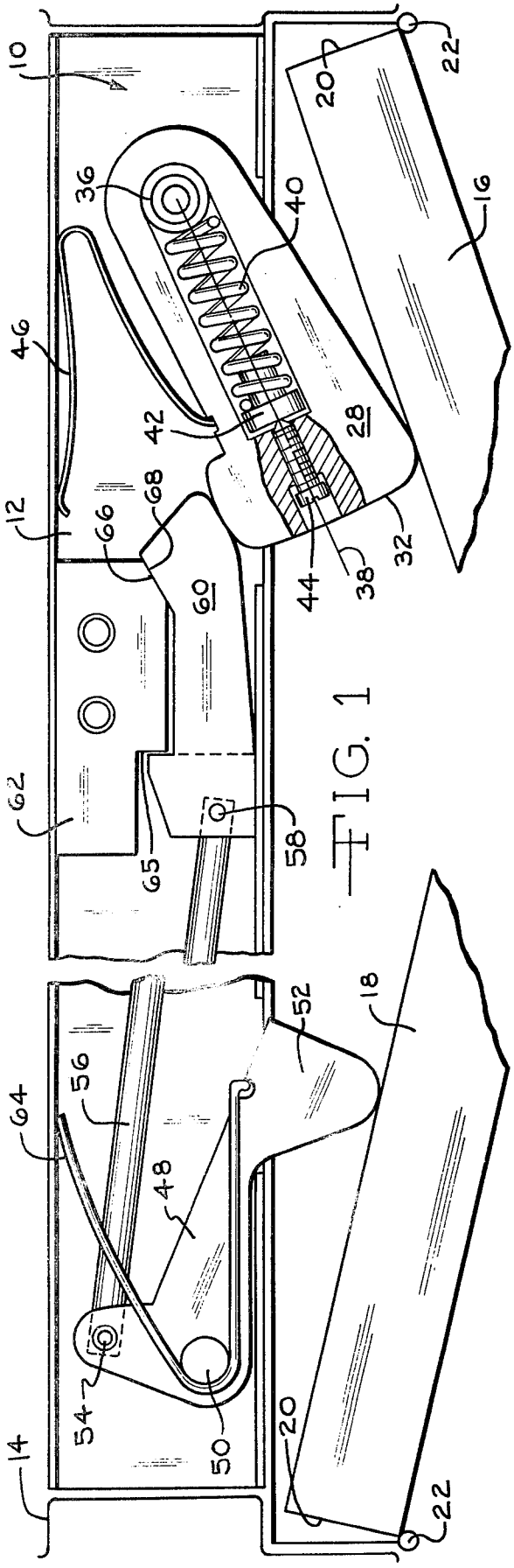

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FIG. 1

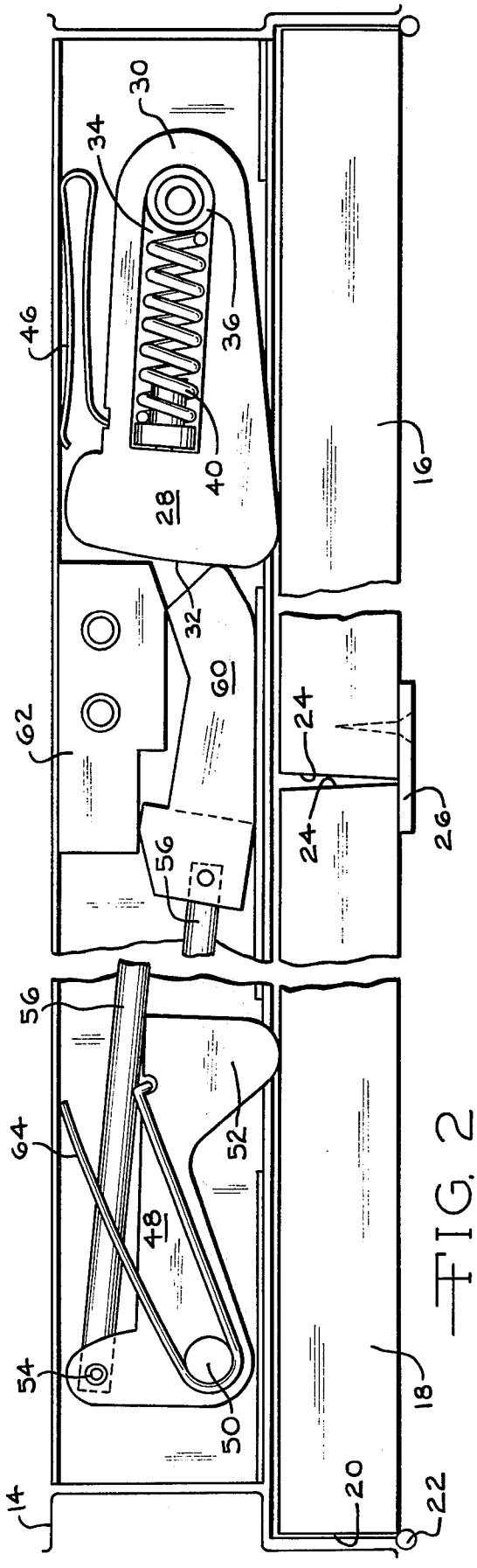
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FIG. 2

DOOR COORDINATOR ASSEMBLY

CROSS-REFERENCE TO RELATED APPLICATION

This application discloses a door coordinating assembly which is an improvement on the door coordinating device shown in a co-pending application Ser. No. **362,106** filed May **21, 1973,** now U.S. Pat. No. **3,822,506,** and assigned to the assignee of this application.

BACKGROUND OF THE INVENTION

Companion doors are conventionally constructed with overlapping edges, astragals and rabbeted faces to provide a seal against smoke and hot air in the event of fire. Because of this construction of the adjacent edges of the doors, the overlapping or active door must be held open until the inactive door is closed. Prior art devices have been subject to several very practical objections. Many are constructed so that they are unsightly, prone to vandalism or accidental mishap, or subject to failure in which they prevent complete closing of the doors. It is desirable in a door coordinating device to incorporate a shock absorbing function in the device to prevent damage to the door in response to an abnormally high closing force on the door. It is also desirable to incorporate an automatic reset feature in the coordinator assembly so that in the event the active door is forced closed ahead of the inactive door, the coordinator assembly will automatically return to normal position when the active door is next opened. It is also desirable to incorporate an adjustable feature in a door coordinator assembly which will allow adaptation of the assembly to doors of varying weight and subject to varying closing forces. The principal object of the present invention, therefore, is to provide an improved door coordinator assembly which accomplishes these desirable objectives.

SUMMARY OF THE INVENTION

The door coordinator assembly of this invention consists of a supporting frame that is mounted in the door frame at the top ends of a pair of independently movable companion doors. A door stop lever is pivotally mounted on the frame so that the free end of the lever will engage the active door adjacent its hinged edge prior to closing of the active door. A trigger member, pivotally mounted on the support frame, controls the movement of a body member that normally holds the door stop lever in a position engaged with the active door so as to keep it in an open position until the trigger member is moved in response to closing of the inactive door.

The door stop lever is hollow and has an internal compression spring that cooperates with the pivotal support for the door stop lever to impart a shock absorbing capability to the door stop lever. In addition, the spring enables the door stop lever to move under yieldable pressure with respect to its pivotal support to a position overriding the body member thereby preventing damage to the door in response to an abnormally high closing force on the active door. The spring pressure is adjustable to adapt the door coordinator assembly to doors of different weights and subject to different closing forces.

In summary, therefore, the door coordinator assembly of this invention has the desirable features of shock absorbing capability, reset ability and adjustability by virtue of the spring and pivotal mounting provided for the door stop member.

Further objects, features and advantages of this invention will become apparent from a consideration of the following description, the appended claims, and the accompanying drawing in which:

FIG. **1** is a plan view of the door coordinator assembly of this invention, shown in an installed relation with respect to a pair of independently movable companion doors, only fragmentary portions of which are shown, showing the components of the coordinator assembly in positions corresponding to closing positions of the doors; and

FIG. **2** is a plan view, like FIG. **1,** showing the coordinator components in positions corresponding to closed positions of the companion doors.

With reference to the drawing, the door coordinator assembly of this invention, indicated generally at **10,** is shown in FIG. **1** as including a supporting frame **12** mounted in a door frame **14,** preferably at the upper end of the frame **14.** For details of the location of the frame **12,** reference is made to the aforementioned copending application. The assembly **10** is provided for controlling the sequence of closing of a pair of independently movable companion doors consisting of an active door **16** and an inactive door **18.** The doors are supported at their outer edges **20** on conventional hinges **22** so that when the doors are closed (FIG. **2**), their inner or free edges **24** are adjacent each other and an astragal **26** on the active door **16** overlaps the free edge **24** of the inactive door **18.**

The assembly **10** includes a door stop lever **28** having a pivoted end **30** and a free end **32.** The lever **28** is hollow, having an internal cavity **34** shaped at one end to fit on a pivot member **36** secured to the support frame **12.** Since the lever **28** is in surface to surface engagement with the pivot **36,** it is desirable that the pivot **36** have some of the characteristics of a sleeve bearing and it is therefore preferred to form the pivot of Oilite. The cavity **34** is of a width corresponding substantially to the diameter of the fixed pivot **36** thereby enabling the lever **28** to move longitudinally along the axis **38** to in turn move the free end **32** of the lever **28** closer to or further away from the fixed pivot **36** to adjust the effective length of the lever **38.**

A coil spring **40** is positioned in the cavity **34** and is provided at one end with an internal plug **42.** The plug **42** engages a set screw **44** carried by the lever **28** and the opposite end of the spring **40** engages the pivot **36.** Thus, adjustment of the screw **44** operates to vary the compression of the spring **40** to thereby vary the force necessary to move the lever **28** on the axis **38** to compress the spring **40.** A hairpin spring **46** extends between the frame **12** and the lever **28** to normally urge the lever **28** from its recessed position shown in FIG. **2** to its protruding positions shown in FIG. **1.**

A bell crank shaped trigger member **48** is pivotally supported on a fixed pivot **50** carried by the frame **12** and has one end **52** engageable with the inactive door **18** and another end which is connected by a pivot to one end of a link **56.** The opposite end of the link **56** is connected by a pivot **58** to a body member **60** mounted on the support **12** for movement between the extended and retracted positions illustrated in FIGS. **1** and **2,** respectively. A hairpin spring **64** normally urges

the trigger member **48** toward its operative position shown in FIG. **1.**

Closing of the inactive door **18** moves the trigger member **48** to its inoperative position shown in FIG. **2.** Movement of the trigger member **48** to its inoperative position causes the link **56** to pull the body member **60** from its extended position shown in FIG. **1** to its retracted position shown in FIG. **2** in which the body member **60** is out of the way of the door stop lever **28.** This enables the door stop member **28** to be moved to its recessed position shown in FIG. **2** thereby allowing the active door **16** to close. Closing movement of the active door **16** at this time is desirable inasmuch as the inactive door **18** has already closed. Prior to closing of the inactive door **18,** the body member **60,** in its extended position shown in FIG. **1,** blocks movement of the door stop member **28** to its recessed position thereby preventing closing of the active door **16** out of sequence with the inactive door **18.**

In the operation of the assembly **10,** assume that both doors **16** and **18** are open, in which case the springs **46** and **64** have moved the door stop member **28** and the trigger member **48** to the positions shown in FIG. **1.** Should the door **16** close with normal force against the door stop member **28,** the door stop member **28** will check the closing movement of the door **16** and will hold the active door in the partially open position shown in FIG. **1.** Closing movement of the door **16** against the lever **28** will apply a force against the lever **28** that will have a component parallel to the spring axis **38** which will be absorbed by the spring **40.** This shock absorbing characteristic of the assembly **10** is important from the standpoint of maintaining the door **16** over a prolonged service life.

The lever **28** will thus hold the door **16** in its partially open position shown in FIG. **1** until the inactive door closes, thereby rotating the trigger **48** and moving the body member **60** to its retracted position shown in FIG. **2.** The closing force of the door **16** on the lever **28** will then move the lever **28** past the body member **60** to the recessed position shown in FIG. **2.** The doors **16** and **18** will then be in their desired relationship when closed.

When doors **16** and **18** are again both opened, the spring **64** will move the trigger **48** to its FIG. **1** position in which the body member **60** will be moved against a shoulder **65** on a block **62** thereby insuring the desired extended position for the body member **60.** When the door **16** tends to close with a large force against the lever **28,** this force will be transmitted to the body member **60** in a manner to tend to move the body member **60** rearwardly. A rear edge surface **66** on the body member **60** is engaged with a complimentary surface **68** on the block **62** so that the fixed block **62** will maintain the body member **60** in its FIG. **1** position. This arrangement maintains the body member **60** in working condition over a prolonged service life.

In the event the door **16** should, for some abnormal condition, tend to close with a force that is so great that it would have a destructive effect on the door **16,** the lever **28** will override the body member **60.** This will take place by virtue of the capability of the lever member **28** to move longitudinally of the axis **38** a distance sufficient to enable the effective length of the lever **28** to be shortened enough to allow the lever **28** to move past the body member **60** when the body member **60** is in its extended position shown in FIG. **1.** The door **16** will then close ahead of the inactive door **18.** Such closing movement is not the desired sequence but is preferable to having the coordinator assembly **10** destroy the active door **16.**

Such closing out of sequence is not totally objectionable, however, in the event the assembly **10** automatically returns to normal operation in response to the next opening of the door **16.** This is accomplished in the assembly **10** by virtue of the inclusion of the spring **40** in the lever **28.** Spring **40** will automatically extend the lever **28** to its FIG. **2** position as soon as the door **16** is next opened. Thus, all of the components of the assembly **10** will return to their FIG. **1** positions as soon as both doors **16** and **18** are opened. This automatic reset feature is an important attribute of the assembly **10.**

From the above description it is seen that the door coordinator assembly **10** of this invention automatically controls the sequence of closing of the doors **16** and **18.** By virtue of the inclusion of the coil spring **40** in the lever **28,** the assembly **10** performs a shock absorbing function and has an automatic reset capability. The pressure of the spring **40** is readily adjustable by manipulation of the spring **44** to adapt the assembly to hard closing doors and particularly heavy doors. Thus, the assembly **10** is readily adaptable to a variety of door installations.

What is claimed is:

1. A door coordinator assembly for independently movable companion doors consisting of an active door and an inactive door each of which has a hinged edge and a free edge, said assembly comprising a fixed pivot member, a stop lever mounted on said pivot member for both pivotal and translatory movement relative to said pivot member, said stop lever being pivotally movable between protruding and recessed positions, said lever in its protruding position being engageable with said active door adjacent the hinged edge thereof to impede closing of said active door, said lever being movable to said recessed position on closing of said active door, a trigger member movable between an operative position engageable with said inactive door to prevent closing thereof and an inoperative position in which said trigger member is out of the way of said inactive door during closing thereof, means engaged with and extending between said trigger member and said stop lever maintaining said stop lever in said protruding position so long as said trigger member is in said operative position, and spring means extending between said stop lever and said pivot member in a position to resist said translatory movement of said stop lever, said spring means being capable of absorbing shock loads applied to said lever by said active door so as to cause translatory movement of said stop lever.

2. A door coordinator assembly according to claim **1** wherein said stop lever is formed with a cavity in which said pivot member and said spring means are located, and said spring means comprises a coil spring member extending between said pivot member and the protruding end of said stop lever thereby enabling movement of said lever in a direction against the pressure of said spring member and with respect to said pivot member to enable shortening of the effective length of said stop lever.

3. A door coordinator assembly according to claim **2** further including means mounted on said lever member and engageable with said spring means for adjusting the pressure of said coil spring on said stop lever.

4. A door coordinator assembly according to claim 3 wherein said coil spring member has an axis generally parallel to said active door when said stop lever is engaged with said active door.

5. A door coordinator assembly according to claim 1 wherein said means extending between said trigger member and said door stop member includes a body member engaged with the rear side of said stop lever in the protruding position of said stop lever so as to block pivotal movement of said lever toward the recessed position thereof, said body member being movable to a clearance position with respect to said stop lever so as not to interfere with movement of said stop lever to said recessed position therefor, and means connected to and extending between said trigger member and said body member providing for said body member movement in response to movement of said trigger member to said inoperative position.

6. A door coordinator assembly according to claim 5 wherein said means extending between said trigger member and said body member comprises a link member pivotally connected to and extending between said lever member and said body member.

7. A door coordinator assembly according to claim 5 wherein said body member is provided with a front surface engageable with said stop lever to normally prevent pivotal movement of the stop lever from its protruding to its recessed position, said stop lever being movable in response to compression of said spring means past said front surface to said recessed position therefor in the extended position of said body member thereby enabling closing movement of said active door in response to the application of a large closing force of said door on said stop lever.

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