

ORIGINAL

**IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF GEORGIA**

KASON INDUSTRIES, INC.)
)
Plaintiff)
)
vs.)
)
COMPONENT HARDWARE GROUP)
)
Defendant.)

Civil Action No. **1:03-CV-0522-JEC**

JURY TRIAL DEMANDED

FEB 25 2003
U.S. DISTRICT COURT
NORTHERN DISTRICT OF GEORGIA
ATKINS, GA.
CLERK

COMPLAINT

Plaintiff KASON INDUSTRIES, INC. ("KASON") for its Complaint against Defendant COMPONENT HARDWARE GROUP ("CHG"), alleges:

PARTIES

1. KASON is a New York corporation having a place of business at 57 Amlajack Boulevard, Shenandoah, Georgia 30265.
2. CHG is a New Jersey corporation having a place of business at 1890 Swarthmore Avenue, Lakewood, New Jersey 08701.

JURISDICTION AND VENUE

3. This Court has original jurisdiction over the subject matter under 28 USC §§1331 and 1338(a).
4. This Court has personal jurisdiction over CHG and venue is proper in this judicial district under 28 USC §1391(c) and 28 USC §1400(b). CHG conducts business in this judicial district, and

FORMS RECEIVED
Consent To US Mag.
Federal Instructions
3/15/03 INTG
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has committed acts of patent infringement in this judicial district.

COUNT 1 - INFRINGEMENT OF U.S. PATENT NO. 6,299,224

5. On October 9, 2001, the United States Patent and Trademark Office granted U.S. Patent No. 6,299,224 (“the ‘224 patent”) titled “Panel Fastener”, a copy of which is attached as Exhibit A. The patent is owned by KASON by virtue of an Assignment that was recorded in the United States Patent and Trademark Office on August 12, 1999 at reel 010171, frame 0440.

6. CHG has offered for sale and has sold panel fasteners which infringe upon one or more claims of the ‘224 patent, in this judicial district and elsewhere in the United States in violation of 35 USC §271.

7. Infringement by CHG of the ‘224 patent has caused, and will continue to cause, KASON to suffer damages in an amount to be determined by the trier of facts.

8. Unless restrained and enjoined by this Court, CHG will continue to infringe the ‘224 patent, resulting in substantial, continuing and irreparable damages to KASON.

9. This act of infringement is exceptional within the meaning of 35 USC §285.

COUNT II - INFRINGEMENT OF U.S. PATENT NO. 6,409,235

10. On June 25, 2002, the United States Patent and Trademark Office granted U.S. Patent No. 6,409,235 (“the ‘235 patent”) titled “Panel Fastener”, a copy of which is attached as Exhibit B. The patent is owned by KASON by virtue of an Assignment that was recorded in the United States Patent and Trademark Office on December 28,1999 at reel 010507, frame 0962.

11. CHG has offered for sale and has sold panel fasteners which infringe upon one or more claims of the ‘235 patent in this judicial district and elsewhere in the United States in violation of

35 USC §271.

12. Infringement by CHG of the '235 patent has caused, and will continue to cause, KASON to suffer damages in an amount to be determined by the trier of the facts.

13. Unless restrained and enjoined by this Court, CHG will continue to infringe the '235 patent, resulting in substantial, continuing and irreparable damages to KASON.

14. This act of infringement is exceptional within the meaning of 35 USC §285.

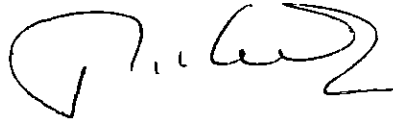
PRAYER FOR RELIEF

WHEREFOR KASON respectfully demands judgment against CHG as follows:

- A. Declaring that CHG has infringed both the '224 and the '235 patents;
- B. Pursuant to 35 USC §283, permanently enjoining and restraining CHG and its officers, agents, servants, employees, and those persons in active concert or participation with them, from further acts of infringement of the '224 patent and the '235 patent;
- C. Pursuant to 35 USC §284, awarding to KASON damages together with prejudgment interest, postjudgment interest, and costs, adequate to compensate KASON for CHG's acts of infringement of the '224 patent and the '235 patent;
- D. Declaring that CHG's infringement has been willful and that this is an exceptional case pursuant to 35 USC §285 and awarding KASON treble damages and reasonable attorneys' fees against CHG for its infringement of the '224 patent and the '235 patent; and
- E. Awarding Plaintiff such other and further relief as the Court deems just and proper.

Dated: February 25, 2003

Respectfully submitted,

A handwritten signature in black ink, appearing to read "R. B. Kennedy", written over a horizontal line.

Robert B. Kennedy
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Five Concourse Parkway, Suite 900
Atlanta, Georgia 30328
Telephone: (678) 406-8702

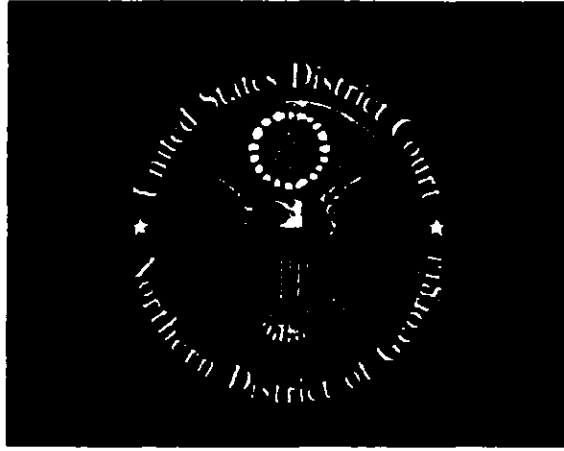


EXHIBIT / ATTACHMENT

A

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US006299224B1

(12) **United States Patent**
Finkelstein

(10) **Patent No.:** US 6,299,224 B1
(45) **Date of Patent:** Oct. 9, 2001

(54) **PANEL FASTENER**
(75) **Inventor:** Burl Finkelstein, Newnan, GA (US)
(73) **Assignee:** Kason Industries, Inc., Shenandoah, GA (US)
(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

3,661,410	*	5/1972	Larson	52/127.9
3,671,006		6/1972	Berkowitz	249/97
3,784,240		1/1974	Berkowitz	292/111
4,020,613	*	5/1977	Reynolds et al.	52/127.9 X
4,417,430		11/1983	Loikitz	52/584
4,507,010	*	3/1985	Fujiya	52/127.9 X
4,512,122		4/1985	Berkowitz	52/127.9
5,212,924		5/1993	Finkelstein	52/583
6,079,754	*	6/2000	Alexy	52/127.9 X

* cited by examiner

Primary Examiner—Teri Pham Luu

(74) *Attorney, Agent, or Firm*—Baker, Donelson, Bearman & Caldwell

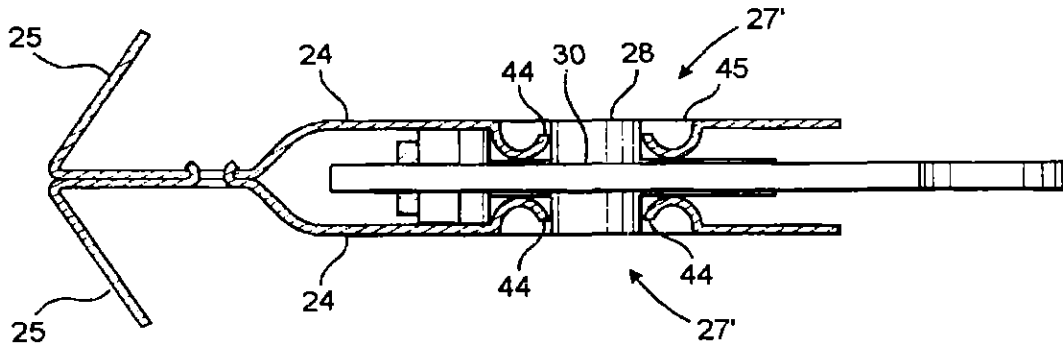
(21) **Appl. No.:** 09/387,469
(22) **Filed:** Sep. 1, 1999
(51) **Int. Cl.⁷** E05C 3/04
(52) **U.S. Cl.** 292/241; 292/240; 52/127.9
(58) **Field of Search** 52/127.9, 127.7; 292/240, 241

(57) **ABSTRACT**

A panel fastener has a casing with two side walls formed with a boss having an outer annular wall that extends reartrantly from an adjacent planar surface of the casing side wall and an inner annular wall with a planar edge recessed from the adjacent casing side wall surface. A cam has a shaft journaled in the boss inner walls that extends out from the boss inner walls. A hook is mounted in camming engagement with the cam whereby the cam shaft is maintained axially aligned in said bosses by their inner wall edges.

(56) **References Cited**
U.S. PATENT DOCUMENTS
2,581,816 * 1/1952 Schuleter 52/127.9 X
3,191,244 * 6/1965 Burke 52/127.9
3,400,958 * 9/1968 Haines et al. 52/127.9
3,472,545 10/1969 Berkowitz .

1 Claim, 4 Drawing Sheets

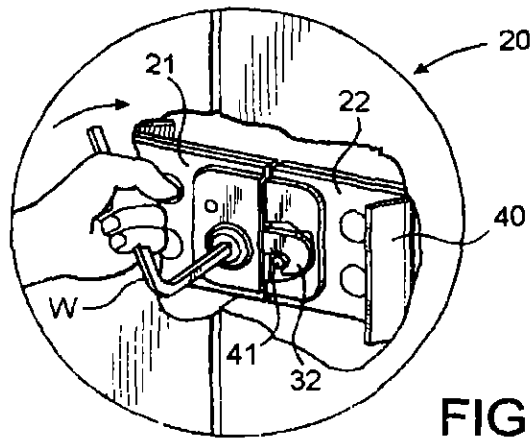
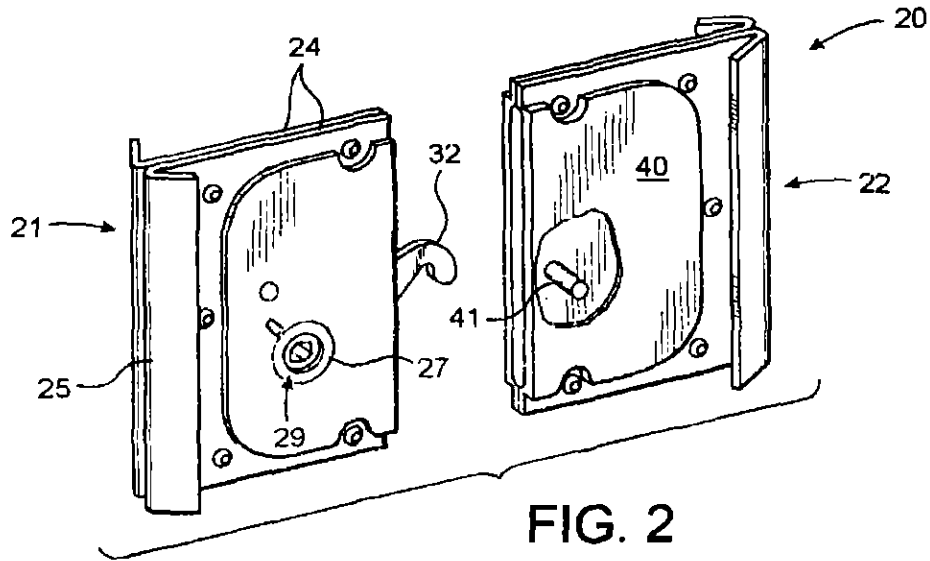
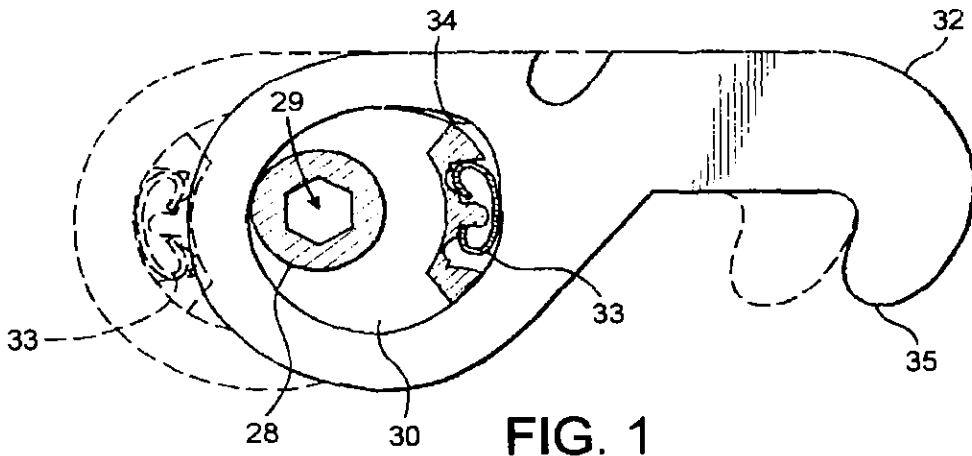


U.S. Patent

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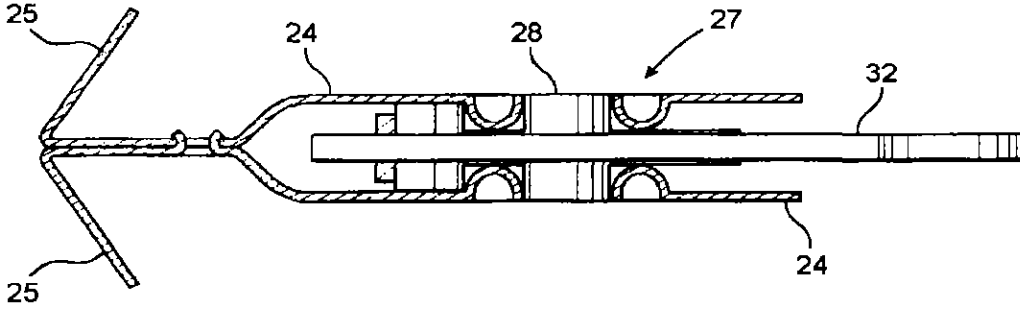


FIG. 4 PRIOR ART

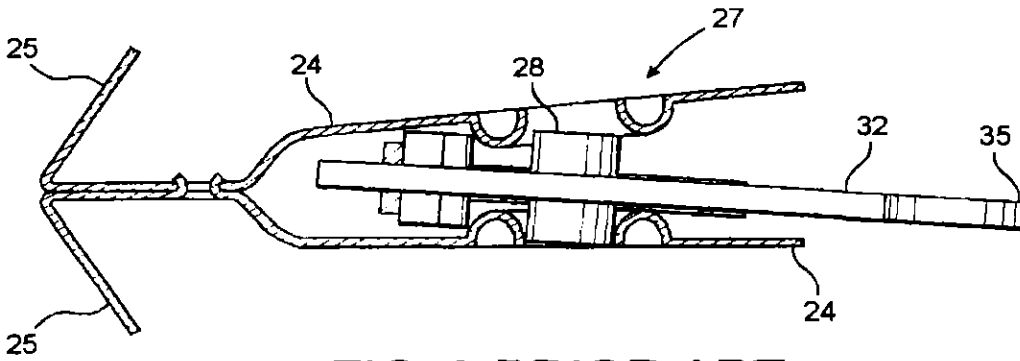


FIG. 5 PRIOR ART

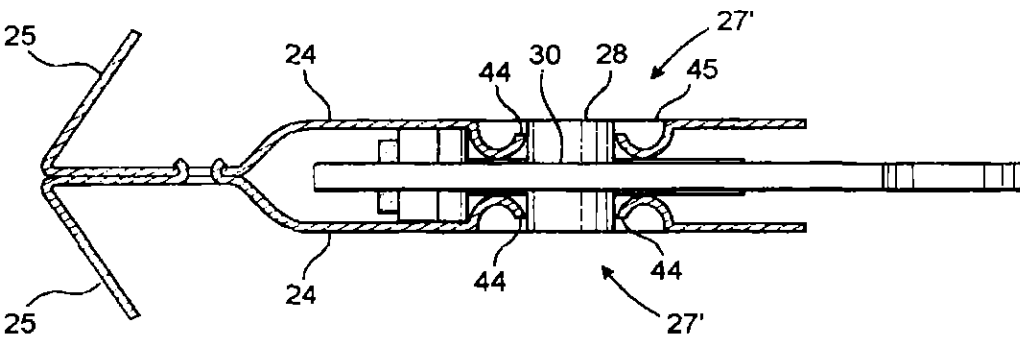


FIG. 6

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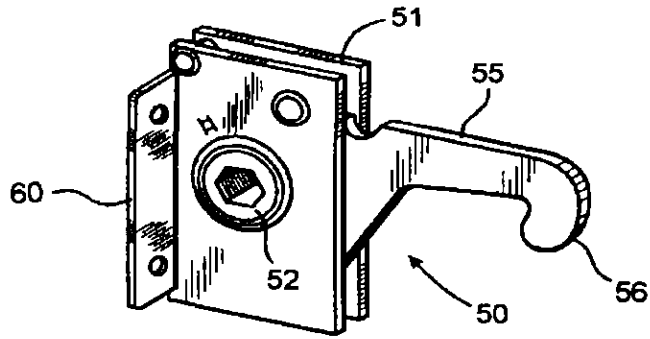


FIG. 7
PRIOR ART

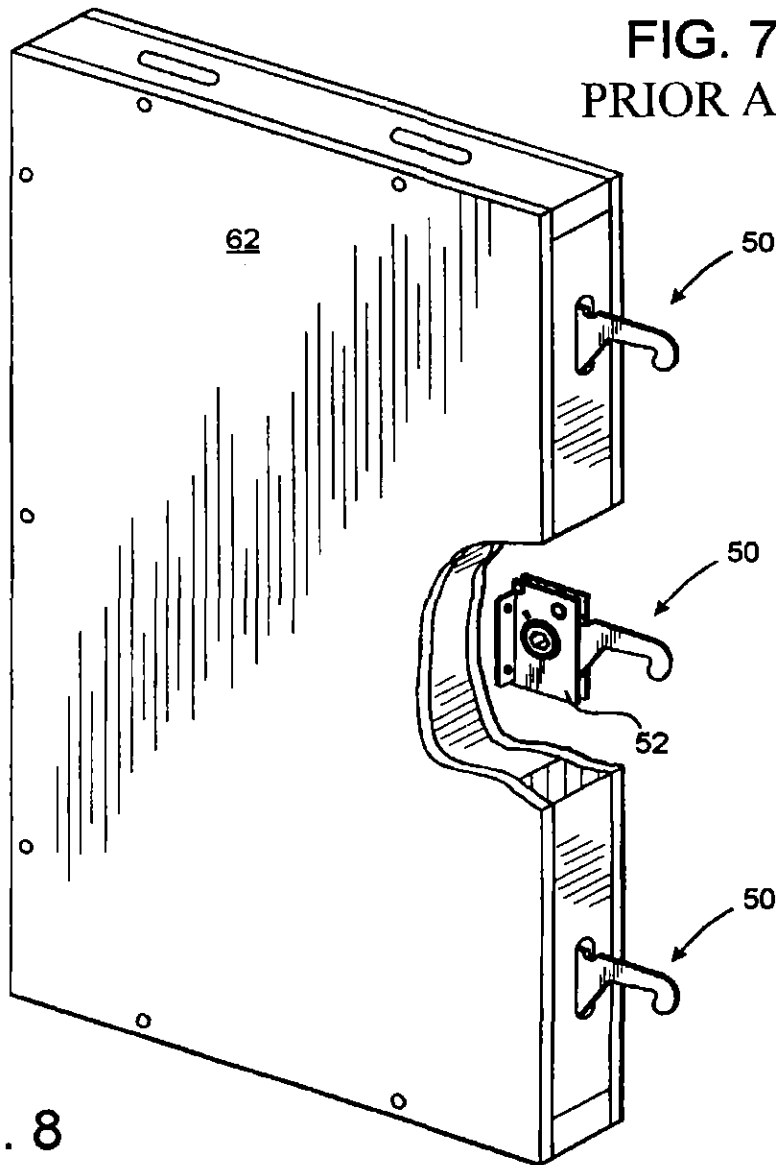


FIG. 8
PRIOR ART

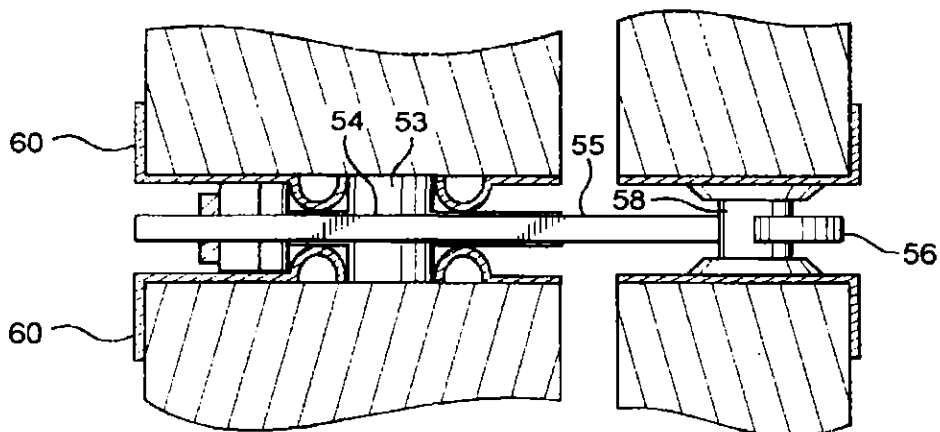


FIG. 9 PRIOR ART

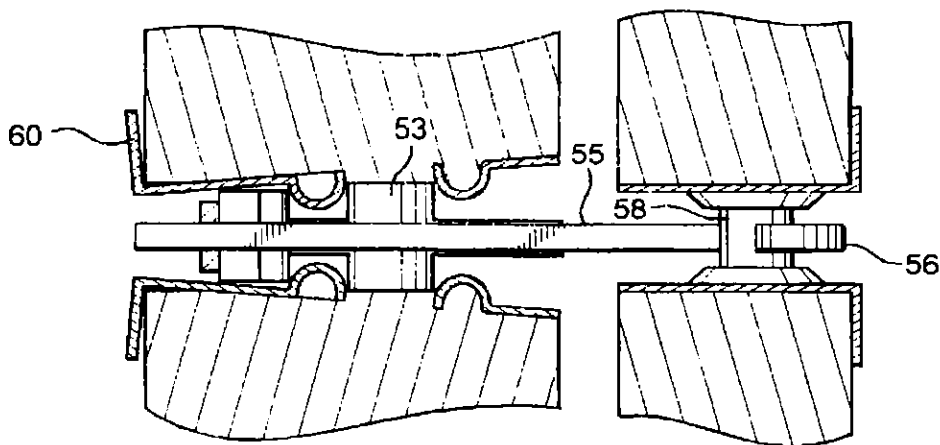


FIG. 10 PRIOR ART

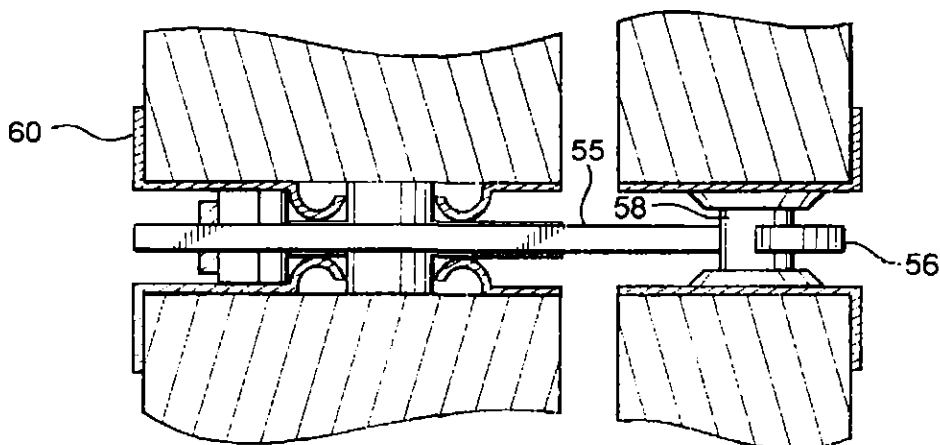


FIG. 11

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PANEL FASTENER

TECHNICAL FIELD

The present invention relates generally to panel fasteners, and particularly to panel fasteners for large insulated panels like those used to form cooler room walls, floors and ceilings.

BACKGROUND OF THE INVENTION

Commercial walk-in coolers, like those commonly found in convenience stores and commercial food storage facilities such as supermarkets, are typically constructed of insulating wall, ceiling and floor panels that are fastened snugly together. The panel ends are shaped to fit together in tongue and groove fashion and are provided with latch type fasteners for drawing and holding adjacent panels together. The latches themselves commonly comprise a hook and cam assembly that is mounted to one panel for latching engagement with a pin that is mounted to an adjacent panel.

There are two main types of panel fasteners, nail-in-place and winged. Both types have a casing with two side walls formed with an annular opening defined by a boss with a curved lip. A cam has a shaft journaled in the boss and a hook mounted in camming engagement with it. Examples of these fasteners are shown in U.S. Pat. Nos. 3,784,240 and 3,671,006, respectively.

A casing boss with a curved lip is fundamentally better than one with a straight lip. However a curved lip renders the casing more susceptible to spreading in the area about the boss. As the hook engages the pin and pulls it, the cam shaft exerts a force on the side of the boss nearer to the pin. As a result, the cam shaft exerts a spreading force on the casing.

This tendency for the casing to spread or bulge is even greater when the latch and pin are misaligned. Winged fasteners are usually mounted by being foamed in place using methods similar to the one shown in U.S. Pat. No. 5,212,924. Foam is injected inside the panel. As it hardens the fasteners become secured in place. Foam hardening often causes the casing of the hook to cock out of mutual alignment. As a result, when the hook engages the pin and pulls on it, the cam shaft pushes against the front of a casing side wall and spreads the hook assembly casing walls apart. The force exerted by the hook on the casing side wall, in combination with the funneling action of the boss, can even cause one side of the cam shaft to pull out of the boss opening and the fastener to malfunction.

The nail-in fastener hook assembly casings also often spread or bulge even though they are mounted to boards usually made of hardened foam. Foam boards are used because they provide good insulation, are inexpensive to manufacture, and are resistant to rotting and water damage. Upon fastening a nail-in panel fastener hook with a pin, the force on the hook often causes the foam board to be crushed or crinkled. This is attributable to the foam board lacking strength sufficient to resist spreading of the metallic walls of the casing. This crushing or crinkling of the foam board often enables the back of the casing to move closer together and the front portion to spread apart. The giving way of the foam board, in combination with the force of the cam shaft against the boss, can easily result in the casing walls spreading significantly. Indeed, the cam shaft may actually become dislodged from the boss resulting in the fastener malfunctioning.

It thus is seen that a need has long existed for a panel fastener hook and cam assembly that is resistant to damage

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caused during fastening to a complimentary pin assembly. Accordingly, it is to the provision of such that this invention is primarily directed.

SUMMARY OF THE INVENTION

In a preferred form of the invention a panel fastener comprises a casing having two side walls each formed with a boss having an outer annular wall that extends concentrically from an adjacent planar surface of the casing side wall and an inner annular wall with a planar lip edge recessed from the adjacent casing side wall surface. A cam has a shaft journaled in the boss inner walls that extends out from the boss inner walls. A hook is mounted in camming engagement with said cam. So constructed the cam shaft is maintained axially aligned in the bosses by their inner wall edges. Preferably the inner wall lip edge is recessed a third of the height of the boss from the surface of the surrounding side wall.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a conventional wing type panel fastener with its hook assembly shown disengaged from its complimentary pin assembly.

FIG. 2 is a perspective view of the panel fastener of FIG. 1 shown with its hook engaged with its pin.

FIG. 3 is a side view, partially in cross section, of a panel fastener hook and cam assembly.

FIG. 4 is a sectional view of a winged type panel fastener of the prior art.

FIG. 5 is a sectional view of the fastener of FIG. 3 shown with its cam shaft being dislodged from its bosses.

FIG. 6 is a sectional view of a winged panel fastener hook and cam assembly that embodies principles of the present invention.

FIG. 7 is a perspective view of a conventional nail-in type panel fastener hook and cam assembly.

FIG. 8 shows three of the nail-in panel fasteners of FIG. 7 mounted to a board type panel.

FIG. 9 is a cross sectional view of a nail-type panel fastener of the prior art while FIG. 10 shows the same fastener with its bosses and adjacent casing spread apart with its cam almost dislodged from the bosses.

FIG. 11 is a cross sectional view of a nail-in type panel fastener that embodies principles of the present invention.

DETAILED DESCRIPTION

With reference next to the drawings, there is shown in FIGS. 1-5 a conventional wing type panel fastener 20. The fastener has a hook and cam assembly 21 and a pin assembly 22. The hook and cam assembly has a metallic casing comprised of two side walls 24 joined together. Each side wall has a flange 25, hence a wing. Each side wall is formed with a boss 27 through which a cam shaft 28 is journaled. The cam shaft is formed with a socket 29 in which a hand wrench may be inserted as shown in FIG. 3. The cam shaft protrudes from each side of a disc-shaped cam 30. A hook 32 is mounted in camming engagement with the cam. As best shown in FIG. 1, a C-shaped leaf spring 33 is mounted to the cam in frictional engagement with an inner wall 34 of the hook 32. The catch end 35 of the hook extends out of the casing.

The pin assembly 22 is of similar construction. It too has a winged metallic casing 40 to which a pin 41 is mounted that bridges two side walls of the casing. The pin assembly

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22 is foamed in place in a panel in catching alignment with the hook of a hook and cam assembly 21 that has been foamed in place in an adjacent panel.

As best shown in FIGS. 2 and 3, in securing two adjacent panels together the hook 32 is rotated with a wrench w
5 which brings its shank into a position atop the pin. Further rotation of the wrench cams the hook laterally to the position shown in broken lines in FIG. 1. In doing this the catch 35 of the hook engages the pin and then pulls it and the panel to which it is mounted snugly against the panel from which
10 the hook extends.

A common problem heretofore had with these fasteners is shown in FIGS. 4 and 5. In FIG. 4 the hook is shown aligned properly at a right angle to the casing with the cam shaft 28
15 extending coaxially with the axes of the two bosses 27. FIG. 5 however shows the result of the hook 32 having engaged and pulled a pin that was misaligned with the hook. Again this can easily occur where the hook and/or the pin have become set as the foam around it hardens at different angles,
20 i.e. where the hook is not normal to the pin. As a result the hook becomes cocked with respect to its casing and bosses as shown in FIG. 5. The extent of this misalignment and force applied is such in FIG. 5 that it is seen that the cam shaft 28 has actually become dislodged from one boss. This
25 results in the panels not being fastened snugly together, at least in the area about this fastener.

This problem is basically solved by the new hook and cam assembly shown in FIG. 6. Here it is seen that the boss 27
30 is formed as a reentrant in each casing side wall 24. It has an outer annular wall and an inner annular wall with an edge 44 of its lip located along a plane substantially parallel to and spaced from the plane 45 of the outer surface of the
35 adjacent portion of the casing side wall. The flat edge thus extends normally from the cam shaft although the annular inner wall itself extends from the shaft at an acute angle thereto. Preferably the edge 44 is recessed one-third of the
40 overall height of the boss, i.e. the distance from the plane 44 to a surface of the bottom of the boss in contact with the cam 30. It has been found that a recess of significantly less than one-third renders poor wear of the cam. Conversely, a recess
45 of significantly more than one-third allows the casings to spread under load.

With the boss lip edge recessed together with the cam shaft 28 extending beyond the lip edge, any cocking of the
45 hook, cam and cam shaft is resisted by the lip edges. Should the cam shaft exert a cocking force on the boss, the lip edges of the boss counteract by biting into the shaft. As a result the cam shaft is forced to maintain axial alignment with the bosses which in turn avoids bulging and spreading of the casing walls about the bosses.

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The invention also finds good application in nail-in type panel fasteners. A conventional nail-in panel fastener hook and cam assembly is shown in FIGS. 7, 8 and 9. Again the nail-in type hook and cam assembly 50 has a metallic casing
5 with two side walls 51 with reentrant bosses 52 through which a shaft 53 of a cam 54 is journaled. A hook 55 mounted in camming engagement with the cam extends out of the casing such that its catch 56 may engage and pull a pin
10 58 of a pin assembly mounted to an adjacent panel. However, rather than the casing having winged flanges, it has two coplanar mounting flanges 60 with holes through which nails may be driven into a panel. The fasteners are mounted to panels 62 as shown in FIG. 8 that have solid
15 frames formed with slots in which the fastener hooks and cam assemblies are mounted. Normally their cam shafts would not extend beyond their casings since that would require lateral recesses to be formed internally in communication with the slots.

Again the prior problem is demonstrated in FIG. 10 where
20 it is seen that forces on the cam shaft have caused the casing bosses to spread even though mounted flush to the panel. This can occur because their metal construction is stronger than the panel frame structure which again is usually made of solidified foam. Conversely, with the new bosses shown
25 in FIG. 11 with recessed lips this is avoided even in the presence of cocking forces.

It thus is seen that a new panel fastener hook and cam assembly is provided that overcomes the problem of casing
30 buckling. Although the new assembly has been shown in its preferred form, many modifications, additions and deletions may be made thereto without departure from the spirit and scope of the invention as set forth in the following claims.

What is claimed is:

1. A panel fastener comprising a casing having two side walls each formed with a boss having an outer annular wall that extends reentrantly from an adjacent planar surface of said casing side wall and an inner annular wall with an edge
35 recessed from said adjacent casing side wall surface, a cam having a shaft journaled in said boss inner walls that extends out from said boss inner wall, and a hook mounted in camming engagement with said cam and wherein said outer boss wall extends reentrantly from said adjacent casing wall surface a selected distance and wherein said inner boss wall
40 edge is located approximately one third of said selected distance from said adjacent casing wall surface and extends from said cam shaft at substantially a normal angle thereto, and wherein boss inner wall extends from said cam shaft at an acute angle thereto.

* * * * *



EXHIBIT / ATTACHMENT

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(12) **United States Patent**
Finkelstein

(10) **Patent No.:** **US 6,409,235 B1**
(45) **Date of Patent:** **Jun. 25, 2002**

(54) **PANEL FASTENER**

(75) **Inventor:** **Burl Finkelstein, Newnan, GA (US)**

(73) **Assignee:** **Kason Industries, Inc., Shenandoah, GA (US)**

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

3,671,006 A	6/1972	Berkowitz	249/97
3,784,240 A	* 1/1974	Berkowitz	292/111
3,851,922 A	* 12/1974	McCoy	292/111
4,020,613 A	* 5/1977	Reynolds	52/321
4,417,430 A	11/1983	Loikitz	52/584
4,512,122 A	4/1985	Berkowitz	52/127.9
4,788,395 A	* 11/1988	Sakoda	219/10.55 R
5,212,924 A	5/1993	Finkelstein	52/583
5,244,710 A	* 9/1993	Bricher	428/100
5,452,925 A	* 9/1995	Huang	292/57

* cited by examiner

(21) **Appl. No.:** **09/473,752**

(22) **Filed:** **Dec. 28, 1999**

(51) **Int. Cl. 7** **E05L 3/04**

(52) **U.S. Cl.** **292/210; 292/111**

(58) **Field of Search** **292/111, 57, 65, 292/210; 29/437, 438, 410, 513; D8/344**

(56) **References Cited**

U.S. PATENT DOCUMENTS

767,378 A	* 8/1904	Bower	220/689
1,505,380 A	* 8/1924	Dexter	292/337
2,630,175 A	* 3/1953	Dickerman	164/18
2,887,242 A	* 5/1959	Grau	220/4
3,191,244 A	* 6/1965	Burke	20/82.4
3,265,349 A	* 8/1966	Hamrick	249/177
3,365,223 A	* 1/1968	Bishing	287/20.924
3,472,545 A	* 10/1969	Berkowitz	292/111

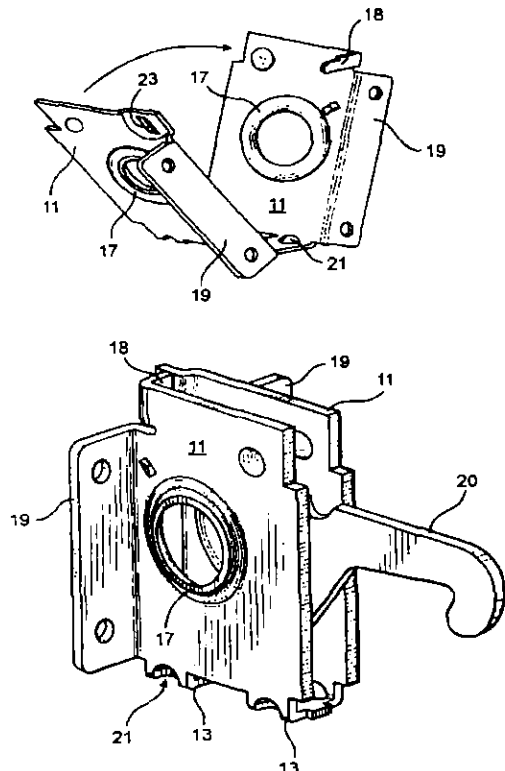
Primary Examiner—Gary Estremsky

(74) *Attorney, Agent, or Firm*—Baker, Donelson, Bearman & Caldwell

(57) **ABSTRACT**

A panel fastener comprises a unitary casing having two parallel side walls unitarily connected together at one end by a bridge and held together at an opposite end by a tab formed unitarily with one of the side walls. A hook has its mounting end rotatably mounted between and to the casing side walls and has its catch end extending out of the casing. The fastener is made from a casing blank by folding bridges linking two casing sides to a parallel position over a hook and cam assembly and then swagging a tab on an end opposite the bridge over the other casing side.

4 Claims, 4 Drawing Sheets

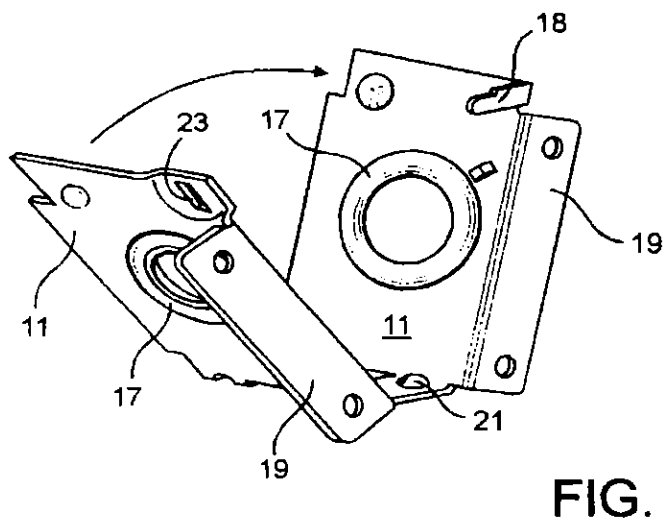
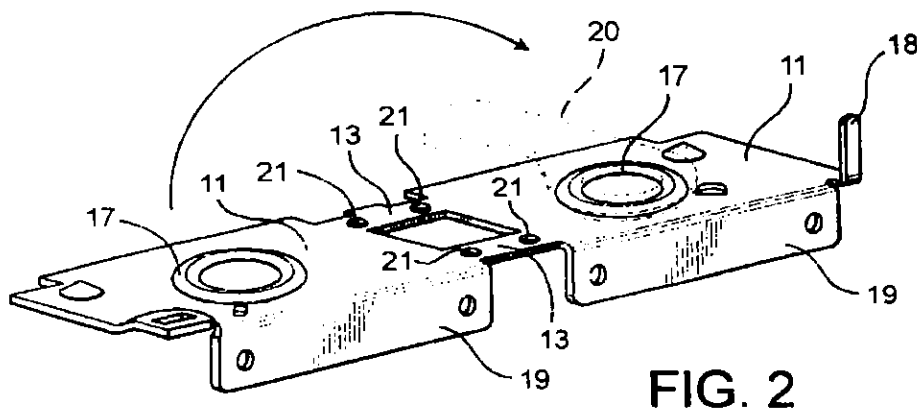
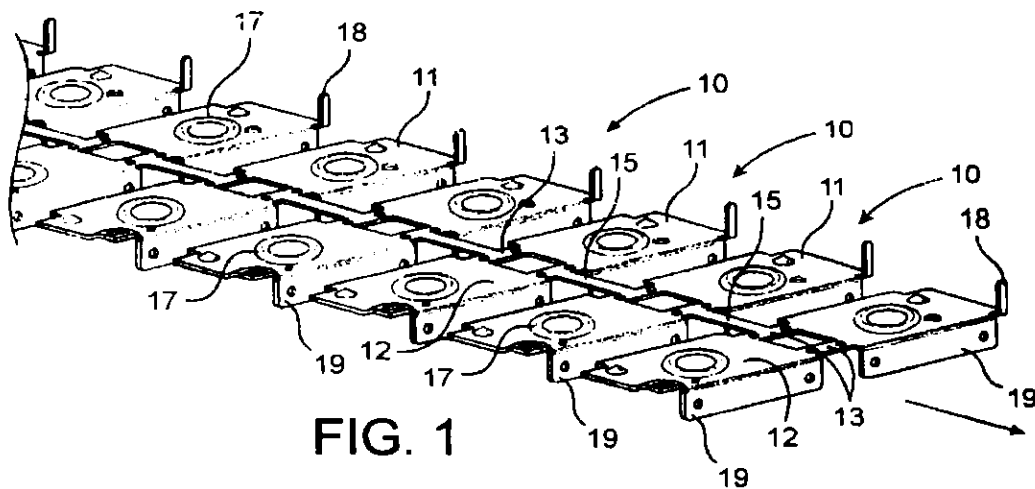


U.S. Patent

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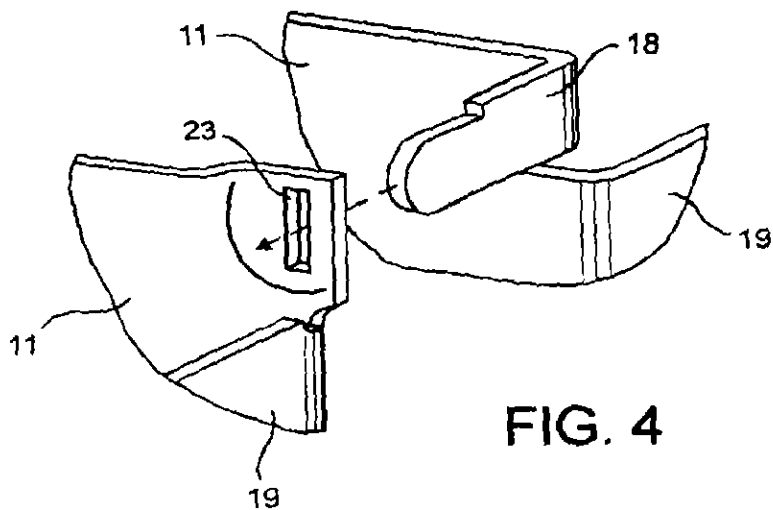


FIG. 4

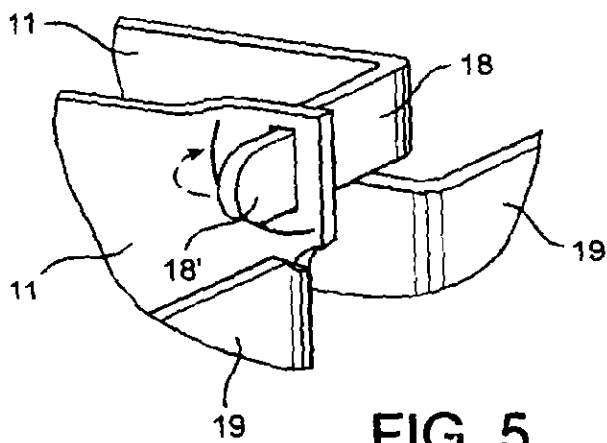


FIG. 5

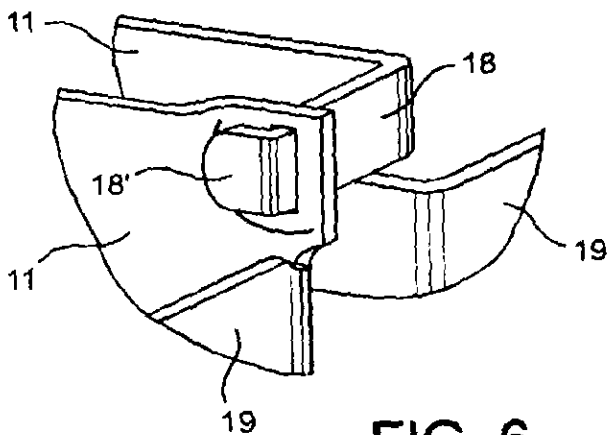


FIG. 6

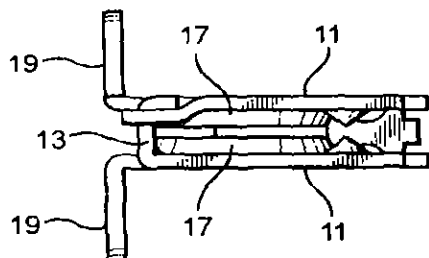


FIG. 9

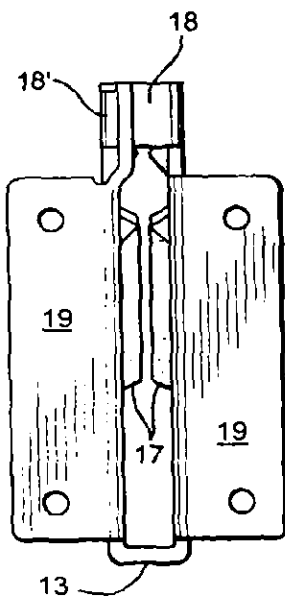


FIG. 8

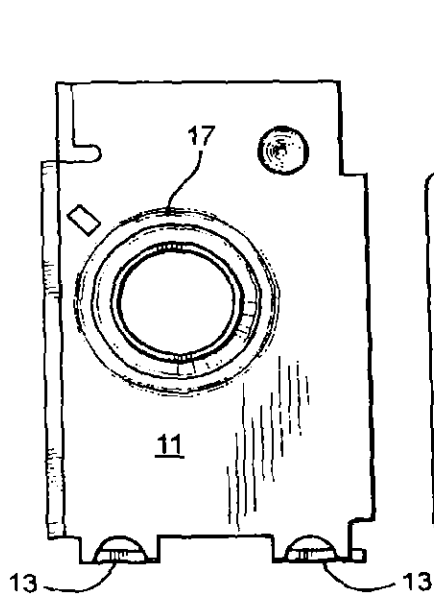


FIG. 7

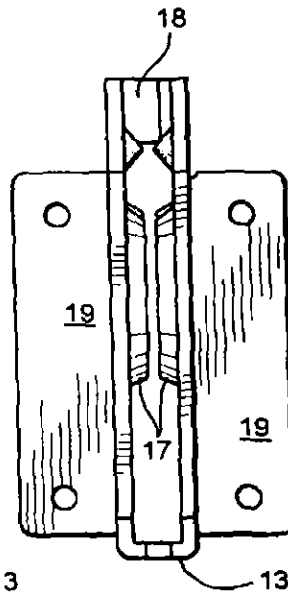


FIG. 10

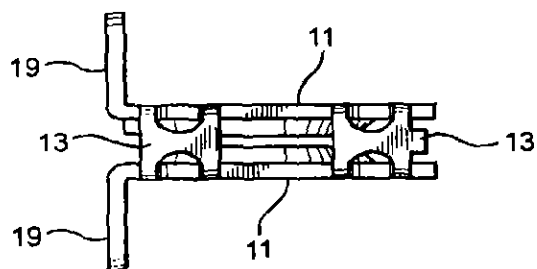


FIG. 11

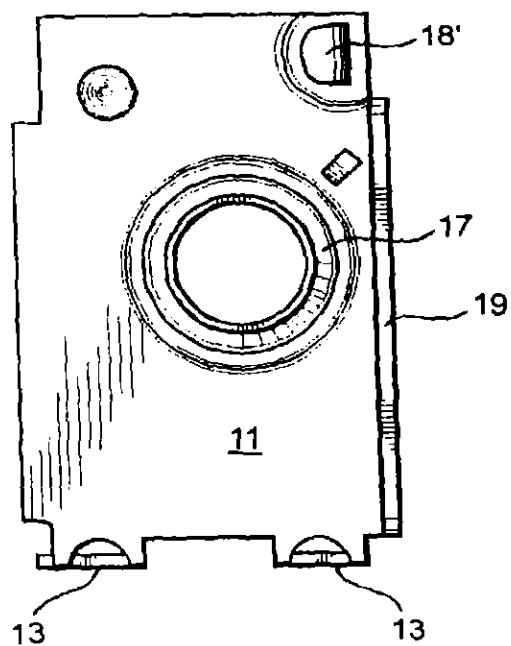


FIG. 12

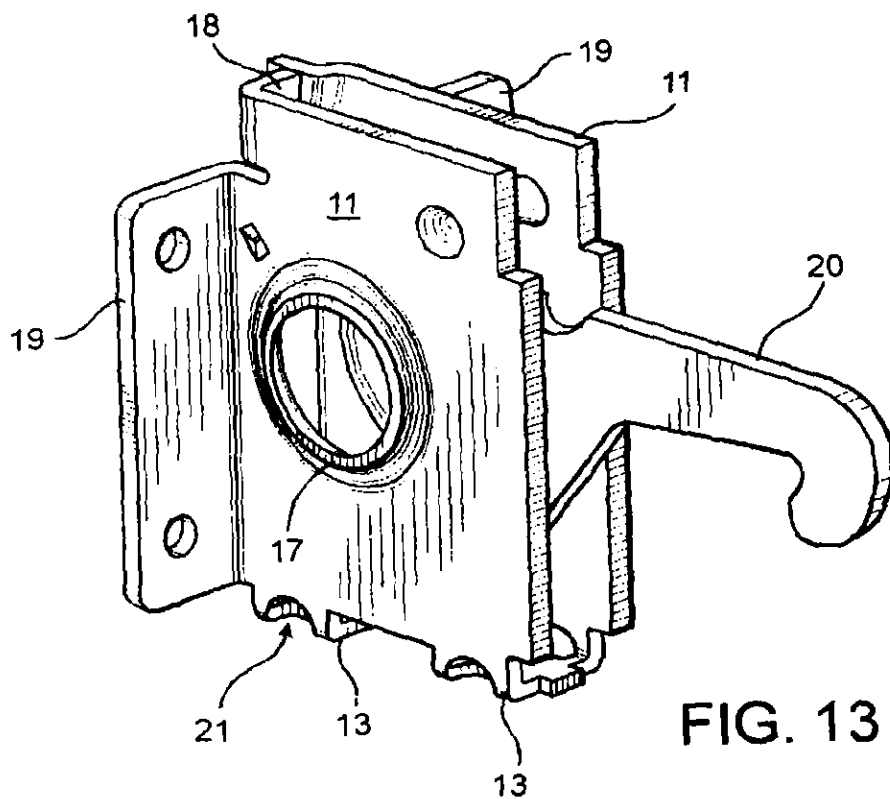


FIG. 13

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PANEL FASTENER

TECHNICAL FIELD

The present invention relates generally to panel fasteners, and particularly to panel fasteners for large insulated panels like those used to form cooler room walls, floors and ceilings.

BACKGROUND OF THE INVENTION

Commercial walk-in coolers, like those commonly found in convenience stores and commercial food storage facilities such as super markets, are typically constructed of insulating wall, ceiling and floor panels that are fastened snugly together. The panel ends are shaped to fit together in tongue and groove fashion and are provided with latch type fasteners for drawing and holding adjacent panels together. The latches themselves commonly comprise a hook and cam assembly that is mounted to one panel for latching engagement with a pin that is mounted to an adjacent panel.

There are two main types of panel fasteners, nail-in-place and winged. Both types have a casing with two side walls formed with an annular opening defined by a boss with a curved lip. A cam has a shaft journaled in the boss and a hook mounted in camming engagement with it. Examples of these fasteners are shown in U.S. Pat. Nos. 3,784,240 and 3,671,006, respectively.

A casing boss with a curved lip is substantially easier and more economical to produce than one with a straight lip. However a curved lip renders the casing more susceptible to spreading in the area about the boss. As the hook engages the pin and pulls it, the cam shaft exerts a force on the side of the boss nearer to the pin. As a result, curved lipped boss exerts a spreading force on the casing.

This tendency for the casing to spread or bulge is even greater when the latch and pin are misaligned. Winged fasteners are usually mounted by being foamed in place using methods similar to the one shown in U.S. Pat. No. 5,212,924. Foam is injected inside the panel. As it hardens the fasteners become secured in place. Foam hardening often causes the casing of the hook to cock out of mutual alignment. As a result, when the hook engages the pin and pulls on it, the cam shaft pushes against the front of a casing side wall and spreads the hook assembly casing walls apart. The force exerted by the hook on the casing side wall, in combination with the funneling action of the boss, can even cause one side of the cam shaft to pull out of the boss opening and the fastener to malfunction.

The nail-in fastener hook assembly casings also often spread or bulge even though they are mounted to boards usually made of hardened foam. Foam boards are used because they provide good insulation, are inexpensive to manufacture, and are resistant to rotting and water damage. Upon fastening a nail-in panel fastener hook with a pin, the force on the hook often causes the foam board to be crushed or crinkled. This is attributable to the foam board lacking strength sufficient to resist spreading of the metallic walls of the casing. This crushing or crinkling of the foam board often enables the back of the casing to move closer together and the front portion to spread apart. The giving way of the foam board, in combination with the force of the cam shaft against the boss, can easily result in the casing walls spreading significantly. Indeed, the cam shaft may actually become dislodged from the boss resulting in the fastener malfunctioning.

Heretofore the two side walls of panel fastener casings have typically been held by pins and interlocked tabs. For

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example the model 1156 panel fastener that has long been sold by Kason Industries, Inc. has a two-piece casing. Each piece has a side wall with central boss from which a mounting flange extends right angularly. Each end of each casing wall has one centrally located tab and two tabs that straddle the central tab. During assembly, the two pieces are juxtaposed about, so as to capture the hook and cam assembly. The tabs are then crimped or folded over each other. A dimple in the abutting tabs is then staked to the underlying tabs in securing together one end of the casing. The other end, from which the hook emerged, and thus is open, is fastened together with a pin.

As previously explained, overload places a separation force on these two walls. This force can even cause the dimples to pop apart and the fastener to fail. Moreover, it is difficult to monitor the integrity of the dimples in quality control checks during manufacture. The overlapping tabs also is costly in material.

Accordingly, it is seen that a need has long existed for a panel fastener that is more resistive to bulging and failure of its casing during the high loads sometimes imparted during panel fastening. It is to the provision of such that the present invention is previously directed.

SUMMARY OF THE INVENTION

In a preferred form of the invention a panel fastener comprises a unitary casing having two substantially parallel side walls unitarily connected together at one end by a bridge and held together at an opposite end by a tab formed unitarily with one of the side walls. A hook has a mounting end rotatably mounted between and to the casing side walls and has a catch end extending out of the casing. The panel fastener is preferably formed and assembled from a casing blank with two coplanar sides unitarily connected by a bridge by bending the bridge to bring the two sides to a parallel position about a mounting end of the hook. The ends of the two casing sides opposite the bridge are then fastened together by crimping a tab formed unitarily with one side over the other side.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of an in-line series of panel fastener casings being stamped and formed from a single sheet of metal.

FIG. 2 is a perspective view of a single panel fastener casing that has been severed from the sheet shown in FIG. 2.

FIG. 3 is a perspective view of the casing being folded about the hook and cam assembly shown in broken lines in FIG. 2.

FIGS. 4-6 are perspective views of a portion of the casing showing an ending of two casing sides being secured together.

FIG. 7 is a side view of one side of the finished casing without the hook and cam assembly.

FIGS. 8 and 10 are front and rear end views of the finished casing without the hook and cam assembly.

FIGS. 9 and 11 are top and bottom views of the finished casing without the hook and cam assembly.

FIG. 12 is a side view of the side of the finished casing opposite the side shown in FIG. 7.

FIG. 13 is a perspective view of the finished panel fasteners with an eye portion of the hook, cam and socket not shown.

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DETAILED DESCRIPTION

The manner in which the new panel fastener is produced is illustrated in the drawing. First a sheet or strip of strong metal, preferably steel, is passed through an unshown series of stamping, trimming station and forming stations from which it emerges as shown in FIG. 1. Here it is seen to have an in-line series of partially formed casings 10. Each casing has two coplanar sides 11 and 12 joined together by two bridges 13 in their plane. Adjacent pairs are still joined here by a coplanar link 15 (that extends behind an adjacent bridge 13 in each adjacent casing 10.

Each casing side is seen to be formed with a annular boss 17. A tab 18 projects upwardly from a corner of one side of each casing. A mounting flange 19 projects downwardly aside each casing side 11.

The sheet or strip of the formed metal is passed through a cutting station where the link 15 is cut thereby severing the casings one by one from the in-line strip. A single casing, thus severed, is shown in FIG. 2. From the enlarged view of this figure it is seen that each bridge is formed with two holes 21 located about tangentially with a side 11.

Next the casing is folded, as shown in FIG. 3, along curved folds that straddle the bridge holes 21. The presence of these holes facilitates the folding and bending. When this occurs the hook 20, shown in FIGS. 2 and 13, has already been placed between to be sandwich between the two casing sides. Thus this folding brings the hook and cam assembly with the assembly hex socket to be rotatably journaled in the bosses 17 for pivotal movement within the casing.

As the two casing sides are brought towards a position parallel with one another, the tab 18 is passed through a small slot 23 in a corner of the opposite casing side 11. Once through, the tab tip 18' is bent or swaged over and flush against the side 11 about the slot 23. This interlocks and fastens the ends of the sides opposite their sides from which the bridges 13 extend.

The finished panel casing is shown in FIGS. 8-12 without the hook assembly. FIG. 13 shows the panel fastener with the hook 20 projecting out of an open end of the casing in its locked position. The eye end of the hook, and its cam and socket, are not shown here. The hook may be rotated to an upright, unlocked position with a socket wrench inserted

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into the hook and cam assembly socket that is mounted within the eye portion of the hook. Fully rotated uprightly, the hook is stopped by engagement with the tab 18.

It thus is seen that a panel fastener is now provided that is substantially free of problems long associated with those of the prior art. It may be made expeditiously and efficiently with a single unitary casing. Made in this manner it has far less scrap metal waste and is far easier to position the casing sides accurately and to monitor such accuracy. More importantly, it is far less susceptible to failure from overloads exerted on the hook from misalignment and/or misspacing from the mating bar assembly in an adjacent panel. There are no interlocks held by dimples. One end of the casing is unitary with its walls and thus extremely rugged. The other end, with its tab tip crimped over the slot wall, is virtually unseparable absent a fracture of the steel. It also serves as the hook stop.

Though the invention has been described in its preferred form it should be understood that modifications may be made thereto without departure from the spirit and scope of the invention as set forth in the following claims.

What is claimed is:

1. A panel fastener comprising a unitary casing having two substantially parallel side walls unitarily connected together at one end by a bridge and held together at an opposite end by a tab formed unitarily with one of said side walls, the tab extending from said one side wall to the other side wall with a tab end distal said one side wall being bent over the other side wall, and a hook having a mounting end rotatably mounted between and to said casing side walls and having a catch end extending out of said casing, said hook catch end extending out of said casing adjacent said casing tab in one rotary position with said tab serving as a hook rotary stop.

2. The panel fastener of claim 1 wherein said casing side walls are unitarily connected together at one end by two mutually spaced bridges.

3. The panel fastener of claim 1 wherein an end of said casing tab is swaged over the other of said casing side walls.

4. The panel fastener of claim 3 wherein said other casing side wall has a slot through which said tab extends.

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