United States Patent [19]

Lew

[11] **3,832,756**

[45] **Sept. 3, 1974**

[54] **DUAL ACTION HINGE FOR FOLDING DOORS**

[76] Inventor: **Hyok Sang Lew,** 1620 E. Blacklidge Dr. No. 6, Tucson, Tex. 85719

[22] Filed: **July 2, 1973**

[21] Appl. No.: **375,337**

[52] **U.S. Cl.** **16/163,** 16/184

[51] **Int. Cl.** **E05d 3/06**

[58] **Field of Search** 16/163, 164, 180, 184, 16/229

[56] **References Cited**

UNITED STATES PATENTS

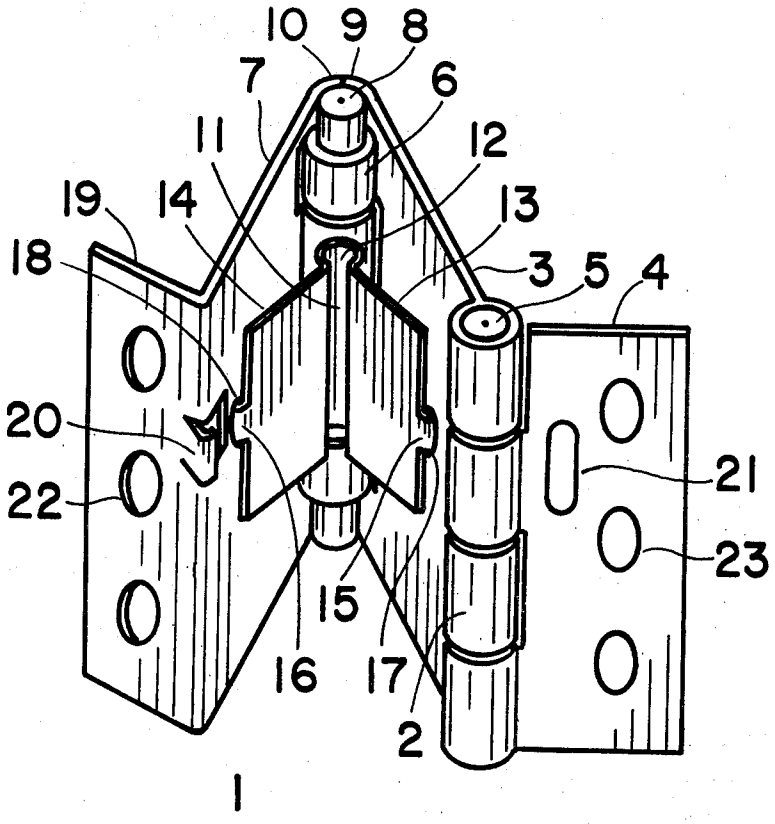
1,155,161	9/1915	Ramsey	16/163
2,277,176	3/1942	Wagner	16/163

Primary Examiner—Bobby R. Gay
Assistant Examiner—Doris L. Troutman
Attorney, Agent, or Firm—Cahill, Sutton & Thomas

[57] **ABSTRACT**

A folding door hinge having two pivot points and including a resilient member disposed intermediate two of the flaps extending from one of the pivot points provides a two step closing operation and prevents a snap action closing of a folding door.

9 Claims, 9 Drawing Figures



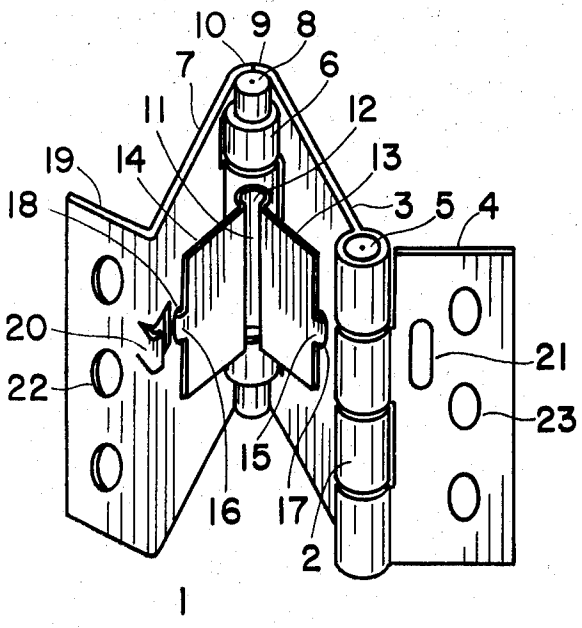


Fig. 1

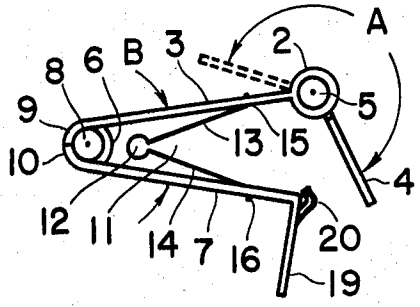


Fig. 3

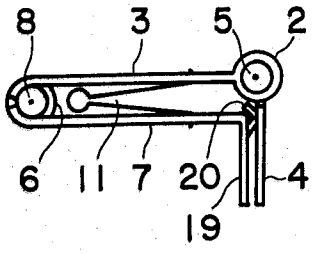


Fig. 4

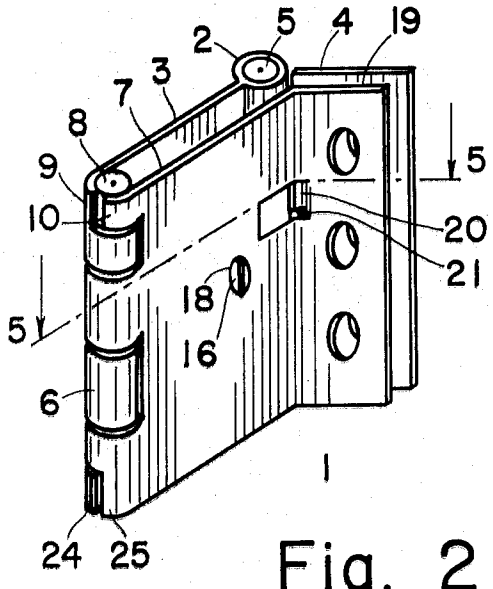


Fig. 2

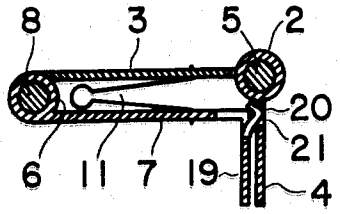


Fig. 5

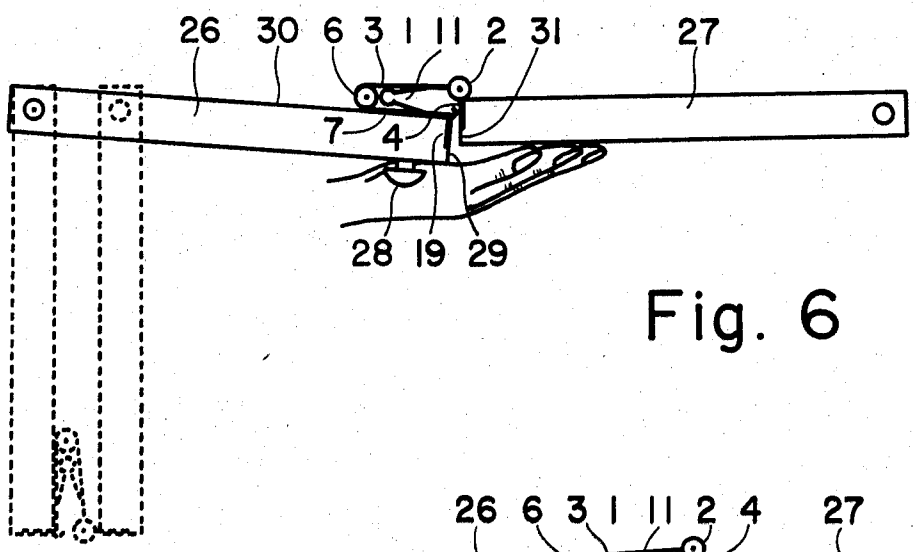


Fig. 6

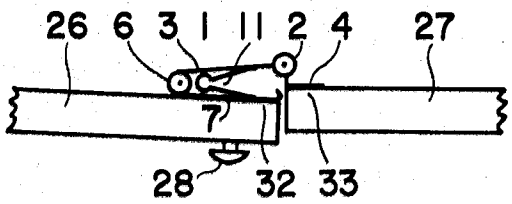


Fig. 7

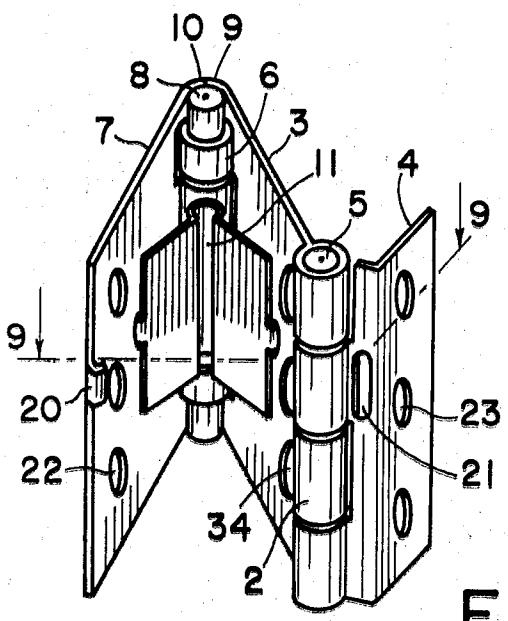


Fig. 8

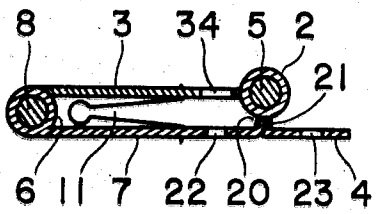


Fig. 9

DUAL ACTION HINGE FOR FOLDING DOORS

The present invention relates to door hinges, and, more particularly, to door hinges for folding doors.

Presently, the panels of a folding door are pivotably secured to one another by means of a piano hinge on two or more individual hinges. When the folding door is pushed into the closed position, the edges of the panels adjacent the hinge point usually come together in a snap action.

The snap action presents a safety hazard to children in that their fingers are usually placed adjacent the panel edges and are caught or squeezed by the edges when the folding door is pushed closed. If the palm of the hand is used to close the folding door by pushing at the hinge line, the snap action often painfully squeezes a fold of skin.

It is therefore a primary object of the present invention to provide a dual action hinge for folding doors to prevent the folding door from snapping shut.

Another object of the present invention is to provide a hinge for folding doors having resilient means to prevent snap action closing of the folding door.

Still another object of the present invention is to provide a sliding action between the hinged edges of the folding door panels.

Yet another object of the present invention is to provide a dual action hinge having a latch mechanism for maintaining a folding door in the unfolded position.

A further object of the present invention is to provide a dual action hinge, which hinge is compatible with all presently used folding doors.

A yet further object of the present invention is to provide a dual action replacement hinge for folding doors.

These and other objects of the present invention will become apparent to those skilled in the art as the description thereof proceeds.

The present invention may be described with greater specificity and clarity with reference to the following drawings, in which:

FIG. **1** illustrates an isometric view of the present invention.

FIG. **2** illustrates the present invention in the closed position.

FIG. **3** illustrates a top view of the present invention as shown in FIG. **1.**

FIG. **4** illustrates a top view of the present invention in the closed position, as shown in FIG. **2.**

FIG. **5** illustrates a cross-sectional view of the present invention taken along line **5—5,** as shown in FIG. **2.**

FIG. **6** illustrates a top view of the present invention attached to a folding door.

FIG. **7** illustrates a top view of the present invention attached to a folding door employing the means of attachment different from that shown in FIG. **6.**

FIG. **8** illustrates the present invention employing the means of attachment shown in FIG. **7.**

FIG. **9** illustrates a cross-sectional view of the present invention taken along line **9—9,** as shown in FIG. **8.**

Referring to FIGS. **1** and **3,** there is shown a dual action hinge for folding doors constructed in accordance with the present invention. A first flap hinge **2** is formed by flaps **3** and **4** pivoting about a shaft **5.** The angular displacement of flaps **3** and **4** with respect to one another define an angle of at least 180°, as shown by angle A in FIG. **3.** A second flap hinge **6** is defined

by flaps **3** and **7** pivoting about a shaft **8.** Each of flaps **3** and **7** include stops **9** and **10,** and stops **24** and **25** (see FIG. **2**), respectively, to limit the angular displacement of flaps **3** and **7** about shaft **8** to a small angle, as shown by angle B in FIG. **3.**

A spring **11** is disposed intermediate flaps **3** and **7** to urge them to pivot away from one another. In the embodiment shown, spring **11** is formed by a resilient open ended cylindrically shaped member **12** having arms **13** and **14** extending therefrom. Spring **11** is keyed to flaps **3** and **7** by means of tabs **15** and **16** extending outwardly from the extremity of arms **13** and **14,** respectively. Tab **15** engages and protrudes through aperture **17** disposed within flap **3** and tab **16** engages and protrudes through aperture **18** disposed within flap **7.** Spring **11** serves the purpose of urging flaps **3** and **7** to pivot away from one another about shaft **8** until stops **9** and **10,** and **24** and **25** (also see FIG. **2**) restrain further pivotal movement.

A flange **19** extends from the extremity of flap **7** at an angle of approximately 90°. A resilient latch **20,** which may be formed by well known die cutting processes, extends outwardly from flange **19** in proximity to the junction between the flange and flap **7.** An aperture **21** is disposed within flap **4** to receive and mate with latch **20.**

A plurality of apertures **22** are disposed within flange **19** extending from flap **7.** Screws or other attachment means engage each of apertures **22** and an edge of a panel of folding door to secure flange **19** adjacent the edge of the panel. Similarly, a plurality of apertures **23** are disposed within flap **4.** Screws or other attachment means engage each of apertures **23** and an edge of the adjacent panel of the folding door to secure flap **4** against the edge of the adjacent panel.

The dual action hinge **1** of the present invention is shown in the closed position in FIGS. **2** and **4.** In the closed position, latch **20** engages aperture **21** to retain flaps **3** and **7** essentially parallel to one another while compressing spring **11.** In this position, flange **19** and flap **4** are essentially juxtopposed with one another. It may also be noted that stops **9** and **10,** and **24** and **25** are not in contact with one another. The engagement of latch **20** and aperture **21** is further illustrated in FIG. **5** by showing a cross sectional view taken along line **5—5,** as shown in FIG. **2.**

The operation of the present invention will be described with reference to FIG. **6.** Edges **29** and **31** of a pair of folding door panels **26** and **27,** respectively, are pivotally connected to one another by dual action hinge **1.** The opposite edge of each folding door panel may be pivotably mounted or slidably mounted, depending upon the configuration of the folding door. In FIG. **6,** panel **26** is pivotably mounted on the door frame and panel **27** is slidably mounted on the door frame. Folding door panel **26** may include a knob **28** to aid in the folding and unfolding of the folding door. Flange **19** is affixed to edge **29** of panel **26** by means of screws or other attachment means inserted through apertures **22** (see FIG. **1**) to position flap **7** adjacent the inside surface **30** of the panel **26.** Flap **4** is secured to edge **31** of panel **27** by means of screws or other attachment means engaging apertures **23** (see FIG. **1**). The folding door drawn in solid lines in FIG. **6** is about to be pushed closed to or pulled open from the fully unfolded position. The folding door outlined in broken lines is in the fully folded position. When the folding

door panels **26** and **27** are not in the fully unfolded position, as shown in either position in FIG. **6**, latch **20** no longer engages aperture **21** to positionally lock flaps **3** and **7**. Thus, flaps **3** and **7** are free to pivot with respect to one another in response to the force exerted by spring **11** until stops **9** and **10**, and **24** and **25** come into contact with one another.

The main pivotal action of panels **26** and **27** is effected by flap hinge **2** of dual action hinge **1**. When panel **26** and **27** are fully folded, flap **4** has pivoted approximately 180° from the position it had taken when panels **26** and **27** were fully unfolded. When panels **26** and **27** are not in the fully unfolded position, flaps **3** and **7** have pivoted about shaft **8** in response to the bias provided by spring **11** to laterally displace edge **29** relative to edge **31**. Thus, spring **11** has shifted the pivot axis between panels **26** and **27** slightly away from surface **30** but along a plane generally defined by edge **29**.

When the folding door is unfolded, panels **26** and **27** will rotate about flap hinge **2** until edges **29** and **31** are approximately parallel to one another, as shown by the folding door drawn in solid lines in FIG. **6**. The edges **29** and **31** of panels **26** and **27**, respectively, are offset from one another because of the previously discussed action of spring **11**. The offset of the edges of panels **26** and **27** cause panel **27** to be lodged in place within the folding door frame first. Panel **26** is lodged in place by exerting a sufficient force upon knob **28** or in proximity to edge **29** to overcome the bias of spring **11**. As spring **11** is compressed, latch **20** approaches and finally locks into aperture **21** to retain panel **26** in alignment with panel **27** in the fully unfolded position. The final configuration of dual action hinge **1** attached to the fully unfolded folding door is that shown in FIGS. **2** and **4**.

From the above discussion, it becomes apparent that edges **29** and **31** of folding door panels **26** and **27**, respectively, do not pivotally snap together when the folding door is unfolded. Instead, the edges **29** and **31** essentially slide with respect to one another with a minor accompanying pivotal movement. Thus, the probability of injury to one's fingers or palm when closing the folding door is practically zero. FIG. **6** illustrates schematically how the dual action hinge eliminates the safety hazard to one's fingers or palm caused by the snap action of the edges of folding door panels.

To open the folding door, knob **28** is grasped and a pulling force is exerted thereon. The pulling force cause the folding door panels **26** and **27** to rotate about flap hinge **2**, as the folding door begins to fold. This folding movement of the folding door is effected by the pivotal movement of flaps **3** and **4** about shaft **5**. This pivotal movement separates flange **19** attached to edge **29** and flap **4** attached to edge **31** away from one another. Thus, latch **20** extending from flange **19** disengages automatically from aperture **21** disposed within flap **4** when the folding door is pulled open. As soon as the disengagement of latch **20** from aperture **21** is effected, the bias provided by spring **11** tends to pivot panel **26** outwardly and maintains edges **29** and **31** in the offsetting position. If the pulling force on knob **28** is continued, panels **26** and **27** pivot with respect to one another about flap hinge **2** until the panels are fully folded as shown by the folding door drawn in broken lines in FIG. **6**.

As the only parts of the dual action hinge **1**, which must be mated with parts of folding door panels **26** and **27**, are flap **4** and flange **19**, their two parts may be configured to be dimensionally equivalent to standard sized flap hinges. Thus, the present invention may be incorporated into existing folding doors without alteration of the folding door panels.

In some applications, it is impractical or not feasible to secure the dual action hinge **1** to the edges of the respective folding door panels. More particularly, the dual action hinge of the present invention may be secured to the inside surfaces of the respective folding door panels, as shown in FIG. **7**. For this application, the modification shown in FIGS. **8** and **9** may be employed.

In the following description of the modification shown in FIGS. **8** and **9**, the numerology previously used will be retained where possible. Flap **4** is bent approximately 90° along a line intermediate aperture **21** and the plurality of apertures **23**. With this configuration, flap **4** may be secured to the inside surface of a folding door panel corresponding to panel **27** (see FIG. **7**). Flange **19** has been deleted and flap **7** is retained as previously described. The plurality of apertures **22** are disposed within flap **7** to afford a means for securing flap **7** to the inside surface of a folding door panel corresponding to panel **26** (see FIG. **7**). Latch **20** extends from and offset with respect to flap **7**. The positional relationship of latch **20** and aperture **21** are configured to permit an interlock therebetween when the dual action hinge is closed, as shown in FIG. **9** by a cross sectional view taken along line **9—9**, as shown in FIG. **8**. In order to provide an access to the plurality of apertures **22**, a plurality of apertures **34** are disposed within flap **3**. The operation of the remaining elements shown in FIGS. **8** and **9** are described above with respect to FIGS. **1** through **6**.

From the above description, it may be readily understood that the modifications shown in FIGS. **8** and **9** operates in conformance to the previously described operation. The only major difference in the modified form of the dual action hinge **1** is that of the means by which the hinge may be secured to the folding doors to accomodate a different manner of attaching the hinge.

While the principles of the invention have now been made clear in an illustrative embodiment, there will be immediately obvious to those skilled in the art many modifications of structure, arrangement, proportions, the elements, materials and components used in the practice of the invention which are particularly adapted for specific environments and operating requirements without departing from those principles.

I claim:

1. A dual action hinge for pivotably connecting the panels of a folding door, said hinge comprising:

a. a first hinge point having first and second flaps extending therefrom, said first flap including attachment means for securing said first flap to one of the folding door panels;

b. a second hinge point secured to said second flap and including a third flap extending from said second hinge point, said third flap including further attachment means for securing said third flap to another of the folding door panels;

c. bias means urging said first and second flaps to pivot apart from one another; and

d. latch means for releasably engaging said first flap with said third flap to counter the force of said bias means; whereby, the panels are pivotably connected to one another and pivotally biased apart from one another by said bias means when said latch means is unengaged.

2. The combination as set forth in claim **1** including stop means forming a part of said first and second flap for limiting the pivotal movement between said first and second flaps in response to said bias means.

3. The combination as set forth in claim **2** wherein said third flap is rotatable about said second hinge point through an angle of at least 180°.

4. The combination as set forth in claim **1** wherein said latch means includes a protrusion extending from said first flap and an aperture disposed within said third flap for receiving said protrusion.

5. The combination as set forth in claim **1** wherein said bias means is formed of resilient sheet metal.

6. The combination as set forth in claim **2** wherein said first flap includes a flange extending therefrom at an angle of 90°, said attachment means being disposed in said flange, whereby said flange is positionable adjacent one edge of one of the folding door panels.

7. The combination as set forth in claim **6** wherein said third flap extends from said second hinge point for engagement with one edge of another of the folding door panels, whereby said flange and said third flap are adjacent one another when the folding door is fully unfolded.

8. The combination as set forth in claim **2** wherein said third flap is bent approximately 90° along a line between said aperture receiving said latch and said attachment means, whereby said third flap is positionable on the rear surface of one of the folding door panels.

9. The combination as set forth in claim **8** wherein said first flap includes attachment means, whereby said first flap is positionable on the rear surface of another of the folding door panels.

* * * * *