March 9, 1937. M. P. POTTER 2,073,024

DOOR STOP

Filed June 14, 1934 2 Sheets-Sheet 1

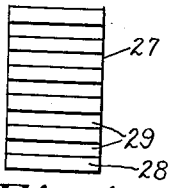


Fig. 4.

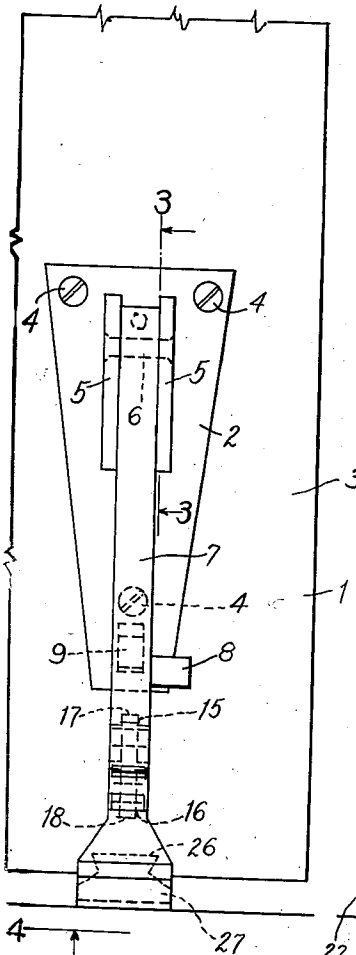


Fig. 2.

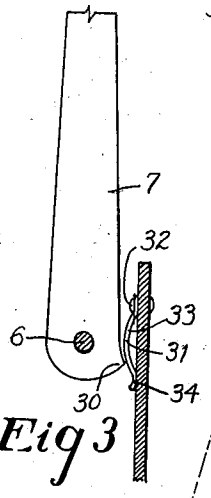


Fig 3

Fig. 1.

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DOOR STOP

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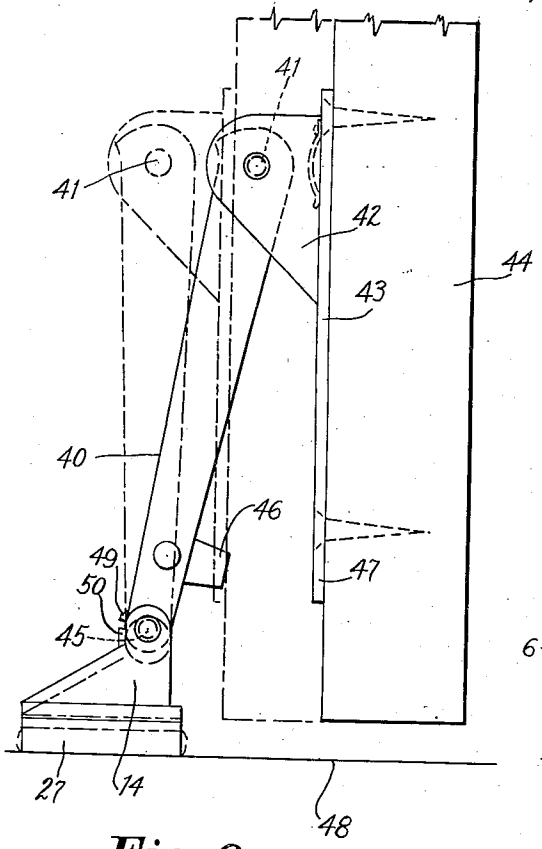


Fig. 6.

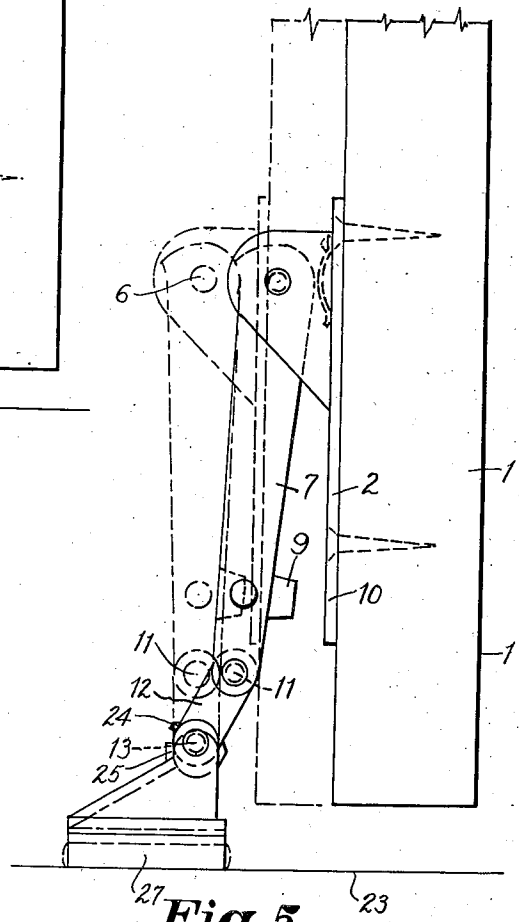


Fig. 5.

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DOOR STOP

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Application June 14, 1934, Serial No. 730,619

10 Claims. (Cl. 292—338)

This invention relates to door stops and the like for holding doors open against the tendency of draft or of closing devices, to close the door.

The invention comprises in general a simple mechanism adapted to be attached to a door and operable to a neutral position to render it ineffective to stop the door and alternatively operable to a door stopping position.

Heretofore, various devices have been proposed, of this general class, but such devices have generally had elements engageable with the floor to hold the door in its stopped position, and on floors that are very smooth or have become smooth or even slippery during use and after scrubbing or polishing them, such devices are ineffective to stop the door. Also, such devices have generally employed spring means or locking means which when operated emit noises which are highly objectionable in many installations, such for example on the doors of hospitals and in homes.

It is therefore an object of the present invention to provide generally an improved door stop.

Another object is to provide a door stop having improved means for engaging the floor under the door to stop the door and hold it in any open position from partly open to full open.

Another object is to provide a door stop having improved means for engaging the floor under the door without liability of slipping thereon.

Another object is to provide an improved door stop having improved means adapting it to different levels or elevations of floor under the door which may be encountered at different open positions of the door.

Another object is to provide a door stop of the general class referred to having improved means for holding the door stop mechanism in neutral or inoperative position and operable in a simple manner into the effective door stopping position.

Other objects will be apparent to those skilled in the art to which my invention appertains.

My invention is fully disclosed in the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a side elevational view of an embodiment of my invention illustrating its application to a door and a mode of operation thereof;

Fig. 2 is a front elevational view of the door and stop of Fig. 1;

Fig. 3 is a fragmentary sectional view taken from the plane 3—3 of Fig. 2 and illustrating parts thereof in different positions;

Fig. 4 is a view taken approximately from the plane 4 of Fig. 2 illustrating a part of the construction of a floor-engaging element which I may employ;

Fig. 5 is a view generally similar to Fig. 1 illustrating parts thereof in different positions, and further illustrating a mode of operation of my invention;

Fig. 6 is a view generally similar to Figs. 1 and 5 but illustrating a modification.

Referring to the drawings, Figs. 1 and 5, I have shown at 1 a part of a door supported on hinges not shown so that when the door moves on its hinges, it will move, as viewed in the drawings, toward the left in going toward the closed position.

A metal plate 2 is secured to the base 3 of the door in any suitable manner, for example by screws 4—4, and has a pair of forwardly projecting ears 5—5 formed thereon carrying a transverse pin or pintle 6.

Oscillatably mounted on the pintle 6 is a normally depending arm 7 preferably formed from metal and having adjacent its lower end a laterally extending finger 8 and a rearwardly extending boss 9, the lower end portion 10 of the plate 2 and the boss 9 being so disposed that upon counter-clockwise oscillation of the arm 7 as viewed in Fig. 1, the boss 9 may engage the lower portion 10 of the plate for a purpose to be described.

The lower end of the arm 7 is pivotally connected by a pintle pin 11 to a toggle arm 12 and the lower end of the toggle arm 12 is pivotally connected by a pintle pin 13 to a foot 14.

The oscillatory connection thus provided between the toggle arm 12 and the arm 7 at one end and the foot 14 at the other end is preferably made by providing tongues 15 and 16 on the opposite ends of the toggle arm 12 and disposing them in slots or grooves 17 and 18, respectively in the arm 7 and foot 14. Stops 19 and 20 are provided on the lower end of the arm 7 and upper end of the toggle arm 12 to limit the oscillatory movement of the arms 7 and 12 in the direction to move the pintle pin 11 toward the left as viewed in Fig. 1, limiting said movement to the amount which will bring the pintle pin 11 in a straight line between the pintle pins 6 and 13, this position being indicated in broken lines in Fig. 5 and to be referred to later.

Stops 21 and 22 are provided respectively on the toggle arm 12 and foot 14 to limit oscillatory movement of the toggle arm 12 around the pintle pin 13 in the clockwise direction as viewed in Fig. 1 to a position in which the pintle pins 11 and 13 are on a line in general at about 45°

to the horizontal floor line indicated at 23. Stops 24 and 25 are provided respectively on the toggle arm 12 and foot 14 to limit the oscillatory movement of the toggle arm 12 on the pintle pin 13 to prevent the toggle arm from moving substantially beyond a position in which the pintle pin 11 is on an approximately vertical line above the pintle pin 13.

The foot 14 is, like the arms 7 and 12, preferably formed from metal and has, besides the portion thereof directly under the pintle pin 13, a portion extending forwardly therefrom, and is preferably concave or hollowed out on its underside to provide a dovetail form recess 26; and a rubber pad 27 is fitted into the recess, interlocked by a dovetail portion with the foot proper 14, and the rubber pad 27 has a generally flat surface 28 adapted to engage the floor 23 and the surface 28 may have provided therein a series of transverse grooves 29—29. Preferably the pad 27 projects downwardly below the metal of the foot 14 to provide a substantial thickness of rubber between the foot and the floor. While rubber is preferred for the pad 27, other compressible materials obviously may be employed, such for example as cork.

The upper end of the arm 7 is provided with a cam-like projection 30 and a spring, preferably a flat leaf spring, 31 is provided on the forward surface of the plate 2 secured thereto by a rivet 32, and provided with an intermediate portion 33 spaced from the plate, the free end of the spring, 34, preferably engaging the face of the plate.

The spring 31 and projection 30 are relatively disposed, in connection with the pintle pin 6, so that when the arm 7 is oscillated or rotated upwardly as viewed in Fig. 1 around the pin 6, the projection 30 will ride over the intermediate portion 33 of the spring, compressing the same, and then by continued rotary movement of the arm 7 allowing the portion 33 to expand into a position above the projection 30 as shown in Fig. 3. By this means the arm 7 and the toggle arm 12 and foot 14 connected thereto may be yieldingly supported in an inoperative or neutral position indicated by the broken lines 35 in Fig. 1, the parts just referred to being disposed closely adjacent to the front face 3 of the door.

In the operation of the stop embodying my invention as thus far described, the parts may be considered as normally retained in the neutral position 35. To put the device into operation, the door may first be moved to an open position, whether full open or partly open, and then the operator may engage the sole of his shoe with the finger 8, and by pulling forwardly thereon may rock the arm 7 counter-clockwise as viewed in Fig. 1, the spring 31 yielding to permit the arm to be rotated. After a predetermined amount of movement, gravity will cause the arm 7 and parts connected thereto to drop into the solid line position of Fig. 1 with the pad 27 on the floor 23.

The arm 7 will then be inclined at a relatively obtuse angle with the floor 23. If the door 1 should now be moved toward the closed position, for example to the broken line position 36, the pintle pin 6 will thereby be moved toward the left and the arm 7 will tend to rotate around the pintle pin 11. The toggle arm 12 cannot rotate clockwise around the pintle pin 13 because of the stops 21 and 22 and therefore the pintle pin 11 cannot move; thus the pin 6 has a tendency to rise. But the weight of the door and the hinges of the door acting through the plate 2 prevent the pin 6 from rising and thus the tendency of the door to move toward the left exerts a powerful downward thrust in the nature of a toggle action, through the arms 7 and 12 and into the foot 14, compressing the pad 27 against the floor 23. Because of the nature of the toggle action, the thrust on the pad 27 is largely downwardly and the greater the tendency of the door to close, the greater the downward thrust. There is very little forward thrust on the pad 27 and thus a negligible tendency of the pad 27 to slip even if the floor 23 be slippery because of being smooth or polished or even wet from scrubbing. The grooves 29 providing intermediate corrugations of rubber augment the natural tendency of the compressed rubber to grip the floor and resist slipping.

Thus, the door is effectively stopped from closing. It will be apparent that if the stopped position of the door of Fig. 1 is an intermediate partly open position, the door may be moved to a more open position, that is, toward the right as viewed in Fig. 1, and thereupon the toggle action will be immediately relieved and the arms 7 and 12 and foot 14 will trail along after the door, the pad 27 dragging along on the floor. When the desired position of the door is reached and the door again attempts to move toward the closed position, the parts will be in the position for exerting the toggle action described and prevent closure movement of the door.

To put the stop out of action, it is only necessary to apply a slight lifting force on the finger 8 to elevate the parts to the dotted line position 35 above described where they will be retained out of action or in neutral position by the spring 31. In some cases, the floor may slope so that when it is in a wide open position the floor 23 may be near the bottom of the door as shown in Fig. 1, and at other open positions the floor 23 may be farther from the door as shown in Fig. 5. In such case, if the above described action alone were relied upon, the movement of the door toward closed position might move the pintle pin 6 forwardly without exerting the above described toggle action to press the pad 27 on the floor. However, with the embodiment of my invention under consideration, in such cases, the forward movement of the door will, as shown in Fig. 5, bring the lower portion 10 of the plate 2 forwardly into engagement with the boss 9 and will thereby and thereafter carry the arm 7 forwardly bodily with the door and ultimately rock the toggle arm 12 counter-clockwise around the pintle pin 13 thereby exerting a downward toggle action to compress the pad 27 upon the floor. In extreme cases, the movement of the arm 7 and toggle arm 12 may be sufficient to place the pintle pins 13, 11 and 6 in a straight line as shown in Fig. 5, in which case the stops 24 and 25 may be relied upon to prevent the toggle from discharging forwardly and relieving the pressure on the pad, such extreme position of the parts being shown in broken lines in Fig. 5.

Where the toggling elements including the arm 7 and the toggle arm 12 and foot 14 are under considerable compression in holding the door open, and when it is desired to close the door, it may be necessary to give to the door a slight movement toward the open position to relieve the pressure whereby the parts may be released and may be rotated to the neutral position referred to.

As will now be apparent therefore, in installing

the device, the plate 2 may be attached to the door 1 in a position to dispose the pintle pin 6 at a suitable distance from the floor so that the device will function to hold the door for varying distances of floor from the pintle pin; and that for extreme distances of the floor from the pin, the toggle arm 12 will be rocked on its pintle pin 6 as shown in Fig. 5; and for the minimum and intermediate distances of the floor from the pin 6, the toggle arm 12 will be retained in the position of Fig. 1, and the toggle action all exerted by rocking of the arm 7. Thus, for all of the conditions stated, the pad 27 will be thrust substantially downwardly vertically upon the floor with a negligible amount or component of forward thrust whereby it will in every case grip the floor no matter how slippery the floor may be.

I have found in practice that the pad 27 will grip the floor and stop the door from closing against even great closing tendency, where the floor is polished or oiled or wet and even where the pad 27 itself has been coated with wax or other polish or where it is wet; and I have found that the pad 27 and the floor in contact therewith may both be waxed or oiled or wet with soapy scrubbing water without destroying the grip of the pad on the floor effected by the downward thrust of the toggles thereon and without destroying the stopping action of the device as a whole even where great forces are applied to the door tending to move it to the closed position.

In Fig. 6 I have illustrated a modification in the nature of a simplification which may be sufficient in some cases. In this form, the toggle arm 12 is omitted. An arm 40 having a pintle pin 41 on an ear or ears 42 on a plate 43 secured to the door 44 is connected by a pintle pin 45 directly to the foot 14 having the pad 27. A boss 46 on the arm 40 may be engaged by the lower portion 47 of the plate 43.

For small distances of the floor 48 from the pin 41, the toggling action exerted by the arm 40 on the pad 27 by movement of the door 44 toward the left, which is in the closing direction, will be sufficient to effect stopping action. For extreme distances of the floor 48 from the pin 41, the lower portion 47 of the plate 43 may engage the boss 46 to thereafter move the arm 40 bodily with the door; and stops 49 and 50 respectively on the lower end of the arm 40 and on the foot 14 may be engaged when the pintle pin 41 is substantially vertically above the pin 45 to retain the parts in the position of maximum toggling action exerting maximum downward thrust on the pad 27. Otherwise the device of Fig. 6 may operate as described for the form of Figs. 1 to 5.

My invention is not limited to the exact details of construction shown and described. Many changes and modifications thereof may be made within the spirit of my invention and without departing from the scope of the appended claims.

I claim:

1. A door stop mechanism for holding a door against hinging movement in one direction comprising a base element adapted to be secured to the door at a portion thereof above the floor over which the door swings, an elongated arm pivoted at one end portion to the base, a foot element having a portion engageable with the floor and connected to the arm by mechanical means comprising a pivot element pivotally supporting the foot element and permitting oscillatory movement of the foot and pivot element relative to a lower end portion of the arm, and an abutment on the arm normally spaced from the base element when the foot element is engaged with the floor and engageable by the base element after a predetermined closing movement of the door relative to the foot element.

2. In a door stop mechanism, a base element adapted to be secured to a door, an elongated arm pivotally connected at one end portion to the base element, a foot element connected to the opposite end portion of the arm by mechanical means comprising a pivot support for the foot element and permitting oscillatory movement of the foot element and pivot support relative to said opposite end portion of the arm and the foot element being provided with a floor-engageable portion.

3. In a door stop mechanism, a base element adapted to be secured to a door, an elongated arm pivotally connected at one end portion to the base element, a second arm pivotally connected at one portion to the opposite end portion of the first arm, a foot element pivotally connected to the second arm at a point spaced from the pivot connection with the first arm, stop means limiting pivotal movement of the second arm in one direction relative to the foot element, and stop means limiting pivotal movement of the second arm in the other direction relative to the first arm.

4. In a door stop mechanism, a base element adapted to be secured to a door, an elongated arm pivotally connected at one end portion to the base element, a second arm pivotally connected at one portion to the opposite end portion of the first arm, a foot element pivotally connected to the second arm at a point spaced from the pivot connection with the first arm, stop means limiting pivotal movement of the second arm in one direction relative to the foot element, and stop means limiting pivotal movement of the second arm in the other direction relative to the first arm, the pivot connections of the first arm being disposable so that a line therethrough is inclined toward the base element when the foot element is engaged with the floor.

5. In a door stop mechanism, a base element adapted to be secured to a door, an elongated arm pivotally connected at one end portion to the base element, a second arm pivotally connected at one portion to the opposite end of the first arm, a foot element pivotally connected to the second arm at a portion spaced from the pivot connection with the first arm, stop means limiting pivotal movement of the second arm in one direction relative to the foot element, the pivot connection with the first arm normally disposable so that a line therethrough is inclined toward the base element when the foot element is engaged with the floor, and an abutment on the first arm engageable by a portion of the base element after predetermined movement of the base element caused by closing movement of the door.

6. In a door stop mechanism, a base element adapted to be secured to a door, an elongated arm pivotally connected at one end portion to the base element, a foot element connected to the opposite end portion of the arm by mechanical means comprising a pivot support for the foot element and permitting oscillatory bodily movement of the foot element and pivot support relative to said opposite end portion of the arm, the foot element having a floor-engageable portion, and stop means limiting oscillatory movement of the foot element.

7. In a door stop mechanism, a base element

adapted to be secured to a door, an elongated arm pivotally connected at one end portion to the base element, a foot element connected to the opposite end portion of the arm by mechanical means comprising a pivot support for the foot element and permitting pivotal movement of the foot element, and oscillatory bodily movement of the foot element and pivot support relative to said opposite end portion of the arm, the foot element having a floor-engageable portion, and stop means limiting pivotal movement of the foot element.

8. In a door stop mechanism, a base element adapted to be secured to a door, an elongated arm pivotally connected at one end portion to the base element, a second arm pivotally connected at one portion to the opposite end portion of the first arm, a foot element pivotally connected to the second arm at a point spaced from the pivot connection with the first arm, the pivot connections of the first arm being disposable so that a line therethrough is inclined toward the base element when the foot element is engaged with the floor.

9. In a door stop mechanism, a base element adapted to be secured to a door, an elongated arm pivotally connected at one end portion to the base element, a second arm pivotally connected at one portion to the opposite end portion of the first arm, a foot element pivotally connected to the second arm at a point spaced from the pivot connection with the first arm and stop means limiting pivotal movement of the second arm in one direction relative to the foot element.

10. In a door stop mechanism, a base element adapted to be secured to a door, an elongated arm pivotally connected at one end portion to the base element, a second arm pivotally connected at one portion to the opposite end portion of the first arm, a foot element pivotally connected to the second arm at a point spaced from the pivot connection with the first arm and stop means limiting pivotal movement of the second arm in one direction relative to the first arm.

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