Aug. 10, 1926. 1,595,723

L. C. NORTON

FLOOR DOOR CLOSER

Filed Sept. 5, 1924 2 Sheets-Sheet 1

Fig. 1.

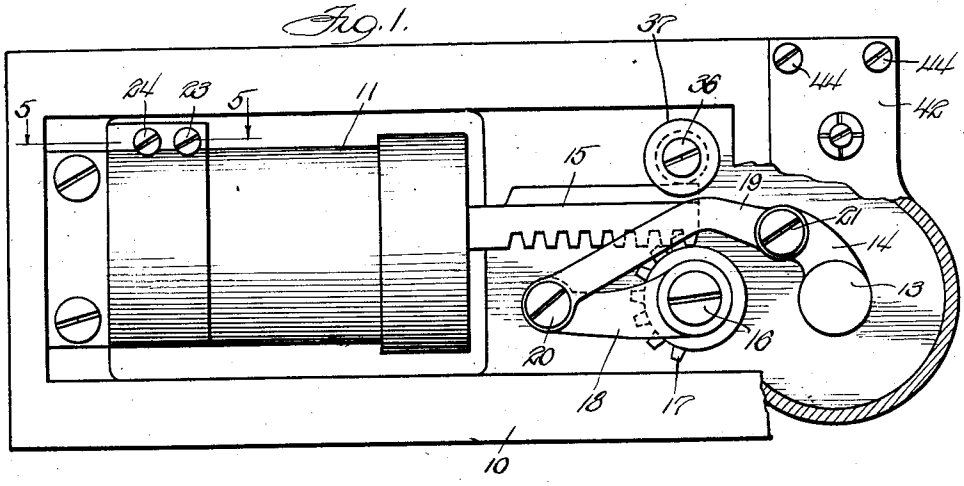


Fig. 6.

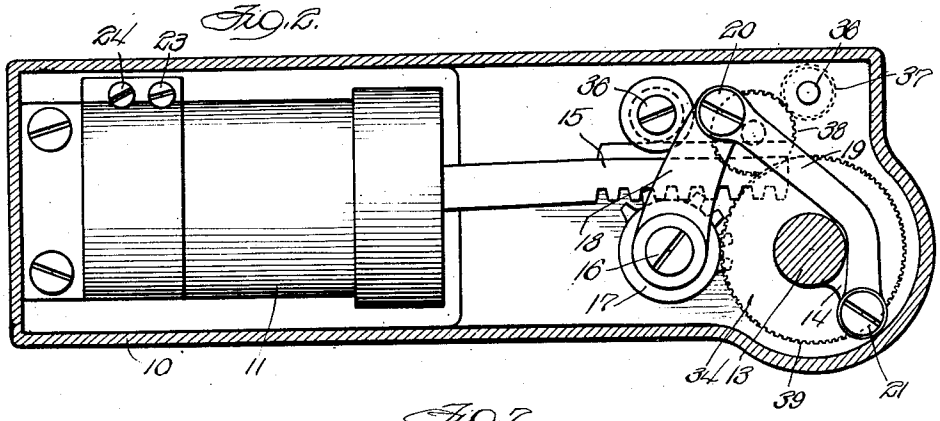
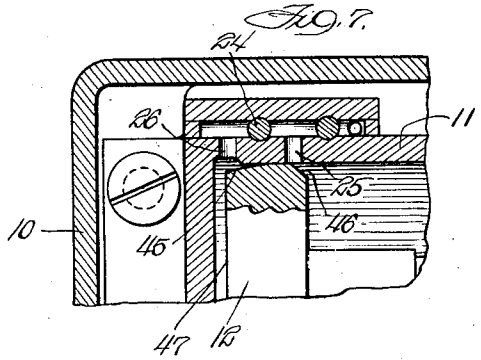


Fig. 7.



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Fig. 3.

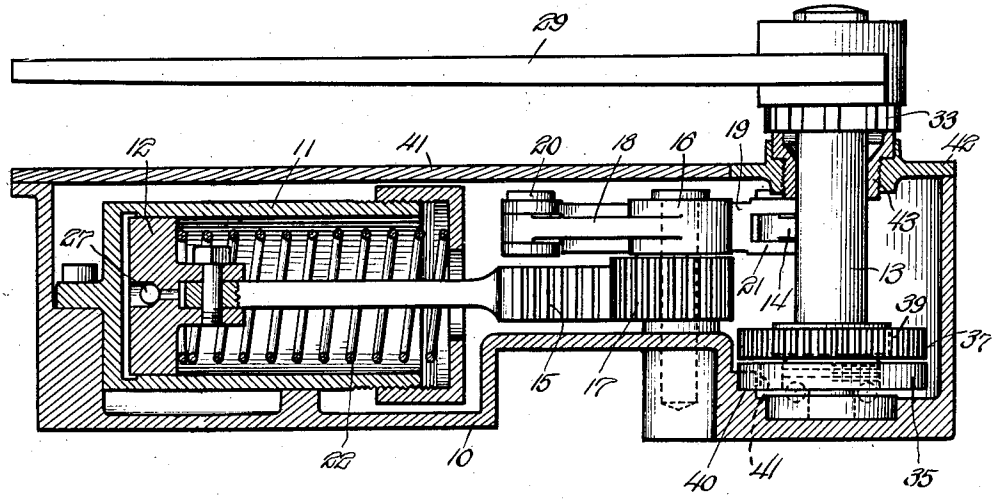


Fig. 6.

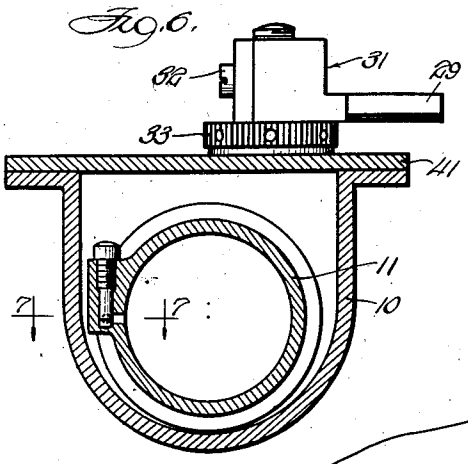


Fig. 5.

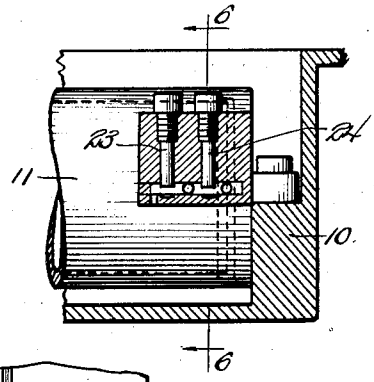
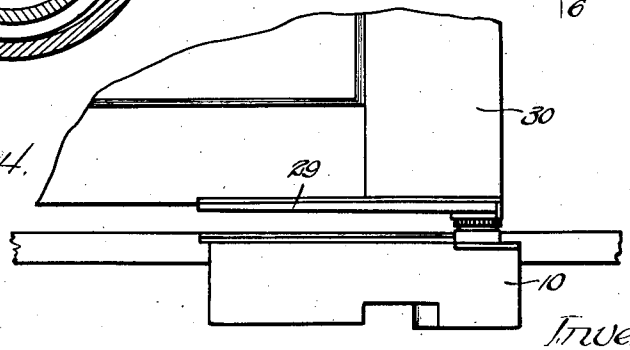


Fig. 4.



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UNITED STATES PATENT OFFICE.

LEWIS C. NORTON, OF CHICAGO, ILLINOIS, ASSIGNOR TO NORTON DOOR CLOSER COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF WEST VIRGINIA.

FLOOR DOOR CLOSER.

Application filed September 5, 1924. Serial No. 736,044.

My invention relates to door closers.

One of the objects of my invention is to provide a door closer which will give the proper amount of pull on the door at all stages of its opening and closing movement.

A further object of my invention is to provide an improved door bar construction which will enable the door bar to be readily attached to the pivot pin after the door bar has been fastened to the door and with the door in position in the door frame.

Further objects will appear from the description and claims.

In the drawings, in which an embodiment of my invention is shown,

Figure 1 is a plan view of a floor door closer;

Fig. 2 is a horizontal section showing the position assumed when the door is wide open;

Fig. 3 is a vertical sectional view;

Fig. 4 is a view showing the door in position on the door bar;

Fig. 5 is a section on the line 5—5 of Fig. 1;

Fig. 6 is a section on the line 6—6 of Fig. 5; and

Fig. 7 is a section on the line 7—7 of Fig. 6.

Referring to the drawings, in detail, the construction shown comprises a casing 10 which is placed below the floor level, an oil containing cylinder 11 in the casing, a plunger or piston 12 operating in the cylinder, a vertical main pivot 13 mounted in the casing, a short arm 14 extending laterally from the main pivot, and transmission from the plunger to this laterally extending arm.

In my prior application, Serial No. 626,738, I have shown a floor door closer similar in some respects to the one disclosed herein, but employing a different transmission between the plunger and laterally extending arm. I find that the present construction has advantages over the prior construction in giving precisely the desired pull on the door at all stages of its opening and closing movement. The transmission referred to herein comprises a rack 15 secured to the plunger 12, a vertical stud shaft 16, a segmental pinion 17 oscillatable on the vertical stud shaft and meshing with the rack, a laterally extending arm 18 secured to oscillate with the pinion and a link 19 pivotally connected at its ends at 20 and 21 with the two laterally extending arms 18 and 14, respectively. The present construction retains the advantages obtained by the two laterally extending arms and link connection of my prior construction and eliminates a variable element by providing a rack and pinion transmission from the rock shaft to the plunger so that the speed ratio of the plunger with respect to the vertical rock shaft remains constant. I find that this combination of the rack and pinion drive between the vertical rock shaft and the plunger with the two-arm and connecting link transmission betwen the rock shaft and main pivot pin gives the most desirable results so far as spring pull on the door is concerned, of any construction which I have devised.

A coil compression spring 22 is provided for effecting the closing movement of the door. The movement of the plunger 12 is regulated by means of two screw valves 23 and 24 which restrict the flow of oil. The screw valve 23 controls the closing of the door up to final closing movement which is controlled by the other screw valve 24. The flow of oil up to the final closing movement is through the port 25 and past the valve 23. After the edge of the plunger passes the port 25, the flow of oil is through the port 26 and past both of the valves. The usual check valve 27 is provided, permitting the door to be easily opened.

In order to enable the door to be easily secured on the upper end of the pivot pin, I provide a door bar having a laterally extending arm 29 which is secured to the under side of the door 30 and having a two-part head 31 split on a vertical plane which is clamped onto the upper end of the main pivot, by means of a pair of screws 32. By this construction, the door-bar can be easily secured to the pivot pin after the door bar is secured to the lower edge of the door and while the door is in position in the door frame, as the door does not have to be lifted up to slip the door bar over the top of the main pivot pin. In order to secure just the right vertical adjustment of the door, I provide a nut 33 underneath the head of the door bar which is threaded on the threaded

upper end of the main pivot pin so that by turning it to the right or left, the door bar can be adjusted up or down.

The link 19 is bent to provide clearance for the main pivot 13 when the door is in wide open position, as shown in Fig. 2. This enables the link to move to a dead center position in which the door will be held open against any pressure exerted by the spring 22.

I also provide adjustable means similar to those described in my prior application, whereby the door may be frictionally held in any desired open position. Briefly, these means comprise a pair of disks, 34, 35, having right and left screw threaded engagement, respectively, with the main pivot pin 13. Means are provided for setting the upper disk 34 to vary its vertical position and thus vary the time at which the two disks will come into engagement on the opening movement of the door. The means for setting the upper threaded disk comprise a vertical shaft 36 having a screw head accessible for setting by means of a screw driver, a pinion 37 mounted on this vertical shaft 36, and an idler gear 38 meshing with this pinion 37 and also meshing with the teeth 39 with which the edge of the screw threaded disk 34 is provided. The lower disk which is threaded on the lower end of the main pivot is held against rotation by means of a lug 40 on the casing, which engages a notch 41 in the edge of the disk. The threads of the two disks are right and left hand, respectively, so that rotation of the main pivot will cause these disks to approach or move away from each other. When the two disks come together, the door will be held against further movement. By proper setting of the upper disk, the door may be held open in any desired position.

In order to facilitate the inspection and repair of the mechanism, I provide certain covers and sub-assemblies, whereby the closing and checking mechanism can be removed without disturbing the main pivot and its mounting, and whereby, when desired, the main pivot and its mounting and cover can be readily removed as a unitary sub-assembly. With this in view I provide two cover portions, a large cover portion 41 overlying the closing and checking mechanism and a small cover member 42 provided with a bearing 43 for the main door pivot. The removal of the large cover member 41 affords access to the closing and checking mechanism which can be readily removed if desired, by loosening up the screw 36 which holds the roller 37. If it is desired to remove the main pivot with its bearing, it can be readily done simply be removing the cover screws 44 and taking out either the screw 20 or 21 to disconnect the main pivot from the checking transmission. It is thus not necessary to disturb the mounting of the main pivot pin in its cover member and making inspection or repairs.

A further refinement of the control of the final movement may be effected by providing notches 45 and 46 in the piston (Fig. 7). The tapering notch 45 prevents a sudden checking of the door when the edge 47 of the piston passes the port 25 as this tapered notch allows a gradually restricted flow as the movement of the piston continues. The abruptly tapering notch 46 permits a quick final closing moving of the door to insure the snapping of the latch into place. As this abruptly tapering notch comes into registration with the port 25 it permits a free flow of the oil through the port 26, past the valve 24 and through the port 25 back again into the cylinder. The valve 24 may be set so that this final closing member will be quick and forceful.

I claim:

1. A door closer comprising a vertical pivot member on which the door is mounted, a laterally extending arm secured to said pivot, a cylinder, a plunger reciprocable in said cylinder and transmission from said plunger to said laterally extending arm, comprising a rack secured to the plunger, a vertical shaft, a pinion mounted on said rock shaft and meshing with said rack, a second laterally extending arm mounted on said shaft and oscillatable with said pinion and a link pivotally connected at its ends to said laterally extending arms respectively.

2. A door closer comprising a vertical pivot member on which the door is mounted, a laterally extending arm secured to said pivot, a cylinder, a plunger reciprocable in said cylinder and transmission from said plunger to said laterally extending arm, comprising a rack secured to the plunger, a vertical shaft, a pinion mounted on said rock shaft and meshing with said rack, a second laterally extending arm mounted on said shaft and oscillatable with said pinion and a link pivotally connected at its ends to said laterally extending arms respectively, the effective lever arm of said second laterally extending arm increasing as the door is opened.

3. A door closer comprising a vertical pivot member on which the door is mounted, a laterally extending arm secured to said pivot, a cylinder, a plunger reciprocable in said cylinder and transmission from said plunger to said laterally extending arm, comprising a rack secured to the plunger, a vertical shaft, a pinion mounted on said rock shaft and meshing with said rack, a second laterally extending arm mounted on said shaft and oscillatable with said pinions, and a link pivotally connected at its ends to said laterally extending arms respectively, said link being movable to a position in which the center of the door pivot is between

and in line with the pivotal points at the ends of the link, whereby the door may remain in wide open position against action of the plunger.

4. A floor door closer construction comprising a vertical pivot pin having a portion extending above the floor level and a door bar to be secured adjacent the lower edge of the door having members separable on a vertical plane embracing the upper end of said pivot pin.

In witness whereof, I have hereunto subscribed my name.

LEWIS C. NORTON.