June 22, 1948. J. D. DENBURGER 2,443,896

DOOR CLOSER

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Fig. 1.

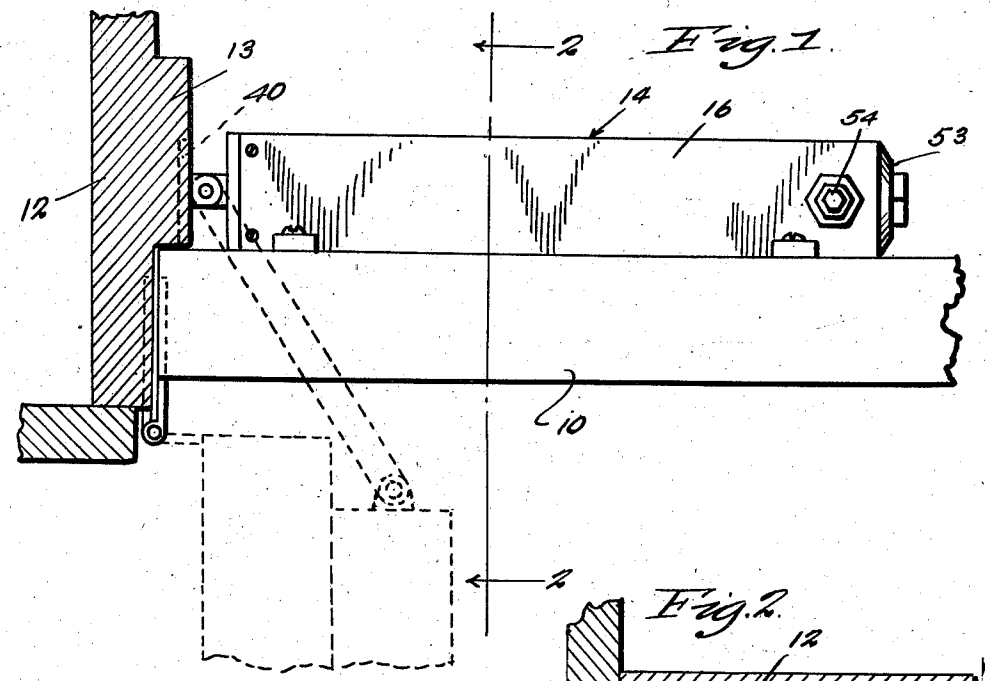
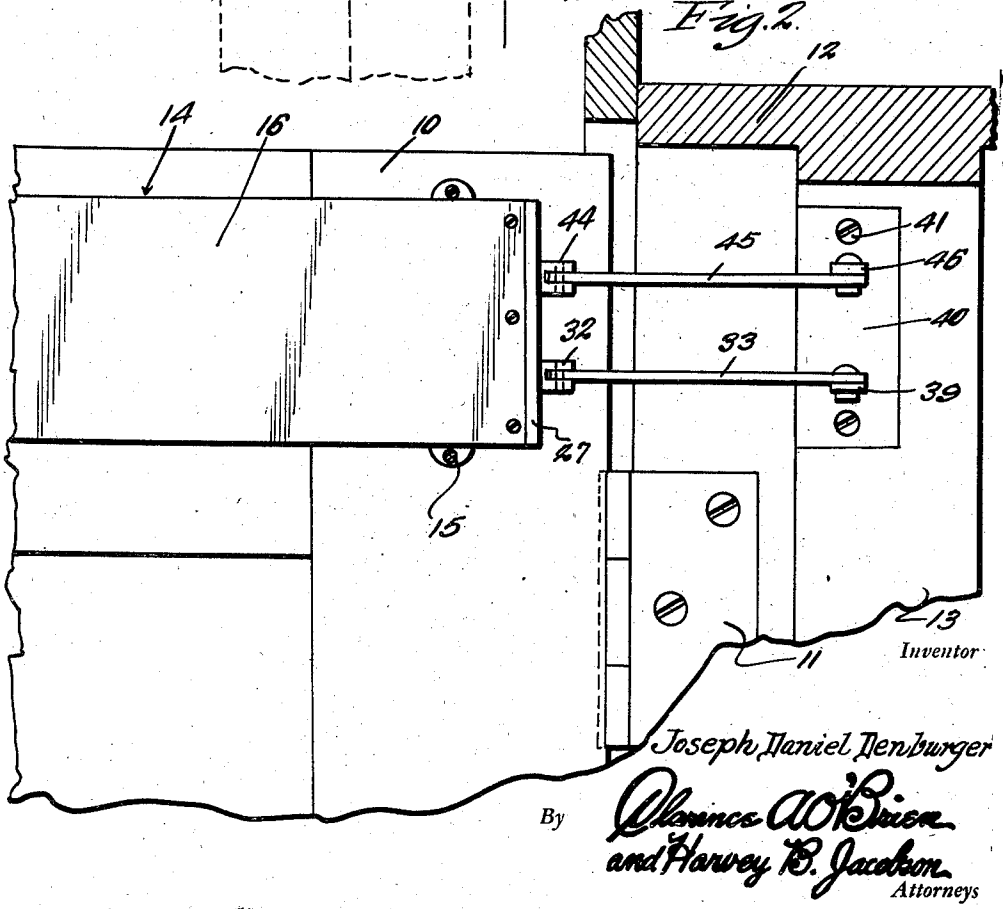


Fig. 2.



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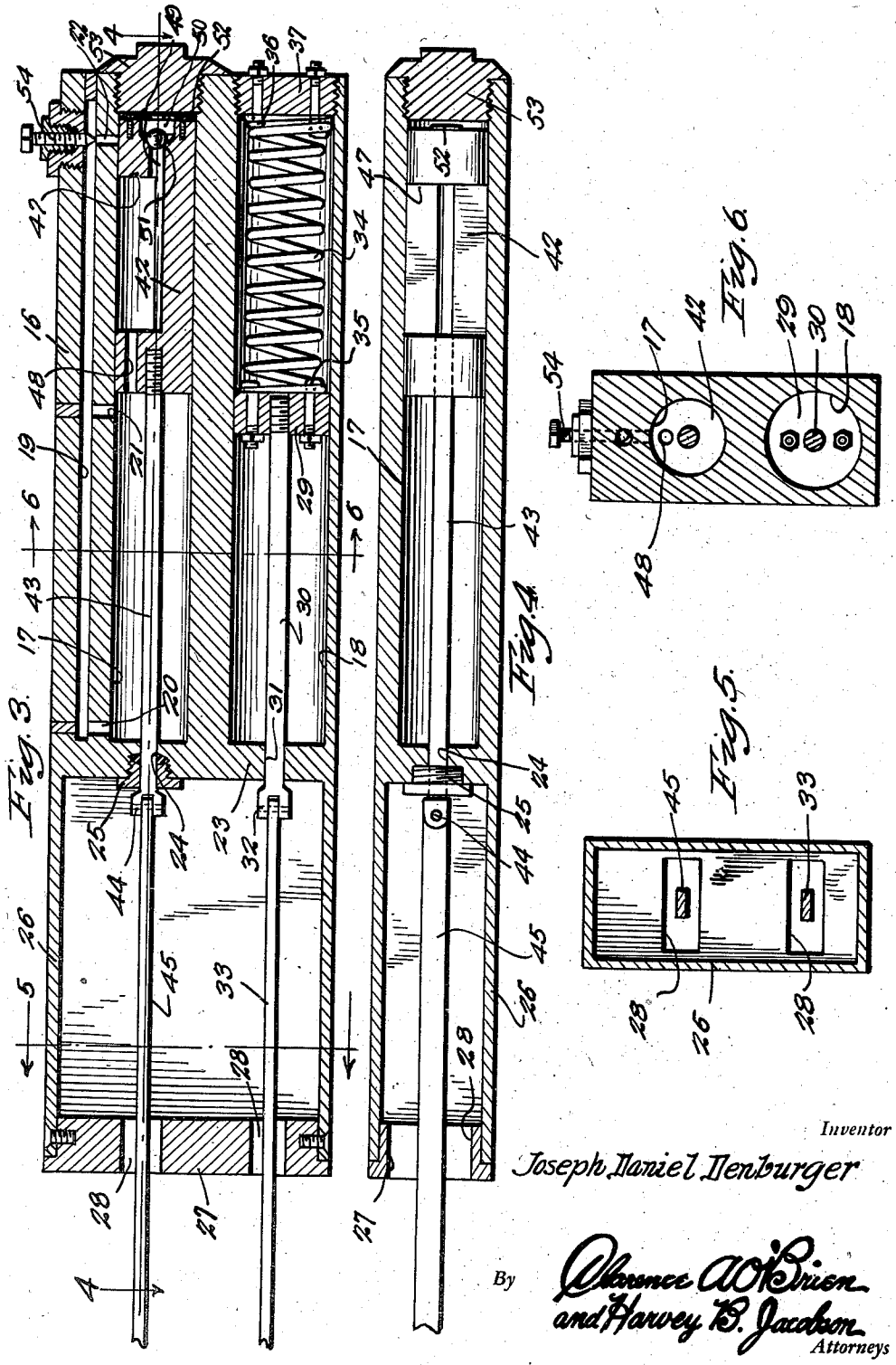


Fig. 3.

Fig. 6.

Fig. 5.

Fig. 4.

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DOOR CLOSER

Joseph Daniel Denburger, Los Angeles, Calif.

Application December 19, 1945, Serial No. 635,859

1 Claim. (Cl. 16—52)

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This invention relates to a door closer and silencer and has for its primary object automatically to close a door.

Another object is to avoid the slamming or banging of a door when it is moved to closed position and to avoid injury thereto as well as to reduce the noise of closing the door to a minimum.

The above and other objects may be attained by employing this invention which embodies among its features a body having a pair of spaced bores therein, one of which is adapted to contain a hydraulic fluid and a piston working against said fluid, a by-pass through which fluid may be transposed from one end of the bore to the other, a crosshead working in the opposite bore, spring means to move the crosshead into the bore, rods connected to the piston and to the crosshead, an attaching plate connecting the ends of the rods whereby the piston and the crosshead will be moved in unison said attaching plate being adapted to be attached to a door jamb while the body is adapted to be attached to a door so that when the door is opened the piston and the crosshead will be moved in unison and the door will be closed by the action of the spring in the crosshead containing bore.

In the drawings:

Figure 1 is a horizontal sectional view through a portion of a door jamb showing this improved door closer and silencer connected to the door and door jamb,

Figure 2 is a vertical sectional view through a door jamb showing a fragment of a door hinged thereto and this improved door closer and silencer in operative position thereon, the door being shown in open position,

Figure 3 is a longitudinal sectional view through the body of the door closer,

Figure 4 is a longitudinal sectional view taken substantially on the line 4—4 of Figure 3,

Figure 5 is a transverse sectional view taken substantially on the line 5—5 of Figure 3, and

Figure 6 is a transverse sectional view taken substantially on the line 6—6 of Figure 3.

Referring to the drawings in detail, a door 10 is hinged as at 11 to the usual door frame or jamb 12, which is provided with the customary door stop 13.

My improved door closer designated generally 14 is secured to the door 10 as by attaching screws 15 and comprises a body 16 having formed therein a pair of spaced longitudinally extending bores 17 and 18, and extending longitudinally through the body 16 adjacent the bore 17 is a passage

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19 which communicates through radially extending passages 20, 21 and 22 with the bore 17. Both bores 17 and 18 are closed at one end by a head 23 and communicating through the head 23 with the bore 17 in axial alignment therewith is an opening 24, the outer end of which is closed by a suitable packing gland 25. A box-like frame 26 extends longitudinally from the body 16 and the open end thereof is closed by a removable cover 27 having relatively large slots 28 through which the connecting rods, to be more fully hereinafter described, extend.

Slidably mounted in the bore 18 is a crosshead 29 to which a pull-rod 30 is connected. This pull-rod extends through an opening 31 in the head 23 which aligns axially with the bore 18 and pivotally connected at 32 to the projecting end of the pull-rod 30 is a connecting rod 33, the free end of which projects through the slot 28 which aligns with the opening 31. A retractile coil spring 34 is anchored as at 35 to the end of the crosshead 29 opposite that from which the pull-rod 30 extends and the opposite end of this coil spring is anchored as at 36 to a plug 37 screwed into the end of the bore 18 opposite that closed by the head 23. It will thus be seen that the connecting rod 33 and the pull-rod 30 will be yieldingly urged into the position shown in Figure 3.

The end of the connecting rod 33 opposite that which is pivoted to the pull-rod 30 is pivotally connected to an ear 39 carried by a plate 40 which is adapted to be attached by attaching screws 41 to the stop 13 of the door jamb 12. It will thus be seen that the spring 34 will tend to pull the door to closed position.

In order to retard the movement of the door under the influence of the spring 34, a piston 42 is slidably mounted in the bore 17 and connected thereto and extending through the packing gland 25 is a piston rod 43, to the end 44 which projects through the packing gland is pivotally connected a connecting rod 45. The opposite end of the rod 45 is pivoted to an ear 46 carried by the plate 40 in spaced relation to the ear 39. The piston is provided intermediate its ends with a recess 47 and communication between the end of the piston to which the rod 43 is attached and the recess is established through a passage 48. An axial passage 49 extends through the piston between the recess 47 and the end opposite that to which the piston rod 43 is attached and formed in the extreme end of the piston opposite the piston rod 43 is a concave recess 50 in which a ball 51 is caged by means of a cross strap 52. A plug 53

closes the end of the bore 17 opposite that closed by the head 23 to form a fluid tight joint and the bore 17, recess 47, passage 19, and the other passages communicating therewith are filled with a suitable non-compressible fluid such as oil. A needle valve 54 opens through the wall of the by-pass 19 in alignment with the opening 22 with the point of the needle valve cooperating with the junction of the bores 19 and 22 to form a constricted passage, the cross section of which is capable of being varied by adjustment of the needle valve.

The operation of the device is as follows:

When the door 10 is pushed to open position, as illustrated in Figure 1 by the dotted lines, pull will be exerted on the connecting rods 33 and 45 with the result that the spring 34 will be extended as the crosshead 29 moves toward the head 23. Due to the communication established through the bores 48 and 49 between one end of the piston and the other, it will be obvious that oil contained in the bore 17 will freely flow through the piston unseating the valve 51 and allowing the door to swing open unhindered. As soon as the opening pressure is released on the door, the spring 34 will tend to move the door to closed position and the valve 51 will seat against the mouth of the passage 49, thus preventing the flow of oil through the piston in the opposite direction. The result will be that the oil will have to find its way through the passage 22 and by-pass 19 back into the bore 17 on the opposite side of the piston and the speed with which the piston moves will be governed by the adjustment of the needle valve 54. As a consequence the speed with which the door returns to closed position may be definitely controlled so that any slamming or banging of the door can be avoided.

While in the foregoing there has been shown and described the preferred embodiment of this invention it is to be understood that minor changes in the details of construction, combination, and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as claimed.

I claim:

A door closer and silencer comprising a body having a pair of spaced parallel cylindrical bores extending longitudinally thereof, a crosshead slidable in one of the bores, a piston slidable in the other bore, a pair of spaced parallel piston rods connected one to the crosshead and the other to the piston, a connecting rod pivotally connected to each piston rod, a spring in the cylinder containing the crosshead to urge it to move its respective piston rod into its respective cylinder, a plate pivoted to the connecting rods to cause the piston and crosshead to move in unison and a fluid within the cylinder containing the piston for cushioning its movement under the influence of the spring.

JOSEPH DANIEL DENBURGER.

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