Jan. 28, 1969 E. A. REYNDERS 3,423,784

STOP AND HOLD DEVICE FOR DOORS

Filed Oct. 20, 1965

Sheet 1 of 2

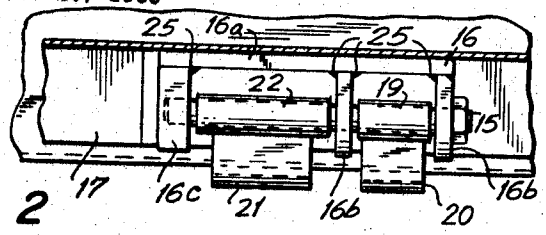


FIG. 2

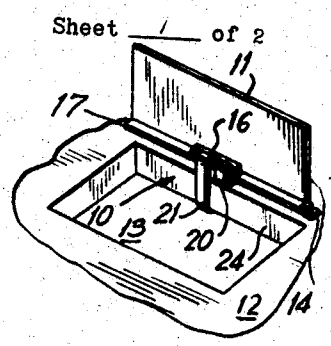


FIG. 1

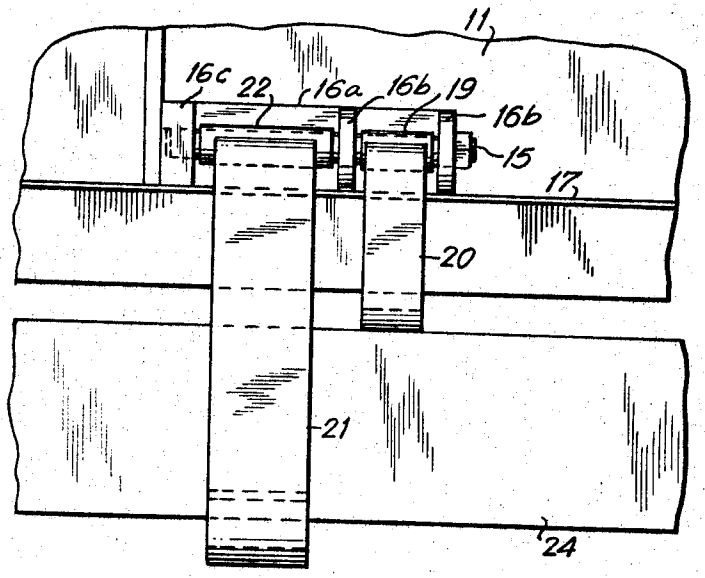


FIG. 3

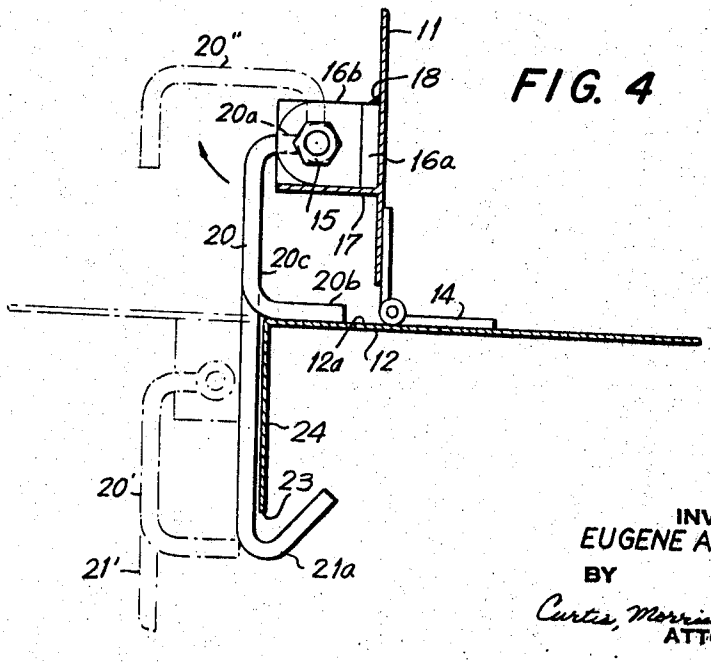


FIG. 4

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Sheet 2 of 2

FIG. 5

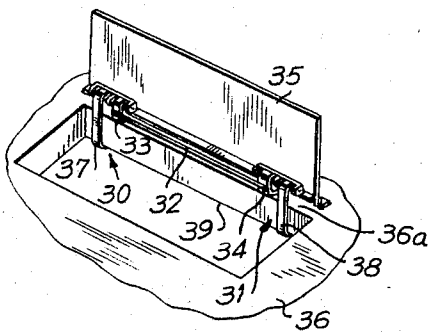


FIG. 6

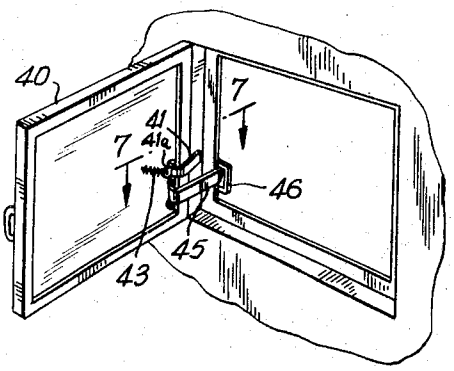


FIG. 7

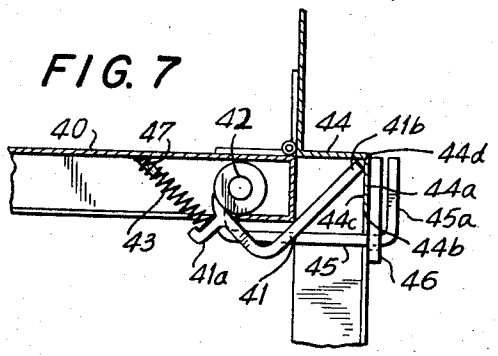


FIG. 8

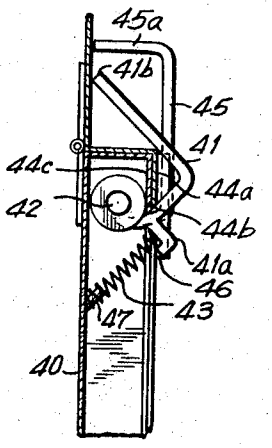
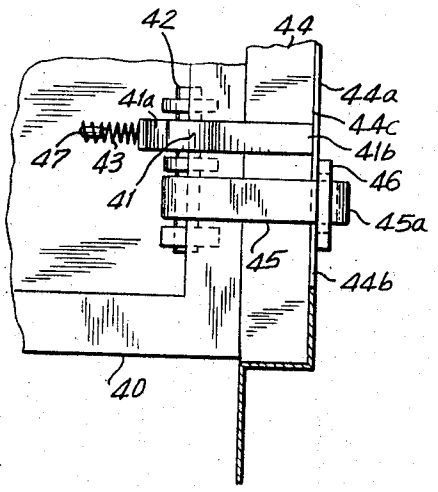


FIG. 9



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STOP AND HOLD DEVICE FOR DOORS

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U.S. Cl. 16—82 4 Claims
Int. Cl. E05f 5/02

ABSTRACT OF THE DISCLOSURE

A stop and hold device for a door hinged to a housing, with the door having a fulcrum member secured to the door along the hinged edge, and a spring biased hold member which is rotatable about the fulcrum member as the door is opened and closed, with one end of hold member bearing against one surface of the housing to hold the door open, and a stop member rotatable about the fulcrum member as the door is opened and closed, and with a hooked end which hooks onto a second surface of the housing, spaced from the first surface, after the door is opened to prevent the door from opening further.

The present invention relates to a device which holds a door open at a predetermined position and prevents the door from closing or opening further. Although the invention has particular application in equipment such as power washers, deburring units, air washers, wet type dust collectors and similar devices, it will be apparent that the invention has considerably broader application and may be employed for various other purposes.

In certain power washers and deburring units, horizontally hinged doors provide access to the water tank. These doors are hinged to the housing of the equipment at the rear of the tank and swing upward. Sometimes the opened doors are leaned against a vertical wall of the housing while in other instances it is preferable not to let the door strike against the housing wall. The doors may range in area from less than one square foot to over eight square feet. Generally, these doors are made of steel with angle bands on the underside resulting in a relatively heavy structure. Such construction serves to stiffen the door and also provide a partial baffle seal to the splashing liquid in the tank.

Often these heavy doors are hinged very close to the vertical wall of the housing against which they lean after they are swung upward. This results in an open door leaning against a wall at only a slight angle. Such a condition is quite dangerous since vibrations or slight movements of the door may cause the door to fall back downward possibly striking someone who is near to the edge of the tank opening. The risk of injury also exists for vertically hung doors.

Various attempts have been made to remove this hazard by arranging hooks or clips at the sides or top of the door. In one form, a hook attached to the vertical wall of the housing is placed over the edge of the open door by hand so as to hold the door in the open position. In another form, as the door is pushed upward it engages a cam which opens a clip. The clip, in turn, engages the edge of the door to hold it in the open position.

None of the approaches previously employed have proven satisfactory in removing the possibility of a heavy door falling downward and injuring an individual. In some cases, the holding device is unreliable so that the door becomes disengaged from the holding device and falls downward. In other instances, the operator of the equipment simply chooses to ignore the holding devices or utilizes them in an inadequate manner merely because he is required to perform an additional step in his routine.

Another objection to presently used holding devices is that they cannot be reached by shorter operators of the equipment with the result that the holding device is not used and the heavy door is held open as if no retaining device were provided.

It is an object of the present invention to provide a new and improved stop and hold device for a door.

It is another object of the present invention to provide a stop and hold device for a door which is reliable.

It is still another object of the present invention to provide a stop and hold device for a door which is simple in construction and inexpensive to fabricate.

It is a further object of the present invention to provide a stop and hold device for a door which requires a minimum amount of handling by an individual opening and closing the door.

It is a still further object of the present invention to provide a stop and hold device for a door in a power washer, deburring unit or similar device which overcomes the limitations and shortcomings of devices presently being employed to hold the doors open in such units.

It is yet another object of the present invention to provide a stop and hold device for a door which may be employed on both horizontally and vertically hung doors.

One stop and hold device for a door constructed in accordance with the present invention and described hereinafter includes a fulcrum member adapted to be secured to the door along the edge of the door which is hinged to a housing and a hold member rotatable about the fulcrum member. The hold member has an end adapted to bear against a first fixed surface when the door is opened to a predetermined position. This results in the door being held open at this predetermined position. Also included is a stop member which is coupled to the fulcrum member. The stop member has an end adapted to engage a second fixed surface, spaced from the first fixed surface, after the door is opened to the predetermined position. This results in the door being prevented from opening further.

In the specification and in the accompanying drawing, there is described and shown an illustrative embodiment of the invention and various modifications thereof are suggested. It is to be understood that these are not intended to be exhaustive, but on the contrary are given for purposes of illustration in order that others skilled in the art may fully understand the invention so that they may modify and adapt it in various forms, each as may be best suited to the conditions of a particular use.

The various objects, aspects and advantages of the present invention will be more fully understood from a consideration of the following specification in conjunction with the accompanying drawing in which:

FIGURE 1 is a perspective view of a first embodiment of a stop and hold device constructed in accordance with the present invention and indicates the manner in which this device is affixed to a horizontally hung door;

FIGURE 2 is a enlarged top plan view of the stop and hold device shown in FIGURE 1;

FIGURE 3 is a front elevation view of the stop and hold device shown in FIGURE 1;

FIGURE 4 is a side elevation view of the stop and hold device shown in FIGURE 1;

FIGURE 5 is a perspective view of two stop and hold devices constructed in accordance with the present invention and indicates how these two devices may work together in unison;

FIGURE 6 is a perspective view of a second embodiment of a stop and hold device constructed in accordance with the present invention and indicates the manner in which this device is affixed to a vertically hung door;

FIGURE 7 is a horizontal section taken on line 7—7 of FIGURE 6;

FIGURE 8 is a section similar to FIGURE 7, but shows the door closed; and

FIGURE 9 is a side elevation view of the stop and hold device shown in FIGURE 6.

Referring to FIGURE 1, a stop and hold device **10**, to be described in more detail hereinafter, is shown affixed to a door **11** at the edge of which the door is hinged to a housing **12**. The door **11** is hinged to the housing **12** by means of a single eleongated hinge **14** or a plurality of shorter hinges. The opening **13** which the door **11** covers when the door is closed may be the water tank of a power washer or a deburring unit. For such an arrangement, the door is hinged along a horizontal axis and is opened and closed by upward and downward movements.

Referring to FIGURES 2, 3 and 4, the stop hold device **10** includes a fulcrum member **15** adapted to be secured to the door **11** along the hinged edge of the door. In particular, the fulcrum member **15**, in the form of a bolt, is supported by a bracket **16**. The bracket arm **16** comprises a back member **16***a*, a pair of support arms **16***b*, and a nut block **16***c*. The support arms **16***b* and the nut block **16***c* are secured to the back member **16***a* by means of welding seams **25**. The bolt **15** passes through holes in the support arms **16***b* and is received by a threaded well in the nut block **16***c*. The bracket **16** is positioned against an angle band **17** and is secured to the door **11** by a welding seam **18** between the back member **16***a* and the door.

The bolt **15** carries a first sleeve or tubing **19** having a bore slightly larger than the shank of the bolt and, therefore, large enough to rotate freely about the bolt, a hold member **20** is affixed to the periphery of the sleeve **19** by welding, for example. The hold member **20**, best illustrated in FIGURE 4, is a C-shaped metallic member having upper and lower end portions **20***a* and **20***b* and a middle portion **20***c*. The hold member **20** is so shaped and dimensioned that the end **20***b* bears against surface **12***a* of the housing **12** when the door **11** is opened to the position illustrated in the drawing.

The bolt **15** carries a second sleeve or tubing **22** also having a bore slightly larger than the shank of the bolt and, therefore, large enough to rotate freely about the bolt. A stop member **21** is affixed to the periphery of the sleeve **22**. The stop member **21** is a metallic member and has a hooked end **21***a* which is adapted to hook against an edge **23** of a housing flange **24** after the door **11** is opened to the position illustrated in the drawing.

With the door **11** closed, the hold member **20** and the stop member **21** occupy the positions shown dotted in FIGURE 4 and indicated by reference numerals **20'** and **21'**, respectively. As the door **11** is opened, the hold member **20** and the stop member **21** rotate about the bolt **15** counterclockwise as viewed in FIGURE 4 due to gravity. When the door **11** reaches a predetermined position, vertical for the example being described, the hold member **20** swings in over the surface **12***a* and occupies the position shown in FIGURE 4 with the end **20***b* bearing against surface **12***a*. This holds the door **11** open and prevents the door from closing. As the door **11** tends to close, the end **20***b* pushes against surface **12***a* holding the door open.

After the door **11** reaches the position illustrated in FIGURE 4, the hooked end **21***a* of the stop member **21** hooks against the edge **23** of the housing flange **24** and prevents the door from opening further. As the door **11** tends to open further, end **21***a* pulls against edge **23**. The door **11** may be moved slightly between the points at which hold member **20** prevents the door from closing and stop member **21** prevents the door from opening further. This slight amount of movement is provided in order to release the hold member **20** when the door **11** is to be closed. Specifically, when the door **11** is to be closed it is pushed open slightly more than is illustrated in the drawing so that the hooked end **21***a* of the stop member **21** engages the edge **23**. This slight movement of the door permits an individual to withdraw the hold member **20** to the position shown dotted in FIGURE 4 and indicated by reference numeral **20''**. Once the hold member **20** is disengaged from the surface **12***a* of the housing the door **11** may be returned to the closed position. As the door **11** is being lowered the hold member **20** and the stop member **21** rotate about the bolt **15** clockwise due to gravity.

FIGURE 5 shows a multiple unit arrangement which may be employed if the door to be held open is too heavy for a single stop and hold device. A multiple unit arrangement may also be employed on a door which can be held open by a single stop and hold device if the added protection against a single stop and hold device malfunctioning is desired. Referring to FIGURE 5, two stop and hold devices **30** and **31** are coupled together by a tie rod **32**. In particular the rod **32** extends between the two hold members **33** and **34**. The rod **32** is secured to the hold members **33** and **34** by welding, for example. As the door **35** is opened to the position illustrated, the two stop and hold devices **30** and **31** function in the manner previously described in connection with the stop and hold device **10** in FIGURES 1 through 4. The two hold members **33** and **34** swing in over the surface **36***a* of the housing **36** and occupy the positions illustrated with the hold members bearing against surface **36***a*. The two stop members **37** and **38** hook against edge **39** of the housing **36** and prevent the door **35** from opening further.

When the door **35** is to be closed, it is pushed open slightly more than is illustrated so that nn individual may withdraw the two hold member **33** and **34** together by pulling on the rod **32**. Once the hold members **33** and **34** are disengaged from surface **36***a*, the door may be lowered and closed.

This arrangement requires the operator to use only one hand in withdrawing the hold members. Still longer and heavier doors may be provided with more than two stop and hold devices which function together in unison by means of a longer tie rod.

FIGURE 6 is a perspective view of a second embodiment of a stop and hold device constructed in accordance with the present invention and indicates the manner in which this device is affixed to a vertically hung door. Since the operation of the second embodiment is generally similar to the operation of the first embodiment, a detailed description of the second embodiment will be omitted.

As previously indicated, for a horizontally hung door, the hold member swings into the hold position due to the influence of gravity as the door is opened. For the vertically hung door **40** shown in FIGURE 6, the hold member **41** swings about a vertical fulcrum in the form of a bolt **42**. A compressed spring **43**, bearing against a projecting lug **41***a* on the hold member **41** pushes the hold member into the hold position as the door is opened. The compressed spring **43** is anchored on the door **40** by means of a projection **47** upon which the spring is mounted.

FIGURE 8 shows the door **40** closed. As the door is opened, the hold member **41** slides along surface **44***a* of the housing **44**. When the end **41***b* of the hold member **41** passes the edge **44***b* of the housing, the spring **43** urges end **41***b* into contact with surface **44***c* of the housing. The end **41***b* slides along surface **44***c* into the corner **44***d* as illustrated in FIGURE 7. Once the hold member **41** is in this position, the door **40** is held open by the hold member bearing against the corner **44***d* of the housing.

The stop **45** serves to prevent the door **40** from opening beyond a predetermined position. In particular, as the door **40** opens and closes, the stop member **45** moves past edge **44***b* of the housing. Edge **44***b* extends parallel to the axis of the bolt **42**. After the door **40** opens to the position illustrated in FIGURES 6, 7 and 9, the hooked end **45***a* of stop member **45** hooks over edge

44*b* and against surface 44*a* of the housing. This prevents the door from opening further. A guide **46**, secured to housing **44** along surface 44*a*, limits the clockwise rotation of stop member **45** about bolt **42** and prevents the hooked end 45*a* from passing completely beyond edge 44*b*. This insures that the hooked end 45*a* will pull against surface 44*a* to prevent door **40** from opening further. Without the guide **46**, there is the possibility that the freely rotating stop member may assume a position in which the hooked end 45*a* would not engage surface 44*a*. The guide **46** also maintains stop member **45** horizontally to prevent binding at the bolt **42**. As the door **40** is opened or closed, the stop member **45** slides through the guide **46**.

To close the door **40**, the door is opened slightly beyond the position illustrated so that the hooked end 45*a* of the stop member **45** engages surface 44*a*. This slight movement of the door permits an individual to withdraw the hold member **41** against the action of spring **43** until the end 41*b* of the hold member clears edge 44*b* of the housing **44**. Once the hold member **41** clears edge 44*b* the door may be returned to the closed position.

From the foregoing, it is seen that a stop and hold device according to the present invention on the one hand prevents a door from opening beyond a predetermined position and on the other hand prevents a door opened to a predetermined position from closing. While in most applications, particularly for power washers and deburring units, the predetermined positions for stopping and holding the door are substantially the same, it is readily apparent that in other applications it may be desirable to provide a greater angular movement between these two positions. Such a result may be achieved by selecting proper shapes and dimensions for the hold and stop members.

While there have been described what are at present considered to be the preferred embodiments of this invention it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention and it is, therefore, aimed to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A stop and hold device for a door comprising:
- a fulcrum member adapted to be secured to said door;
- a hold member rotatable about said fulcrum member as said door is opened and closed and having an end adapted to bear against a first fixed surface when said door is opened to a predetermined position, whereby said door is held open;
- a compressed spring anchored to said door and bearing against said hold member for urging said end of said hold member into contact with said first fixed surface when said door is opened to said predetermined position to hold said door open at said predetermined position;
- and a stop member coupled to said fulcrum member and having an end adapted to engage a second fixed surface, spaced from said first fixed surface, after said door is opened to said predetermined position, whereby said door is prevented from opening further.

2. A stop and hold device for a door hinged to a housing comprising:
- a fulcrum member adapted to be secured to said door along the hinged edge of said door;
- a hold member rotatable about said fulcrum member as said door is opened and closed and having an end adapted to bear against a first surface of said housing when said door is opened to a predetermined position, whereby said door is held open;
- a compressed spring having one end anchored to said door and a second end bearing against said hold member for urging said end of said hold member into contact with said first surface when said door is opened to said predetermined position to hold said door open at said predetermined position;
- and a stop member rotatable about said fulcrum member as said door is opened and closed and having a hooked end adapted to hook onto a second surface of said housing, spaced from said first surface, after said door is opened to said predetermined position, whereby said door is prevented from opening further.

3. A stop and hold device for a door hinged to a housing comprising:
- a fulcrum member adapted to be secured to said door along the hinged edge of said door;
- a hold member rotatable about said fulcrum member as said door is opened and closed and having an end adapted to push against a first surface of said housing when said door is opened to a predetermined position, whereby said door is held open;
- a compressed spring having one end anchored to said door and a second end bearing against said hold member for urging said end of said hold member into contact with said first surface when said door is opened to said predetermined position to hold said door open at said predetermined position;
- and a stop member rotatable about said fulcrum member as said door is opened and closed and having a hooked end adapted to pull against a second surface of said housing, spaced from said surface, after said door is opened to said predetermined position, whereby said door is prevented from opening further.

4. A stop and hold device for a door hinged to a housing comprising:
- a fulcrum member adapted to be secured to said door along the hinged edge of said door;
- a hold member rotatable about said fulcrum member as said door is opened and closed and having an end adapted to bear against a first surface of said housing when said door is opened to a predetermined position, whereby said door is held open;
- a compressed spring having one end anchored to said door and a second end bearing against said hold member for urging said end of said hold member into contact with said first surface when said door is opened to said predetermined position to hold said door open at said predetermined position;
- a stop member rotatable about said fulcrum member as said door is opened and closed and having a hooked end adapted to hook over an edge of a second surface of said housing, spaced from said first surface, after said door is opened to said predetermined position, whereby said door is prevented from opening further, said edge of said second surface extending parallel to the axis of said fulcrum member;
- and means for limiting the rotation of said stop member about said fulcrum member to prevent said hooked end of said stop member from passing completely beyond said edge of said second surface as said stop member rotates, thereby insuring engagement of said hooked end of said stop member and said second surface after said door is opened to said predetermined position.

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