July 28, 1964 W. D. SAWYER 3,142,095

DOOR CONSTRUCTION AND CLOSURE MEANS THEREFOR

Filed Nov. 15, 1961 2 Sheets-Sheet 1

FIG. 1

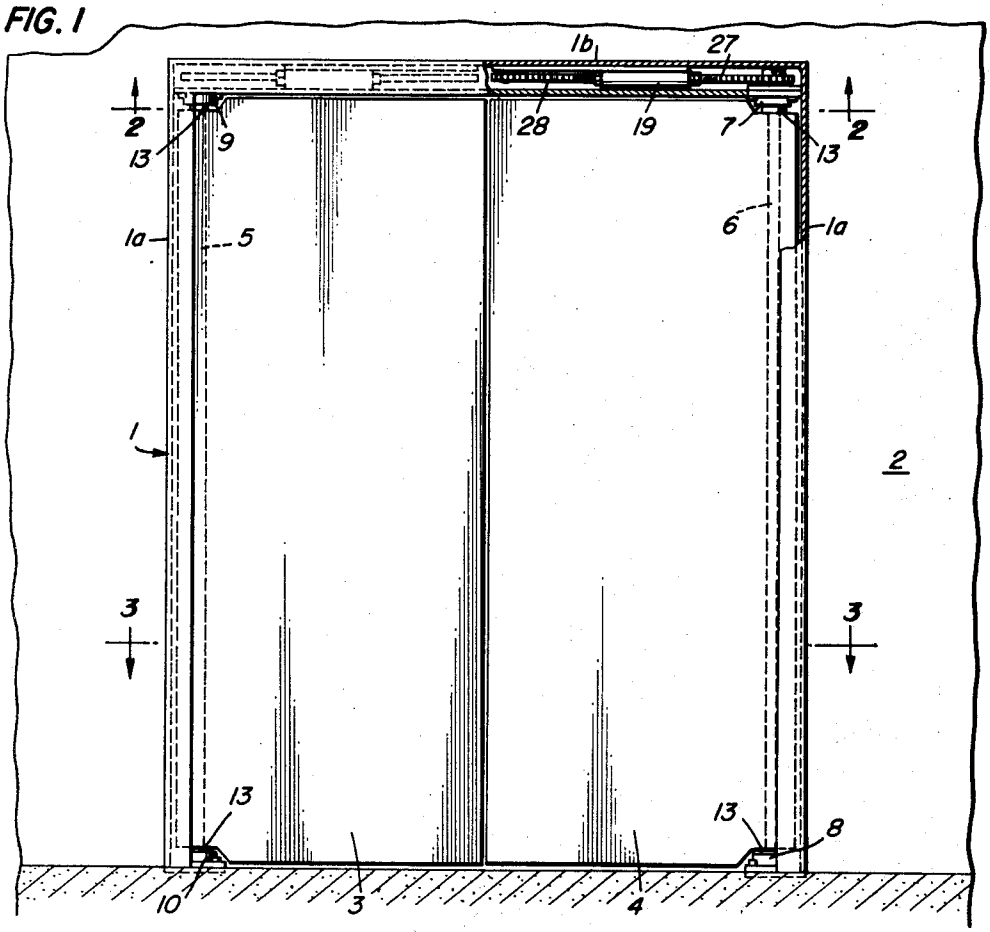


FIG. 2

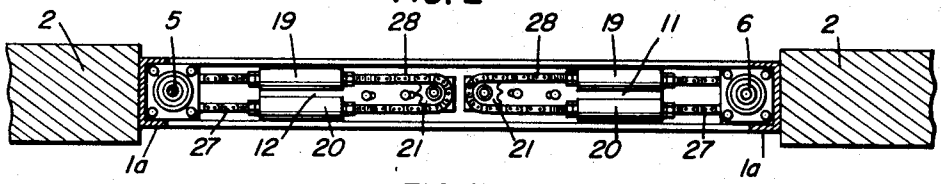
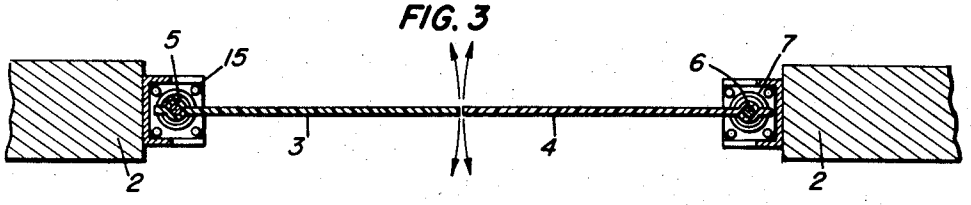


FIG. 3



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DOOR CONSTRUCTION AND CLOSURE MEANS THEREFOR

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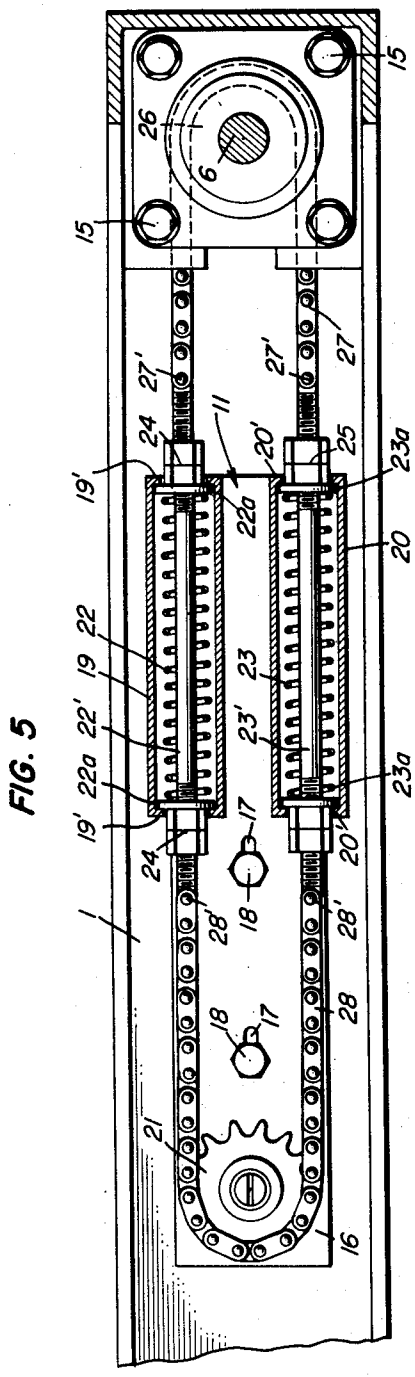

FIG. 5

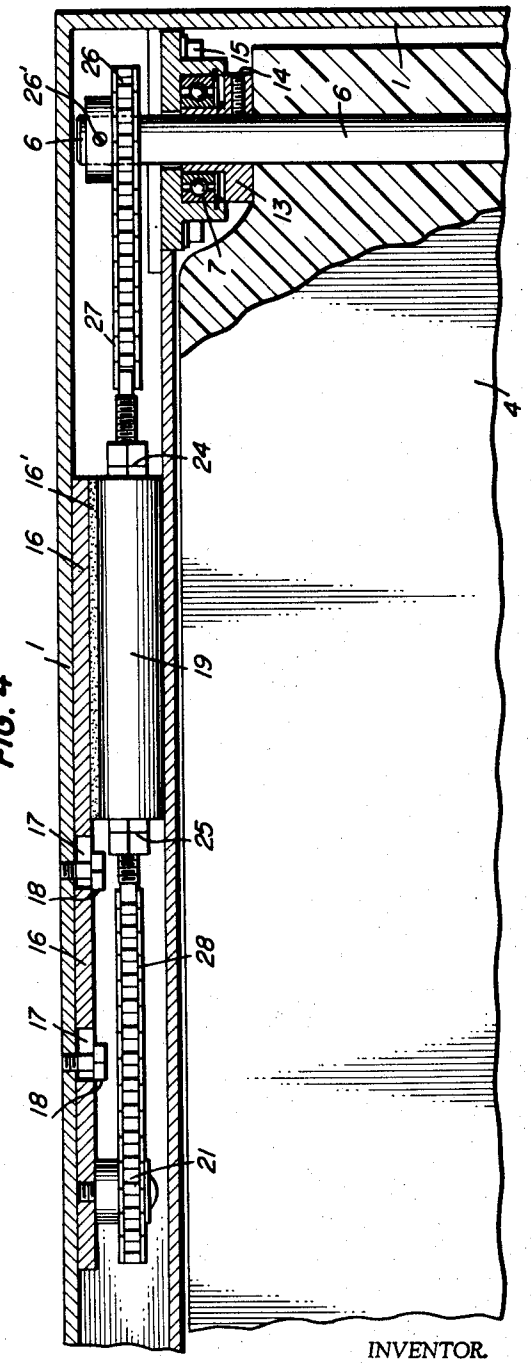

FIG. 4

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DOOR CONSTRUCTION AND CLOSURE MEANS THEREFOR

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8 Claims. (Cl. 20—16)

This invention relates to doors, and more particularly to a door construction and closure means therefor.

An object of the invention is to provide an improved door construction and closure assembly operatively mounted in a frame member adapted to be installed in a wall opening.

Another object of the invention is to provide an improved door construction wherein the door hinge and closure assembly are structurally related in a single unit adapted to be readily installed in a wall opening.

Still another object of the invention is to provide an improved door of the impact type wherein the closure assembly is constructed and arranged so that resistance of the door to opening may be varied.

Yet another object of the invention is to provide an improved door of the impact type, including a closure assembly, operatively mounted in a unitary frame, the closure assembly being adjustable relative to the frame.

A further object of the invention is to provide an improved door of the impact type, having a unitary frame, wherein a door panel is secured to a pivot rod, said pivot rod being adjustable relative to the frame, whereby displacement of the door panel due to impact or vibration may be compensated.

A still further object of the invention is to provide an improved door of the impact type, comprising a pivot rod having a fiberglass panel molded thereon.

With these and other objects in view, which may be incident to my improvements, the invention consists in the parts and combinations to be hereinafter set forth and claimed, with the understanding that the several necessary elements comprising my invention, may be varied in construction, proportions and arrangements, without departing from the spirit and scope of the appended claims.

In order to make my invention more clearly understood, I have shown in the accompanying drawings means for carrying the same into practical effect, without limiting the improvements in their useful application to the particular constructions which, for the purpose of explanation, have been made the subject of illustration.

In the drawings:

FIGURE 1 is a front elevational view of the door construction and closure assembly;

FIG. 2 is a sectional view of the closure assembly taken along line 2—2 of FIG. 1;

FIG. 3 is a sectional view of the door construction taken along line 3—3 of FIG. 1;

FIG. 4 is an enlarged sectional detail view of the closure assembly; and

FIG. 5 is a bottom plan view, partially in section, of the closure assembly shown in FIG. 4.

The improved door construction and associated closure assembly of the present invention comprises, essentially, a unitary frame of channel-shaped cross section, a door comprising a panel member detachably secured to or molded on a pivot rod having its end portions journaled in bearings secured to the frame, the pivot rod being vertically adjustable with respect to the frame, and an adjustable closure assembly mounted on the frame and operatively connected to the pivot rod for biasing the door to closed position.

The improved construction and arrangement of the door and associated closure assembly enables positive

centering of double door installations which may be achieved by having a sprocket wheel secured at the top of the pivot rod, and an idler sprocket secured to an adjustable mounting plate carried by the frame, the axis of the idler sprocket wheel being located a predetermined distance from the pivot rod in the direction of the free edge of the door. Intermediate of the fixed sprocket and the idler sprocket, spring means comprising two coil springs, each of which is contained in a cylinder under slight compression, are mounted on the frame in side-by-side relation.

Each of the cylinders is provided with a drawbar extending through the spring and through a washer assembly at each end of the spring, the ends of the rod exteriorly of the cylinder being threaded to receive locking-type adjustment nuts for compressing the spring, to thereby vary the biasing action of the closure assembly. A sprocket chain attached to one end of the drawbar of one of the spring units, is trained over the idler sprocket and attached to the corresponding protruding end of the drawbar of the adjacent cylinder, and a like piece of sprocket chain is trained over the fixed sprocket and attached to the ends of the drawbar at the opposite ends of cylinders; thereby forming a chain circuit with two-way compression of the springs. Each of the doors of a double door unit is provided with a closure assembly, and all of the mechanisms are sub-mounted in a sturdy door frame provided with a cover to prevent damage to or interference with exposed parts.

Referring to the drawings and more particularly to FIGS. 1, 2 and 3, the improved doors and associated closure assemblies comprise a single frame **1**, having vertical portions **1***a* and a horizontal portion **1***b* channel-shaped in cross section, mounted within an opening formed in a wall **2**. A pair of two-way swinging doors **3** and **4** are secured to vertical rods **5** and **6**, respectively, said rods being pivotally mounted in the frame by means of hinge bearings **7** and **8**, **9** and **10**, carried by the frame; the doors being biased to closed position by means of a pair of closure assemblies **11** and **12** mounted within the frame **1**. Since the construction of each door and the closure assembly therefor is the same, only one of the doors and its associated closure assembly will be described.

As will be seen in FIGS. 1, 3 and 4, the door **4**, which is formed of fiberglass or other suitable synthetic material, is molded to the rod **6**, each end of said rod being provided with a collar **13** secured thereto by set screws **14**, or other suitable fastening means, each collar being press-fitted into its respective bearing **7** and **8**, said bearings being mounted in the frame by bolts **15**, or other securing means. The closure assembly **11** comprises a mounting plate **16** having slots **17** formed therein, FIGS. 4 and 5, through which bolt means **18** extend for adjustably securing the mounting plate to the frame **1**. A pair of cylinders **19** and **20** having peened, open ends **19′** and **20′**, respectively, are rigidly secured to one end of the mounting plate **16**, as by welding **16′**, the opposite end of the mounting plate having an idler sprocket **21** rotatably mounted thereon. Suitable coil springs **22** and **23**, under slight compression, are positioned within the cylinders **19** and **20**, respectively, each of the springs having a drawbar **22′** and **23′** positioned therein, said drawbars having washers **22***a* and **23***a* slidably mounted thereon. As will be seen in FIG. 5, the washers are biased into abutting relationship with the peened ends **19′** and **20′** of the cylinders by means of the springs **22** and **23**, the ends of the drawbars having lock-type adjustment nuts **24** and **25** threadably secured thereto, whereby each spring may be selectively compressed to vary the biasing action of the closure assembly. The upper end of the rod **6** is provided with a sprocket **26**, secured to the rods by means of a

set screw 26'. A sprocket chain 27, having its ends secured to the drawbars 22' and 23', as at 27', is reeved around the sprocket 26, and a second sprocket chain 28, having its ends secured to the drawbars 22' and 23', as at 28', is reeved around the idler sprocket 21. Although the use of sprockets and chains has been described it is contemplated that pulleys and cables may be employed instead.

From the above description it will readily be seen that when the door 4 is pushed in either direction to open position, the sprockets 21 and 26, together with their respective chains 28 and 27, pull the drawbars 22' and 23' outwardly from their respective cylinders, thereby compressing the spring 22 in one direction and the spring 23 in the opposite direction. When the door is released, the springs expand thereby returning the door to its closed position. Although two springs have been described, it will be appreciated, if desired, that only one spring need be used.

As mentioned hereinabove, one of the important features of the present invention is the mounting arrangement of the double, two-way swing doors 3 and 4, and their associated closure assemblies 11 and 12, within the frame 1, thereby forming a single prefabricated unit which can be installed in a suitable wall opening.

Under ideal conditions the free edges of the doors are aligned as shown in FIG. 3; however, in practice it has been found that the doors become misaligned due to warpage or other damage. To compensate for this misalignment, the adjustment nuts 24 at one end of cylinder 19 and the diagonally opposite adjustment nuts 25 at the end of cylinder 20 are loosened; the adjustment nuts 24 at the other end of cylinder 19 and the diagonally opposite adjustment nuts 25 at the end of cylinder 20 are then tightened to vary the biasing action of the springs 22 and 23 to bring the edges of the doors into alignment. Any undue slackness in the sprocket chains 27 and 28 may be compensated by loosening bolts 18 and sliding the mounting plate 16 relative to the frame 1, and if the door panels 3 and 4 should become displaced due to impact or vibration, they may be raised or lowered by loosening the set screws 14 in the top and bottom collars 13.

The need for creating and maintaining various conditions and environments within specific areas, is well recognized, and the present invention accomplishes the critical function of permitting intermittent traffic of customers or employees, either on foot or by vehicle, into and out of specific areas without impedance, while still maintaining minimum disturbance of the atmosphere or environment within the protected area. The improved door construction is well adapted for use with air conditioned rooms, cold storage areas, heat cure rooms, fire blocks and exit doors for hospitals, schools, theatres, and other public buildings; and as impact opening doors for bus stations, stores, warehouses, and the like.

It will be understood that the invention contemplates actuation of a single door or double doors, and that with double door installations the doors may be activated in the same direction in unison when either door is moved, or one door can be opened in the opposite direction to the same degree as the one which is activated. An electric eye-motor, air cylinders, or hydraulic units designed for automatic door opening, may be used with the improved door construction, if desired.

The door assembly may be installed by semi-skilled workmen, for the reason that since it is prefabricated to fit standard openings or special sizes, the frame remains square and true, thereby assuring positive alignment of all its parts and surfaces. The doors may be molded or welded to the pivot rod, or a bracket mounting can be utilized to permit the door to be detached from the pivot rod without removing the rod from its pivot bearings. All of the door components are formed from readily available materials, and the frame is provided with lightweight cover plates to insure grit-free action of the moving parts and prevent battering of the same, in the course of traffic flow. Under certain conditions wherein the air pressure differential tends to open the doors, spring units of greater compression may be used. Since the spring units are easily removed from the frame, substitution can be accomplished after installation of the door. In order to prevent collection and freezing of moisture, the units may be packed with a suitable grease or plastic foam materials. Under extreme conditions a simple strip heater may be used.

While I have shown and described the preferred embodiment of my invention, I wish it to be understood that I do not confine myself to the precise details of construction herein set forth by way of illustration, as it is apparent that many changes and variations may be made therein, by those skilled in the art, without departing from the spirit of the invention or exceeding the scope of the appended claims.

I claim:

1. A prefabricated door unit of the impact type comprising a unitary frame member adapted to be installed in a wall opening, said frame member including a vertical portion and a horizontal portion, a rod pivotally mounted in the vertical portion of the frame member, a door panel secured to the rod, a collar detachably secured to each end of said rod, each collar being press-fit within bearing means carried by the frame, whereby a displacement of the door panel due to impact or vibration may be compensated; a mounting plate, said mounting plate having slots formed therein, bolt means extending through said slots for adjustably securing the mounting plate to the horizontal portion of the frame member, an idler wheel rotatably mounted on the mounting plate, a drive wheel secured to the rod, drive means interconnecting the idler wheel and drive wheel, and spring means carried by the mounting plate and connected to the drive means between the idler wheel and drive wheel, whereby when the door is opened the spring is compressed.

2. A prefabricated, two-way swing door unit of the impact type comprising a unitary frame member adapted to be installed in a wall opening, said frame member including vertical portions and a horizontal portion, a pair of spaced, parallel rods pivotally mounted in the vertical portions of the frame member, each of said rods having a door panel secured thereto, a collar detachably secured to each end of said rods, each collar being press-fit within bearing means carried by the frame, whereby a displacement of the door panel due to impact or vibration may be compensated; a pair of mounting plates, each mounting plate having slots formed therein, bolt means extending through said slots for adjustably securing the respective mounting plate to the horizontal portion of the frame member, an idler wheel rotatably mounted on each mounting plate, one end of each rod having a drive wheel secured thereto and drive means interconnecting each idler wheel with a respective drive wheel, and spring means carried by each mounting plate and connected to the drive means between each idler wheel and the respective drive wheel, whereby when the doors are opened the spring means are compressed to urge the doors to closed position.

3. A door of the impact type according to claim 1 wherein the spring means comprises at least one cylinder having a coil spring positioned within the cylinder, a drawbar slidably mounted within the coil spring and having its ends extending outwardly from the cylinder, each end of said drawbar being connected to the drive means, and spring retainer means carried by the drawbar within the cylinder whereby the coil spring is compressed when the drawbar is pulled outwardly from the cylinder by the drive means.

4. A door of the impact type according to claim 3, wherein the cylinder is provided with peened ends, and the spring retainer means comprises a pair of washers, each

washer being positioned between a peened end of the cylinder and an end of the coil spring.

5. A door of the impact type according to claim 4, wherein nut means are threadably secured to the drawbar between the washers and the ends of the drawbar for adjusting the compression of the coil spring.

6. A prefabricated door unit of the impact type comprising a unitary frame member adapted to be installed in a wall opening, said frame member including a vertical portion and a horizontal portion, a rod pivotally mounted in the vertical portion of the frame member, a fiberglass door panel molded to said rod, a mounting plate, said mounting plate having slots formed therein, bolt means extending through said slots for adjustably securing the mounting plate to the horizontal portion of the frame member, an idler wheel rotatably mounted on the mounting plate, a drive wheel secured to the rod, drive means interconnecting the idler wheel and drive wheel, and spring means carried by the mounting plate and connected to the drive means between the idler wheel and drive wheel, whereby when the door is opened the spring is compressed.

7. A prefabricated door unit of the impact type comprising, a unitary frame member adapted to be installed in a wall opening, said frame member including a vertical portion and a horizontal portion, bearing means mounted in the vertical portion of said frame, each end of said rod being journalled in said bearing means, a door panel

secured to the rod, a mounting plate, said mounting plate having slots formed therein, bolt means extending through said slots for adjustably securing the mounting plate to the horizontal portion of the frame member, an idler wheel rotatably mounted on the mounting plate, a drive wheel detachably mounted on the rod and said rod being detachably secured to the bearing means, whereby a displacement of the door panel due to impact or vibration may be compensated; drive means interconnecting the idler wheel and drive wheel, and spring means carried by the mounting plate and connected to the drive means between the idler wheel and drive wheel, whereby when the door is opened the spring is compressed.

8. A door of the impact type according to claim 7, wherein each end of the rod has a collar detachably secured thereto, said collars being press-fit in the bearing means.

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