

PUBLISHED
APRIL 27, 1943.
BY A. P. C.

G. N. PETERSEN
DOOR CLOSERS WITH OIL BRAKE
Filed Nov. 25, 1941

Serial No
420,411

Fig. 1.

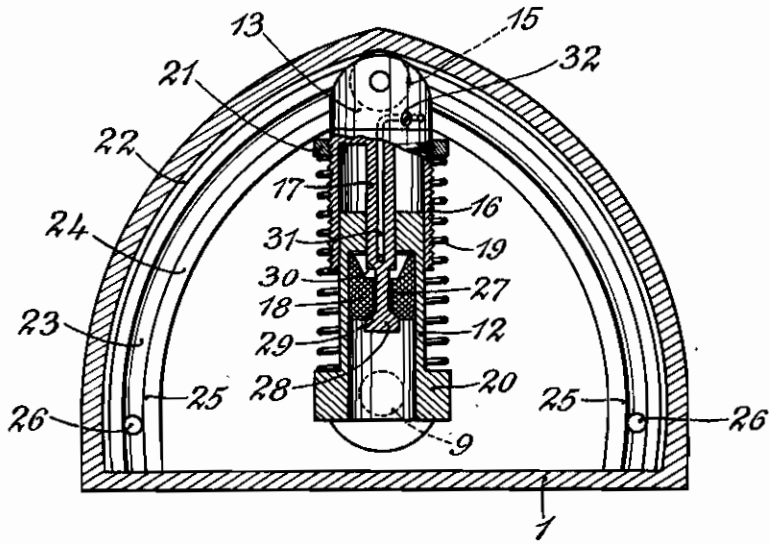
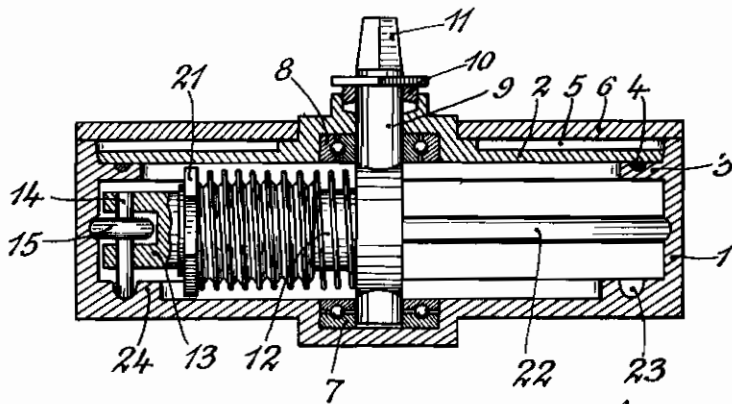


Fig. 2.



Inventor:
A. N. Petersen
By E. F. Munkwitz
Att'y

ALIEN PROPERTY CUSTODIAN

DOOR CLOSERS WITH OIL BRAKE

Gunnar Nimrod Pettersen, Oslo, Norway; vested
in the Alien Property Custodian

Application filed November 25, 1941

The invention relates to door closers having an oil brake arranged radially to the axis of rotation of the door and in which a helical spring acting between the cylinder and the piston of the oil brake causes the closing by intermediation of a cam member.

Door closers of this kind have the advantage that they may be accommodated as a whole in the floor so that they are not visible, but on the other hand they have the disadvantage of not being very reliable since the cam member which in the case of known door closers is in the form of an eccentric rotating with the door and actuated by the piston of the stationary oil brake acts with such a short arm that the door closer does not afford the required closing moment without a very great spring force.

According to the present invention this disadvantage is overcome by the fact that the oil brake is fixed on the pivot of the door so as to partake in the rotational movement of the door, and the cam member is formed by a stationary guiding path for the outer end of the brake.

Hereby it becomes possible to let the closing force act with a greater arm. According to a further feature of the invention this may be further utilized for keeping the door safely in place in the closed position by giving the guiding path such a form that by the transmission of the spring force provided by the camming action it affords a resistance against rotation of the door from closed position. With an outer guiding path this is possible without difficulty, whereas when using an eccentric it would be very difficult because a steep cam surface would be required at the smallest radius of the eccentric so that by an increase of the viscosity of the oil due to a decrease in temperature the door might easily be stuck. Thus, by this feature of the invention the disadvantage that the door is often blown open, which is frequently encountered with the prior construction, is avoided.

Another reason for lack of reliability of door closers of this kind is that the ball valves usually employed which control the passage of the oil through the piston do not operate safely under all conditions since it may happen that the ball may stick due to the variations in the consistency of the oil which occur by changes in temperature. According to a further feature of the invention this disadvantage is avoided by the fact that the piston rod of the oil brake forms the valve element for closing and opening the passage of the oil through the piston by being adapted to perform a short movement with respect to the latter

which movement is limited by two stops of which that at which the piston head is entrained during closing closes said passage.

Still another disadvantage in oil filled door closers adapted for being accommodated in the floor is that the oil may migrate out of the casing and soil the floor. According to a further feature of the invention this is avoided by providing the oil casing with a double cover containing a chamber to receive oil which migrates from the oil chamber.

Other features of the invention will appear from the following specification in connection with the drawings which show a preferred embodiment.

In the drawings:

Figure 1 is a horizontal section through the door closer in the position corresponding to closed position of the door and

Figure 2 is an axial section in a right angle to the door opening showing the door closer in the position corresponding to open position of the door.

The door closer shown is designed for use with a door adapted to be opened in both directions and is therefore symmetric with respect to the plane of the door opening. Its casing consists of an oil casing 1 closed by a cover 2. The cover 2 is fastened by screws (not shown) to a flange 3 with a packing 4 therebetween. Besides, at the upper side of the cover 2 there is a chamber 5 covered by a second cover 6 for receiving oil which migrates from the casing 1.

In the casing 1 and the cover 2 there are indicated supporting, respectively collar ball bearings 7, 8 for the pivot 9 which is provided with a packing 10 for the cover 2 and which merges into a quadrangular pin 11 matching a fitting on the door so as to rotate with the same.

The pivot 9 carries the oil brake of which the cylinder 12 is cast in one piece together with the pivot. The cylinder 12 has a telescopic connection with a piston member 13 which near its outer end carries a fixed pivot 14 for a roller 15 and which comprises a skirt portion 16 at the outside of the cylinder 12 and a central piston rod 17 which penetrates the base of the cylinder 12 and acts on the piston head 18.

Around the cylinder 12 and the skirt 16 there is placed a helical spring 19 compressed between an annular portion 20 of the pivot 9 at the inner end of the cylinder and a nut 21 which may be screwed forward and backward at the outside of the skirt portion 16 for adjusting the spring pressure.

When the door and thereby the oil brake are turned the roller 15 runs on the roller path 22 of the inside wall of the casing 1. Over a section of the roller path 22 ranging from closed position to an opening angle of about 90° the roller path 22 has an increasing distance from the axis of rotation so that during the opening movement of the door the portion 13 is pushed inward and the spring 19 is tensioned, whereas closing the spring 19 pushes the member 13 outward so that the oil brake and thereby the door are turned back to the position shown in Figure 1. At the point where the roller is situated in closed position as shown in Figure 1 the roller path is shown forming a point so that by the camming action between the roller and the roller path the spring 19 affords a certain resistance against turning of the door from this position in order that the door shall not be opened by wind force. However, it is possible also to provide a recess in the roller path at this point so that a still more marked resistance for the roller results.

As shown in Figure 2 the pivot 14 for the roller has a downward extension so as to form a projection guided in a groove 23 at the outside of a flange 24 projecting from the bottom of the oil casing. Hereby it is ensured that the piston member 13 will follow its path when the door is closed by hand with greater velocity than that which corresponds to the operation of the door closer.

As indicated by 25 in Figure 1 the curvature of the guiding path is changed at an opening angle of about 90° so that the distance from the axis of rotation again increases, whereby it will be possible to let the door remain in fully opened position without being closed by itself. For this purpose it is not necessary to provide a particularly steep guiding path since in any case the force of the wind will be small when the door is in this position. However, for various uses it is not at all desired that the door may remain open and in order to be able to use the same door closer in both cases a separate stop may be used for preventing the door closer from passing beyond the position 25. For this purpose a screw may be used which is inserted through a suitable

threaded hole in the cover 2 and has sufficient length for acting as a stop for the member 13. Preferably the screw ought to have a support at the lower end which has been indicated by bores 26 in the bottom of the casing in Figure 1. For uses for which the stop is not desired the threaded hole in the cover may be closed by a short screw acting as a plug.

In the embodiment shown the piston rod 17 acts as a valve member for opening and closing the passage 27 of oil through the piston head 18, the piston rod having at the end a head 28 which abuts against a valve seat 29 on the piston head. The opening of the valve is caused by the inward movement of the member 13, the piston rod being able to move a short distance with respect to the piston head until it abuts against the same with a stop 30 which does not close the passage 27. The cylinder chamber communicates with the oil chamber outside through a duct 31 which passes through the piston rod 17 and may be throttled more or less with a screw 32 provided in the member 13, according to the consistency of the oil.

The oil brake operates in the following manner: When the door is opened and the member 13 is pushed inward the valve 28, 29 is opened and the stop 30 entrains the piston 18 inward so that the cylinder chamber is filled with oil through the passage 27. When the spring 19 thereafter pushes the member 13 outward so that the door is closed the piston head 18 remains still for a moment until the head 28 closes the passage 27 and entrains the piston head in the outward direction. Thereby the oil is pressed through the duct 31 whereby the outward movement of the member 13 and thereby the rotational movement of the door is retarded according to the resistance of flow corresponding to the adjustment of the screw 32. By the valve arrangement employed a very safe operation of the oil brake is obtained.

A door closer according to the invention may be carried out in many other ways than that shown. For example, instead of using a radially movable piston and a cylinder fixed on the pivot it is well possible to use the inverse arrangement etc.

GUNNAR NIMROD PETERSEN.