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Device to assist in closing doors, and biasing mechanism for same

Abstract

There is provided a device to facilitate closing doors for people who use wheelchairs or have other mobility challenges. The device can be secured to an internal or external door surface using conventional means, at a height similar to the height of a typical door handle, but closer to the hinges than a typical door handle. The device comprises a base portion for securing the device to the door surface, an arm extending from the base portion, and a handle at the distal end of the arm. During operation, the device allows a person in a wheelchair to close the door by grabbing the handle of the device without positioning the wheelchair within the door frame. There is also provided a biasing device to return the arm to a biased position.

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Background/Summary

FIELD OF THE DISCLOSURE

(1) The present disclosure relates to a biasing mechanism, for use in, amongst others, a device to assist individuals with disabilities with opening and closing doors.

BACKGROUND

(2) The background description includes information that may be useful in understanding the present inventive subject matter. It is not an admission that any of the information provided herein is prior art or applicant admitted prior art, or relevant to the presently claimed inventive subject matter, or that any publication specifically or implicitly referenced is prior art or applicant admitted prior art.

(3) Simple tasks such as opening or closing a door can become complicated for people with disabilities. For example, a person who is confined to a wheelchair or who uses a walker may find it difficult to close the door behind them as they leave a room, especially if the door opens towards the inside of the room. Other examples: if the door has a high threshold where the wheelchair cannot easily roll over, or if there is a step or ramp at the door making reaching for the conventional door knob more difficult, especially for people with limited balance, strength, or mobility. Therefore, there is a need for a device which assists people with disabilities in closing the door.

(4) There further exists a need for a biasing mechanism which will ensure a rigid element such as a door, lid, or handle is biased in a desired direction.

(5) In some embodiments, the numbers expressing quantities of ingredients, properties such as concentration, reaction conditions, and so forth, used to describe and claim certain embodiments of the inventive subject matter are to be understood as being modified in some instances by the term “about.” Accordingly, in some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the number of reported significant digits and by applying

ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the inventive subject matter are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiments of the inventive subject matter may contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

(6) Unless the context dictates the contrary, all ranges set forth herein should be interpreted as being inclusive of their endpoints and open-ended ranges should be interpreted to include only commercially practical values. Similarly, all lists of values should be considered as inclusive of intermediate values unless the context indicates the contrary.

(7) As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

(8) The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., “such as”) provided with respect to certain embodiments herein is intended merely to better illuminate the inventive subject matter and does not pose a limitation on the scope of the inventive subject matter otherwise claimed. No language in the specification should be construed as indicating any non-claimed element essential to the practice of the inventive subject matter.

(9) Groupings of alternative elements or embodiments of the inventive subject matter disclosed herein are not to be construed as limitations. Each group member can be referred to and claimed individually or in any combination with other members of the group or other elements found herein. One or more members of a group can be included in, or deleted from, a group for reasons of convenience and/or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all Markush groups used in the appended claims.

SUMMARY

(10) The present disclosure is directed to a device comprising a base having a flat surface and a bottom portion; an arm extending from the base, the arm comprises a proximal end and a distal end, with the arm being secured to the base via a pivoting axis allowing the arm to pivot with respect to the base; a handle at the distal end of the arm; the arm including a cavity therein at the proximal end of the arm; and biasing means configured to bias the arm in a direction towards a first position where the arm is substantially parallel to the base, wherein the biasing means includes: a spring within the cavity of the arm; a concave ramp extending upwardly from the bottom portion, the concave ramp having a first end substantially perpendicular to the flat surface and a second end substantially parallel with the flat surface; and a rigid member positioned against the spring and extending out from the cavity to engage with the concave ramp; wherein the radial distance from the pivoting axis to the second end of the concave ramp is greater than the radial distance from the pivoting axis to any other point of the concave ramp, thus allowing the rigid member to extend the furthest out of the arm cavity when the arm is substantially parallel to the base.

(11) In one embodiment, the pivoting axis is defined by two pins extending outwardly from opposing sides of the arm. Preferably, the bottom surface may also include two pin supports which extend upwardly from the bottom surface to engage the two pins.

(12) In a preferred embodiment the base comprises two shoulders extending upwardly from the flat surface, and wherein the proximal end of the arm is positioned in a cavity defined by the two

shoulders. Preferably, each of the two shoulders may also include a channel for housing one of the pin supports and one of the pins.
(13) In one embodiment the device may include a stop member configured to restrict the pivoting of the arm towards the base such that when the arm rests against the stop member the arm is in the first position. This stop member may be located on the arm.
(14) The present disclosure is further directed to a biasing mechanism, comprising a base having a flat surface and a bottom portion; an element extending in a longitudinal direction from the base, the element comprising a proximal end and a distal end, with the element being secured to the base via a pivoting axis allowing the element to pivot with respect to the base; the element including a cavity therein at the proximal end of the element; and biasing means configured to bias the element towards a biased position, wherein the biasing means includes: a spring within the cavity of the element; a concave ramp extending upwardly from the bottom portion, the concave ramp having a first end substantially perpendicular to the flat surface and a second end substantially parallel with the flat surface; and a rigid member positioned against the spring and extending out from the cavity to engage with the concave ramp; wherein the radial distance from the pivoting axis to the concave ramp is greatest when the element is in the biased position, thus allowing the rigid member to extend the furthest out of the cavity when the element is in the biased position.
(15) Various objects, features, aspects and advantages of the inventive subject matter will become more apparent from the following detailed description of preferred embodiments, along with the accompanying drawing figures in which like numerals represent like components.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) The present disclosure will be better understood having regard to the drawings in which:
(2) FIG. **1** shows a perspective view of a person in a wheelchair closing a door according to the prior art.
(3) FIG. **2** shows a perspective view of a person in a wheelchair closing a door using a device according to the present disclosure.
(4) FIG. **3** shows a top view of a device according to at least one embodiment of the present disclosure.
(5) FIG. **4** shows a cross-section view of the device of FIG. **3**, taken along line **4**-**4**.
(6) FIG. **5** shows a top view of the device of FIG. **3**, with the arm in an extended position.
(7) FIG. **6** shows a cross-section view of the device of FIG. **5**, taken along line **6**-**6**.
(8) FIG. **7** shows a top view of the arm section according to at least one embodiment of the present disclosure.
(9) FIG. **8** shows a cross-section view of the device of FIG. **7**, taken along line **8**-**8**.
(10) FIG. **9** shows an exploded view of the arm portion and the biasing mechanism of the device according to at least one embodiment of the present disclosure.
(11) FIG. **10** shows an exploded view of a device according to at least one embodiment of the present disclosure.
(12) FIG. **11**A shows a top perspective view of the base according to at least one embodiment of the present disclosure.
(13) FIG. **11**B shows a bottom perspective view of the base according to at least one embodiment of the present disclosure.
(14) FIG. **12** shows a perspective view of the bottom portion according to at least one embodiment of the present disclosure.
(15) FIG. **13** shows a top view of the bottom portion according to at least one embodiment of the present disclosure.

(16) FIG. **14**A shows a cross-section view of one embodiment of the bottom portion of FIG. **13**, taken along line **14-14**.
(17) FIG. **14**B shows a cross-section view of an alternate embodiment of the bottom portion of FIG. **13**, taken along line **14-14**.
DETAILED DESCRIPTION OF THE DRAWINGS
(18) When a person who is in a wheelchair exits a room, it is difficult for them to close the door when the door opens inward. For example, as illustrated in FIG. **1**, a person in a wheelchair **100** is exiting a room, and is attempting to close the door **110** behind them. However, the door knob is situated at the farthest possible point on the door, and reaching the door knob **120** can be very difficult, and may even require the person in the wheelchair **100** to position the wheelchair within the room to reach the door knob **120**. As the door **110** closes, the person in the wheelchair **100** needs to simultaneously back up through the door frame, while reaching forward to reach door knob **120**.
(19) The situation described above occurs a very large number of times in the day to day life of a person in a wheelchair. In some scenarios, the person in the wheelchair may even fall, risking injury or a major inconvenience.
(20) Accordingly, there is a need for an improved method of closing and opening doors for people in wheelchairs.
(21) Reference is now made to FIG. **2**, which illustrates the operation of a device **200** according to one embodiment of the invention. As can be seen in FIG. **2**, the device **200** is installed on an external surface of the door **110**. Typically, the device **200** is installed at a height comparable to the height where door knob **120** is usually found. However, the device **200** may be installed at any height which is most convenient for the user. As described below, the device **200** may be installed on the door using various means, some possibilities of which are described herein.
(22) As seen in FIGS. **3** and **4**, according to at least one embodiment, a base **210** comprises a flat surface **211** having disposed thereon an adhesive substance. Alternatively, the flat surface **211** may be free of any adhesive substance, and an adhesive substance may be applied to surface **211** at the time of installation.
(23) According to at least another embodiment, device **200** further comprises a separate anchor portion (not shown) comprising means for securing the anchor portion to a door surface. The means for securing the anchor portion to the door surface may include, but are not limited to, holes adapted to receive screws or nails, an adhesive substance, and other securing means known in the art. The anchor portion further comprises means for securing the base **210** of the device **200**. For example, the anchor portion may comprise grooves on its internal sides' surfaces designed to cooperate with tongues extending from the side surfaces of the base **210** to secure the base **210** with the anchor portion. However, other means of securing the anchor portion with the base **210** are within the scope of the present disclosure and the present disclosure is not so limited.
(24) Furthermore, device **200** is typically installed nearer to the door hinges than the door handle, as is shown in FIG. **2**. This allows a person in a wheelchair to grab the device **200** from a position which is outside the door being closed, thereby making it easier for the person in the wheelchair to close the door. In particular, unlike the situation illustrated in FIG. **1**, the person in the wheelchair does not need to be within the room to initially reach the door handle, which means that the person does not need to back up as the door is being closed.
(25) Once the door **110** is closed, the user may release the device **200**, and biasing mechanism **400** will return the device **200** to a first position, where the arm **220** is in a position substantially horizontal to the door **110**. The operation of the biasing mechanism **400** will be explained further below.
(26) While the example illustrated in FIG. **2** shows that the device is installed on an external door surface, the device can also be installed on an internal door surface, especially for doors which swing outwards.

(27) Reference is now made to FIGS. **3-11**, which illustrates a device according to a first embodiment of the present disclosure. The device **200** comprises a base **210**, an arm **220**, and a handle **230**. According to at least one embodiment, the base **210** comprises a flat surface **211** and a bottom portion **215**. The flat surface **211** is for facilitating attachment to a door surface and the bottom portion **215** is for facilitating the biasing mechanism **400**, both of which will be described in greater detail below. The base **210** may also comprise holes **212** for allowing screws or other means of securing the device to a door surface. The biasing mechanism **400**, for returning the device **200** to a first, biased position, is also included in a preferred embodiment.
(28) In the first position, as seen in FIGS. **3** and **4**, the arm **220** extends in a direction which is substantially parallel to the plane in which surface **211** resides. As will be appreciated, this plane corresponds substantially to the door surface when the device **200** is installed on a door. According to at least some embodiments, the arm **220** is separated from that plane by a sufficient distance to allow a person with a closed fist to easily grip or use the arm **220** when device **200** is installed on a door.
(29) In a second position, as seen in FIGS. **5** and **6**, after pivoting relative to the base **210** around a pivoting axis, arm **220** may extend in a direction away from surface **211**, such that when the device **200** is installed on a door, the distal end **221** of arm **220** is further away from the door surface than proximal end **222**.
(30) Device **200** further comprises a handle **230** located at distal end **221** of arm **220**. The handle may form a T-shape as shown in FIG. **3**, but other handle shapes are within the scope of the present disclosure. In at least one embodiment, the handle consists simply of the distal end of arm **220**. Handle **230** allows the user to easily grab the device and close the door.
(31) Furthermore, and as can be seen in cross-sectional views of FIGS. **4**, **6** and **8**, the arm **220** includes a channel **225** at the proximal end **222**.
(32) Also located at the proximal end **222** of the arm **220** is a pivoting axis, for pivoting arm **220** with respect to the base **210**. In a preferred embodiment, the base **210** further comprises a pivoting arrangement **300** for securing arm **220** to the base and for allowing arm **220** to pivot with respect to the base **210**. The pivoting arrangement **300** comprises a cavity **310** for receiving the proximal end of arm **220**. On each side of cavity **310** are shoulders **315***a* and **315***b*, the edges of which define cavity **310**.
(33) In this preferred embodiment, within each shoulder **315***a* and **315***b* are channels **316***a* and **316***b*, which house pins **317***a* and **317***b*. These pins **317***a* and **317***b* each extend outwardly from opposing sides of arm **220** at its proximal end **222**. Thus, with pins **317***a* and **317***b* being housed within channels **316***a* and **316***b*, the arm **220** is secured to base **210** at this pivoting axis. It should be understood that the channels **316***a* and **316***b* and pins **317***a* and **317***b* are dimensioned so that the pins fit snugly within the channels, but are still able to pivot around the pivoting axis.
(34) In a preferred embodiment, and as can be seen in the exploded views in FIGS. **9** and **10**, the base **210** includes a bottom portion **215** which mates to the bottom of flat surface **211**. Extending upwards from bottom portion **215** are pin supports **318***a* and **318***b*. When bottom portion **215** is mated to flat surface **211**, pin supports **318***a* and **318***b* extend upwardly into channels **316***a* and **316***b*, shown in FIG. **11**B, and support pins **317***a* and **317***b*.
(35) As mentioned above, a preferred embodiment of the invention includes a biasing mechanism **400** which pivots the arm **220** around the pivoting axis, to bias the arm **220** back to a first position substantially parallel to the flat surface **211** of the base **210**.
(36) Thus, a user can grasp the device **200** by the handle **230** to close a door, and when the handle **230** is released, the biasing mechanism **400** will pivot the arm back to the first position. This prevents arm **220** from being left extended outwardly from the door, where it could potentially cause injury or damage.
(37) As seen in FIGS. **9-14**, biasing mechanism **400** includes a spring **410**, which is located within the arm cavity **225**, and a rigid member **420**, which is positioned against the spring **410**. The

biasing mechanism **400** further includes a concave ramp **430**, the concave ramp **430** extending upwardly from the bottom portion **215**. In this preferred embodiment the rigid member **420** extends from the arm cavity **225** and engages with the concave ramp **430**. Thus, as the arm **220** pivots around the pivoting axis the proximate end of rigid member **420** travels along the concave ramp from a first end **431** to a second end **432**.

(38) Reference is now made to FIGS. **14**A and **14**B, where it can be seen in these embodiments that the concave ramp **430** does not have a circular profile. Thus, the radial distance from the pivoting axis created by pins **317***a* and **317***b* to the first end **431** of the concave ramp differs from the radial distance to the second end **432** of the concave ramp.

(39) As can be seen in FIGS. **14**A and **14**B, the concave ramp **430** can have varying cross-sectional profiles. In both of these examples it is understood that the pivoting axis is located where the pins **317***a* and **317***b* (not shown in FIGS. **14**A and **14**B) would sit on top of the pin supports **318***a* and **318***b*. It can also be seen that the radial distance from the pivoting axis to the concave ramp **430** varies, depending on the position along the concave ramp.

(40) It should be understood that alternate designs of the concave ramp **430** would be within the scope of the invention. This includes the positioning of the second end **432** of the concave ramp. As seen in the cross-section FIGS. **14**A and **14**B, the second end **432** can be raised upwardly from the bottom portion **215** at differing heights. It is within the scope of the invention for the second end **432** to be approximately the same height from the bottom surface **215** as the first end **431**, creating a profile similar to a U-shaped “half pipe”. Also within the scope of the invention is an embodiment where the second end **432** is flush with bottom portion **215**.

(41) In a preferred embodiment, when the rigid member **420** is engaged at the first end **431** of the concave ramp the arm **220** is in the first position, substantially parallel to the flat surface **211**. In this embodiment the radial distance from the pivoting axis to the first end **431** would be greater than the radial distance from the pivoting axis to any other point along the concave ramp.

(42) In this arrangement, the compressive strength of the spring **410** will attempt to push the rigid member **420** out of the cavity **310** as far as possible, which would occur at the location along the concave ramp where the radial distance is the greatest.

(43) In operation, when arm **220** is extended away from the door (as seen in FIGS. **5** and **6**), the rigid member **420** travels along the length of the concave ramp **430** towards its second end **432**. In doing so, rigid member **420** is pushed further inside cavity **310**, thus increasing tension within spring **410**. When the arm **220** is released, the tension within spring **410** pushes rigid member **420** as far out of cavity **310** as it can, thus bringing the arm **220** back to a position which is parallel, or nearly parallel, to the surface of the door on which it is used.

(44) In an alternate embodiment, where it is desired to bias the arm **220** in a biased position substantially perpendicular to the flat surface **211**, the height of the pin supports **318***a* and **318***b* and the profile of the concave ramp **430** would be configured such that the greatest radial distance from the pivoting axis to the concave ramp **430** would occur at the second end **432** of the concave ramp.

(45) In this manner, it should be understood that alternate biased positions can be achieved by configuring the heights of the pin supports **318***a* and **318***b* and the profile of the concave ramp **430** in other arrangements such that the greatest radial distance between the pivoting axis and the concave ramp **430** occurs when the arm **220** is in the desired biased position.

(46) Reference is now made to yet another embodiment of the present disclosure, where the range of motion of the arm is restricted to improve user experience.

(47) Specifically, some people who require the use of a wheelchair have other conditions which may limit their dexterity. In particular, a condition known as “claw hand” may be caused by muscular dystrophy, or other underlying causes, which severely limits the amount of movement in the hands of people who are affected.

(48) For people suffering from claw hand, or other similar conditions, and who also use a wheelchair, it may be difficult to grab the handle of a device of the present disclosure if the handle

is resting on the door surface. Specifically, the handle may pivot to a position where the handle is touching the door surface. From this position, it may be difficult for some people to engage with the handle and close the door properly.
(49) The optional embodiment provided prevents this situation by limiting the range of motion of the arm, by providing a stop member **330**.
(50) According to at least one embodiment, stop member **330** is located at the proximal end **222** of the arm **220**, as can be seen in FIG. **10**. During operation, stop member **330** engages the flat surface **211**, thus preventing the arm **220** from pivoting to a position where the handle **230** touches the door surface. In one embodiment, this stop member **330** is a rubber plug, which would decrease the bounce when retracted. Although other materials for the stop member **330** would be within the scope of the invention.
(51) In another embodiment, as seen in FIG. **11**A, stop member **330** is located on the upper side of the flat surface **211**, for engaging the proximal end of the arm **220**.
(52) According to at least some embodiments, the height of stop member **330**, as measured from flat surface **211**, is selected such that when the arm is resting on stop member **330**, the arm **220** is substantially parallel with flat surface **211**. However, other heights are within the scope of the present disclosure, and the present disclosure is not so limited. For example, the height of stop member **330** may be selected such that the arm, when resting on stop member **330**, has a distal end **221** which is closer to the door surface (or flat surface **211**) than its proximal end **222**. Alternatively, the height of stop member **330** may be selected such that the arm, when resting on stop member **330**, has a distal end **221** which is farther away from the door surface (or flat portion **211**) than its proximal end **222**.
(53) In another embodiment, as seen in FIG. **11**A, an adjusting screw **340** is positioned to increase the gap between the handle **230** and the door **110**. As seen in FIG. **11**A, this could be used in conjunction with the stop member **330**, but could also be used independently.
(54) According to these embodiments, when installed on a door surface, a device comprising a stop member **330** allows the handle to be grasped easily without needing to separate the handle from the door surface.
(55) Alternatively, a spacer may be installed on the door at a position aligned with the arm of the device, such that when the arm is moved in a position towards the door, the spacer catches the arm and prevents it from touching the door. This allows space to remain between the handle and the door and allows for easy operation of the device for people lacking the ability to grasp objects with their hands. The spacer may be made of rubber, or any other suitable material.
(56) Accordingly, the above describes a device for assisting a person in closing a door. While this device is particularly suited to people suffering from disabilities requiring a wheelchair, other people may benefit from use of the device. For example, elderly people (whether in their home or in a retirement home) will benefit from use of a device according to the present disclosure. Furthermore, people working on construction sites will benefit from the use of such a device. More generally, a device according to the present disclosure will be beneficial to anyone having to occasionally reach for a door knob at the far end of a door while they have their hands full, or suffer from limited mobility. A device according to the present disclosure may be attached to any door, including, but not limited to, bathroom doors, office doors, entrances, access doors, and the like.
(57) It should be noted that although the biasing mechanism **400** detailed above has been described in use for assisting with the closing of a door, the present invention also includes the use of the biasing mechanism **400** in other situations where a biased position is desired. For example, the biasing mechanism **400** could be located on the inside of a cabinet door, with the flat surface **211** of the base **210** secured to the inside of the cabinet frame, with an element being secured to, and extending longitudinally from, the base **210**. In this embodiment the longitudinal element would function the same as the arm **220** described above. The longitudinal element could then be fastened

to the inside of the cabinet door, and the biased position could be when the cabinet door is in a closed position.

(58) Similar to the cabinet door example provided above, the biasing mechanism **400** could be used on the inside of a regular door as well. The flat surface **211** of the base **210** secured to the inside of the door frame, with an element being secured to, and extending longitudinally from, the base **210**. The longitudinal element could then be fastened to the inside of the door.

(59) Another example where the biasing mechanism **400** could be used is on the interior of a container having an upwards-opening lid, such as a freezer or a cooler. Similar to the cabinet door example provided above, the biasing mechanism could be secured to the inside of the container/lid assembly, with the element extending longitudinally along the inside of, and fastened to, the lid. With the desired biasing position being with the lid closed, the biasing mechanism could function similarly, without departing from the scope of the invention.

(60) The embodiments described herein are examples of structures, systems or methods having elements corresponding to elements of the techniques of this application. This written description may enable those skilled in the art to make and use embodiments having alternative elements that likewise correspond to the elements of the techniques of this application. The intended scope of the techniques of this application thus includes other structures, systems or methods that do not differ from the techniques of this application as described herein, and further includes other structures, systems or methods with insubstantial differences from the techniques of this application as described herein.

(61) Moreover, the previous detailed description is provided to enable any person skilled in the art to make or use the present invention. Various modifications to those embodiments will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other embodiments without departing from the spirit or scope of the invention described herein. Thus, the present invention is not intended to be limited to the embodiments shown herein, but is to be accorded the full scope consistent with the claims, wherein reference to an element in the singular, such as by use of the article “a” or “an” is not intended to mean “one and only one” unless specifically so stated, but rather “one or more”. All structural and functional equivalents to the elements of the various embodiments described throughout the disclosure that are known or later come to be known to those of ordinary skill in the art are intended to be encompassed by the elements of the claims. Moreover, nothing disclosed herein is intended to be dedicated to the public regardless of whether such disclosure is explicitly recited in the claims.

(62) The following discussion provides many example embodiments of the inventive subject matter. Although each embodiment represents a single combination of inventive elements, the inventive subject matter is considered to include all possible combinations of the disclosed elements. Thus, if one embodiment comprises elements A, B, and C, and a second embodiment comprises elements B and D, then the inventive subject matter is also considered to include other remaining combinations of A, B, C, or D, even if not explicitly disclosed.

(63) As used herein, and unless the context dictates otherwise, the term “coupled to” is intended to include both direct coupling (in which two elements that are coupled to each other contact each other) and indirect coupling (in which at least one additional element is located between the two elements). Therefore, the terms “coupled to” and “coupled with” are used synonymously.

(64) It should be apparent to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the spirit of the appended claims. Moreover, in interpreting both the specification and the claims, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms “comprises” and “comprising” should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present, or utilized, or combined with other elements, components, or steps that are not expressly referenced.

Where the specification or claims refer to at least one of something selected from the group consisting of A, B, C . . . and N, the text should be interpreted as requiring only one element from the group, not A plus N, or B plus N, etc.

Claims

1. A device comprising: a base having a flat surface and a bottom portion; an arm extending from the base, the arm comprises a proximal end and a distal end, with the arm being secured to the base via a pivoting axis allowing the arm to pivot with respect to the base between a first position where the arm is substantially parallel to the base, and a second position where the arm is substantially perpendicular to the base; a handle at the distal end of the arm; the arm including a cavity therein at the proximal end of the arm; and biasing means comprising: a spring within the cavity of the arm; a concave ramp extending upwardly from the bottom portion, the concave ramp having a first end and a second end; and a rigid member positioned against the spring and extending out from the cavity to engage with the concave ramp; wherein the radial distance from the pivoting axis to the first end of the concave ramp is greater than the radial distance from the pivoting axis to any other point of the concave ramp, thus allowing the rigid member to extend the furthest out of the arm cavity when the arm is substantially parallel to the flat surface, thereby biasing the arm in a direction towards the first position.
2. The device of claim 1, wherein the pivoting axis is defined by two pins extending outwardly from opposing sides of the arm.
3. The device of claim 2, wherein the bottom surface includes two pin supports which extend upwardly from the bottom surface to engage the two pins.
4. The device of claim 3, wherein the base comprises two shoulders extending upwardly from the flat surface, and wherein the proximal end of the arm is positioned in a cavity defined by the two shoulders.
5. The device of claim 4, wherein each of the two shoulders includes a channel for housing one of the pin supports and one of the pins.
6. The device of claim 1, further comprising a stop member configured to restrict the pivoting of the arm towards the base such that when the arm rests against the stop member the arm is in the first position.
7. The device of claim 6, wherein the stop member is located on the arm.
8. A door comprising: a door body; a device according to claim 1 secured to the door body.
9. A biasing device, comprising: a base having a flat surface and a bottom portion; an element extending in a longitudinal direction from the base, the element comprising a proximal end and a distal end, with the element being secured to the base via a pivoting axis allowing the element to pivot with respect to the base between a biased position and an unbiased position; the element including a cavity therein at the proximal end of the element; and biasing means comprising: a spring within the cavity of the element; a concave ramp extending upwardly from the bottom portion, the concave ramp having a lower first end and an upper second end; and a rigid member positioned against the spring and extending out from the cavity to engage with the concave ramp; wherein the radial distance from the pivoting axis to the concave ramp is greatest when the element is in the biased position, thus allowing the rigid member to extend the furthest out of the cavity when the element is in the biased position, thereby biasing the arm in a direction towards the biased position.
10. The device of claim 9, wherein the element is in the biased position when the element is substantially parallel to the flat surface of the base.
11. The device of claim 9, wherein the element is in the biased position when the element is substantially perpendicular to the flat surface of the base.
12. The device of claim 9, wherein the pivoting axis is defined by two pins extending outwardly

from opposing sides of the arm.
13. The device of claim 12, wherein the bottom surface includes two pin supports which extend upwardly from the bottom surface to engage the two pins.
14. The device of claim 13, wherein the base comprises two shoulders extending upwardly from the flat surface, and wherein the proximal end of the arm is positioned in a cavity defined by the two shoulders.
15. The device of claim 14, wherein each of the shoulders includes a channel for housing one of the pin supports and one of the pins.
16. The device of claim 9, further comprising a stop member configured to restrict the pivoting of the arm towards the base such that when the arm rests against the stop member the arm is in the biased position.
17. The device of claim 16, wherein the stop member is located on the arm.