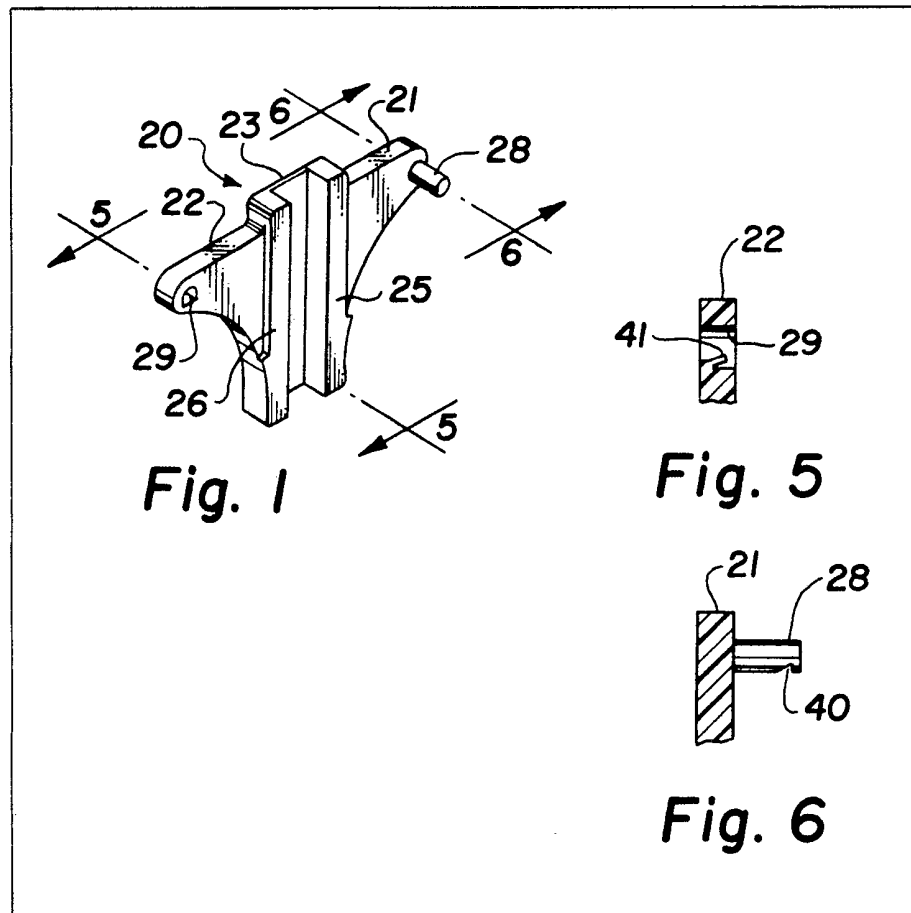


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GB 1519233
GB 1349946
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(54) A handling means for a card-like structure

(57) A unitary body (20) has relatively rigid complementary halves (21, 22) interconnected along their common edges by a flexible hinge (23). The laterally extending body portions of the two halves (21, 22) are of reduced thickness relative to beams (25, 26) extending along the joined edges so that upon folding the complementary halves (21, 22), about the hinge (23), a handle is formed having a channel (30) extending therethrough parallel with the hinge (23). One of the complementary halves (21) carries a pin (28) extending therefrom which when the body (20) is folded mates with an aperture (25) in the opposing complementary half (22) and bridges the channel (30). The pin (28) is inserted through an aperture

in a card-like structure (10) near a corner thereof so that the unitary body (20) may pivot about the corner of the card-like structure. The pin (28) has a V-shaped groove (40) therein which co-operates with a flexible latching flap (41) in the aperture (29) in the opposing half (22) to securely lock the pin (28) within the aperture (29).



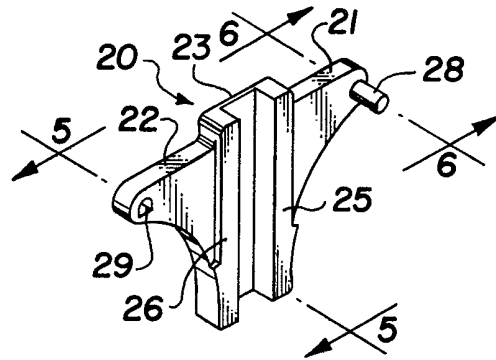


Fig. 1

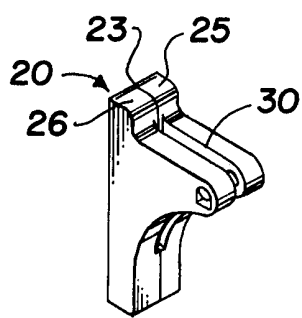


Fig. 2

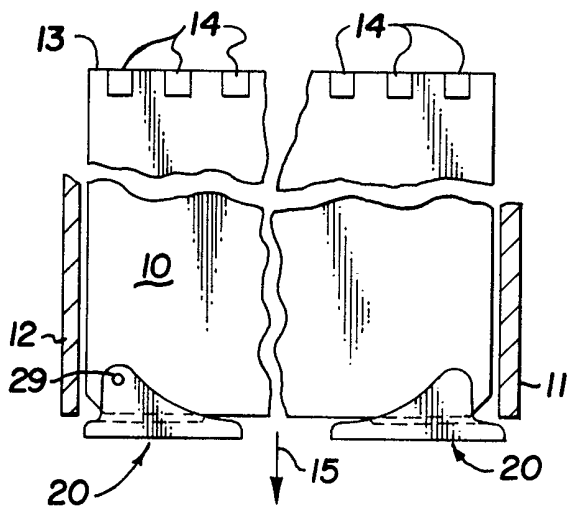


Fig. 3

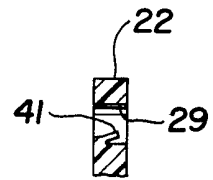


Fig. 5

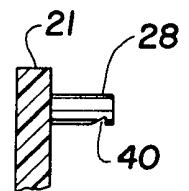


Fig. 6

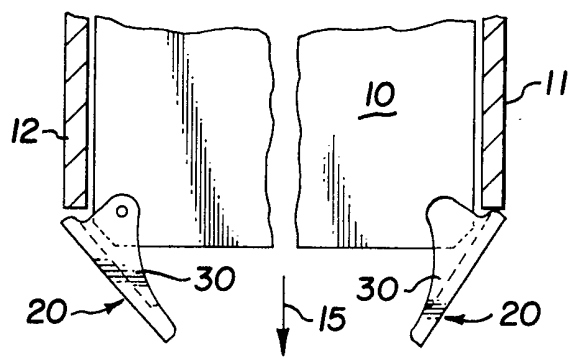


Fig. 4

SPECIFICATION

Handling means for card-like structures

5 This invention relates to apparatus for handling card-like structures such as circuit boards, circuit module cards and the like. In particular, it relates to a foldable unitary body forming a pivotable lever or handle for attachment
10 to such card-like structures to aid in inserting and removing the card-like structures from receptacles therefor.

Various electronic apparatus such as telephone switching equipment, electronic control
15 panels, computers and the like employ a plurality of card-like circuit board structures which carry and electrically interconnect various discrete electronic device packages to form electrical circuits or circuit functions.
20 Ordinarily, such card-like structures includes pins or connector pads adjacent one edge thereof for forming electrical interconnections with mating receptacles so that a plurality of cards may be arranged parallel and electrically
25 interconnected by means of a common mother board arranged normal to the plane of the circuit cards.

Conventionally, the card-like structures are printed circuit boards of like dimensions
30 which are mounted parallel and closely spaced within a housing or rack with the mother board forming the back or bottom side of the housing. Since the connector pads or pins mate with receptacles on a mother board
35 which is remote from the open end of the housing, and since the card-like structures are closely spaced, it is sometimes difficult to remove a card from the housing without damaging the card, components on the card, or
40 the receptacles on the mother board. In order to withdraw a card from the housing or rack, it is preferred that the card be withdrawn uniformly in the mounting plane of the card without twisting or rotating the card in
45 the mounting plane. Furthermore, if the card is allowed to rotate in the mounting plane during insertion or withdrawal thereof, the card may not only become damaged but may become jammed in the mounting housing or the
50 connector pads or pins may become misaligned.

United States Letters Patent No. 4,261,076 discloses a unitary body which may be folded and attached to the card-like structure forming
55 a pivotable handle to aid in handling the card, particularly in removal of such cards from their mounting housings. The unitary handle comprises a pair of complementary members attached along their common edges by flexible hinge means. A pivot pin carried by one
60 of the complementary members passes through an appropriately positioned aperture in the card-like structure and mates with an aperture in the other complementary member
65 to secure the folded handle to the card and

hold the complementary members together in the form of a unitary pivotable handle without the use of any mounting hardware or the like. One end of the handle body extends past the

70 edge of the card to abut against the housing or mounting rack and act as a lever to withdraw the card from the housing when the handle is rotated about the pivot pin. The handle may be pivoted to position its longer
75 edge parallel with the front edge of the card and stored in a position ready for use in extracting the card from its mounting housing.

In accordance with the present invention, the pivot pin and aperture of a pivotable
80 handle of the kind shown in the aforesaid U.S. Patent specification are modified to include means for retaining the pin within the aperture to securely maintain the handle in the folded condition when attached to the
85 card-like structure. The handle of the invention may be inexpensively formed from any suitable material such as plastic, nylon or the like, and, since it may occupy little space in its ready position and does not interfere with
90 the mounting supports when the card is in use, may remain on the card ready for use in extracting the card from its mounting housing. A pair of the handles may be attached to the opposite parts of the card for use as levers
95 applying pressure to opposite sides of the mounting housing adjacent both lateral edges of the card, thereby aiding in uniform removal of the card from the mounting housing and thereby greatly reducing distortion or damage
100 to the connector pads or pins during removal of the card from the mounting housing.

The invention from another aspect comprises a means for handling card-like structures, including a body with complementary
105 first and second body members joined together by flexible hinge means, the first and second body members defining a channel between them when the body is folded about said hinge means, and the first body member
110 including a pin projecting from one major face thereof, being arranged and adapted to extend across the channel and be received in a cooperating aperture formed in the second body member when the body is folded about its
115 hinge means and means being provided for retaining the pin within the aperture.

The pin projecting from the first body member may be formed with a groove, and the aperture in the second body member which
120 receives the pin may contain latch or wedge means therein for mating with said groove to securely retain the pin within the aperture. The latch or wedge means may comprise a flexible latching flap extending from the side
125 wall of the aperture in the direction of the free end of the pin when it is inserted in the aperture.

The groove in the pin may be defined by a first wall substantially perpendicular to the
130 axis of the pin and a second wall inclined with

respect to the said axis, the first wall being nearer the free end of the pin.

In such arrangements, the locking means of the invention is also integrally formed in the unitary body and may serve to permanently and securely attach the handle to the card. Furthermore, since the handle of the invention is a unitary body, no mounting hardware or tools are required to attach the handle to the card-like structure.

The invention from yet another aspect comprises the combination of a card-like structure having substantially rectangular dimensions with a handling means as aforementioned, the card-like structure having first and second oppositely-facing major faces and being formed with an aperture spaced from the intersecting edges which define a corner of the card, the body of the handling means being folded about a portion of the card-like structure which lies nested in the channel and the handling means being pivotally connected with the card-like structure by means of the pivot pin which extends through the said aperture therein, and is received in the aperture in the second body portion and is locked therein by the said locking means, whereby the said handling means constitutes a pivoted handle which can rotate pivotally through a substantial angle relative to the card-like structure.

Other features and advantages of the invention will become more readily understood from the following detailed description taken in connection with the appended claims and attached drawings.

In the following description, one specific embodiment of the invention is described by way of example only and with reference to the accompanying drawings, in which:—

Figure 1 is a perspective view of the preferred embodiment of the invention, the handle being illustrated in the open condition;

Figure 2 is a perspective view of the article of Fig. 1 showing the handle in the folded closed position;

Figure 3 is a top plan view of a portion of a representative card-like structure in a mounting housing utilising a pair of the card handles, of Figs. 1 and 2;

Figure 4 is a top plan view of the assembly of Fig. 3 illustrating use of the handles to extract the card from the housing;

Figure 5 is a partial sectional view of the handle structure of Fig. 1 taken through lines 5-5; and

Figure 6 is a partial sectional view of the handle structure Fig. 1 taken through lines 6-6 to more clearly show the structure of the pivot pin.

For clarity of the illustration, the invention will be described herein with particular reference to use of the card handle in connection with a printed circuit board. However, it will be understood that the printed circuit board is

merely illustrative of a variety of structures which may utilise the invention.

Accordingly, the term "card-like structure" is used herein to describe any structure of essentially rectangular dimensions having opposed major faces and which is mounted in a housing rack or the like in use with its lateral edges adjacent or supported by an enclosing or mounting structure.

Ordinarily, printed circuit boards are approximately 0.06 inch thick and carry a plurality of discrete semiconductor device packages mounted on one or both sides thereof electrically interconnected by printed conductive circuitry. Conventionally, a plurality of such printed circuit boards may be arranged mutually parallel in a mounting housing, bracket or rack. As illustrated in Fig. 3, a printed circuit board 10 is mounted horizontally within a vertically extending housing having vertical parallel sides 11 and 12. Guides, tracks or the like (not illustrated) carried by the sides 11 and 12 may be used to support the board and align the rear edge 13 of the board 10 with electrical connector receptacles on a mother board (not illustrated). The rear edge 13 of the board 10 carries a plurality of connector pads 14 which are adapted to mate with electrical receptacles in the mother board. Such arrangements and interconnections of circuit boards are conventional and well understood by those skilled in the art, thus, will not be described in detail herein.

It will be observed that when a plurality of such circuit boards 10 are arranged parallel and closely spaced in a rack or the like, they may be removed only by pulling the boards in the direction indicated by arrow 15. Unless care is exercised in removing such boards, they may twist in the mounting guides or tracks and become lodged in the mounting housing. Furthermore, if the boards are allowed to twist during extraction from the housing, the connector pads 14 or the receptacles with which they mate may be damaged. It should be realised that in many cases laterally extending pins may be employed instead of connector pads 14. Accordingly, where pins are employed, twisting of the board during extraction or insertion thereof may cause misalignment or breakage of the pins and thereby render the board unuseable.

In accordance with the invention a unitary body, generally indicated at 20, is adapted to fold about the edge of a circuit board and mate with an aperture in the board 10 to act as a pivoting lever or handle for extracting the board from the mounting housing. In the preferred embodiment, the handle 20 (as more clearly illustrated in Fig. 1) comprises a pair of substantially rigid complementary halves 21 and 22 joined by a flexible hinge member 23. Each half 21 and 22 comprises a body elongated in a first direction forming opposed parallel relatively rigid beams 25 and

26 spaced apart but interconnected by a flexible hinge portion 23. Each half 21 and 22 includes a body portion extending laterally therefrom and the halves 21 and 22 are complementary so that when halves 21 and 22 are folded toward each other they form an essentially L-shaped structure as illustrated in Fig. 2. The first half 21 carries a pivot pin 28 extending therefrom normal to the major face of the body at a point substantially removed from the beam 25. Likewise, mating half 22 carries an aperture 29 which mates with and receives pivot pin 28 when the body halves are folded together as illustrated in Fig. 2. The laterally extending portions of each half are of reduced thickness with respect to beams 25 and 26 so that when the body 20 is folded to the closed position as illustrated in Fig. 2, the laterally extending body portions form a channel 30 therebetween. Where the handle 20 is to be used in connection with a card-like structure which is approximately 0.60 inch in thickness, the channel 30 should likewise be at least 0.60 inch in width. Thus, in attaching the handle 20 to the circuit board 10, the pin 28 is inserted through an aperture in the circuit board near the corner thereof and the body 20 is then folded so that pin 28 mates with aperture 29. The handle 20 may therefore rotate about the axis of the pivot pin 28 as illustrated in Fig. 4. It will be understood that the pivot pin 28 should be positioned relatively near the outer extremity of the first half 21 and the channel 30 should be sufficiently deep to permit the pin 28 to pass through an appropriately positioned aperture in the board when the board 10 is fitted within the channel 30. Preferably, the aperture in the board 10 is equidistant from the front edge and one lateral edge of the board 10 so that the handle 20 may be rotated about the corner of the board approximately 90° in the plane of the board 10.

As illustrated in Figs. 3 and 4, (in which two of the handles 20 are shown respectively at opposite corners of the board 10), the beam portions 25 and 26 of each handle 20 form the base of the channel 30 and are longer than the laterally extending body members. Thus, one end of the handle 20 extends past the lateral edge of the board 10 substantially parallel with the front edge of the board. When the board is inserted into the rack as illustrated in Fig. 3, the beam portions 25 and 26 which form the base of the channel 30, lie in a plane substantially parallel with the front edge of the board 10. Thus, the handle 20 does not interfere with full insertion of the board 10 into the housing. However, when the handle 20 is rotated, the outwardly extending ends of the beams 25 and 26 are pivoted toward and contact the side 11 or 12 of the housing. Thus, as the inner ends of the two handles 20 are rotated outwardly, the outer ends of the beams 25 and 26 are

pressed against the edges of sides 11 and 12 and uniformly withdraw the board 10 from the housing in the direction indicated by arrow 15. It will be observed that when the board 10 has been withdrawn by the handles 20, a sufficient distance to permit the connector pads 14 to clear their receptacles, the board may be readily grasped and removed from the housing manually.

In the preferred embodiment of the invention, the handle 20 is formed by conventional injection moulded plastic techniques. The unitary body 20 is formed with the beams 25 and 26 parallel and spaced apart by a distance equal to the cumulative thickness of both beams. The hinge member 23 is a relatively thin sheet of plastic connected between the outer edges of the beams. Thus, the width of the hinge strip 23 is equal to twice the thickness of one beam. It will thus be observed that as the inner faces of the laterally extending body members are folded toward each other, the inner faces of the beams 25 and 26 are brought into mutual contact and pin 28 is forced into aperture 29. In the preferred embodiment, the hinge portion 23 bridges the entire backside of the folded device from the outer edge of beam 25 to the outer edge of beam 26 as shown in Fig. 2. Alternatively, the bridge portion may join the inner edges.

Pin 28 is a substantially rigid member extending normal to the laterally extending body portion and is sufficiently long to bridge the channel 30 and extend into aperture 29. The outside diameter of pin 28 is substantially the same as the inside diameter of aperture 29. Thus, the pin 28 is snugly nested in the aperture 29. Since the hinge member 23 is flexed and thus deformed from its formed condition, it tends to return to its formed condition unless the pin 28 is securely locked within the aperture 29. To retain the pin 28 within the aperture 29, pin 28 is provided with a V-section notch or groove 40 near its free end and aperture 29 is provided with wedge or latch means such as flap 41. The wedge or latch means mates with the groove 40 and the body 20 is thus locked in the folded condition due to the interlocking of wedge or latch 41 and groove 40 when the body halves are snapped together.

In the preferred embodiment, the groove 40 is defined by two intersecting walls. The first wall is substantially normal to the axis of the pin and the second wall is inclined with respect to the axis of the pin 28 as illustrated in Fig. 6. The first wall is nearer the free end of the pin. The wedge or latch means is in this case a flexible flap 41 integrally formed as a part of the body extending from the inner wall of the aperture 29. The flap 41 extends in the general direction of the free end of the pin 28 when the pin is nested within the aperture. Accordingly, the end of the flap 41

abuts the first wall of the groove to securely lock the pin within the aperture. Since the flap is flexible, the end of the pin 28 may be pressed past the flap 41 until the flap 41 is positioned in registry with the groove. The flap 41 then expands into the groove 41 securely locking pin 28 within aperture 29.

While the invention has been described with particular reference to a moulded plastics body for use in connection with printed circuit boards, it will be readily recognised that the invention is not so limited. The unitary body of the invention may be formed by various other methods from various other materials and be used in connection with various other card-like structures. The dimensions of the body, the pin 28 and the channel 30 may, of course, be varied as required to match the dimensions of the card-like structure with which it is to be used. It should also be recognised that when the handle body 20 is made from suitable resilient plastic, the mating flap 41 and groove 40 will lock the structure in the closed position since the flap 41 abuts the wall of the groove. However, the handle may be removed from the card by simply reversing the installation procedure without damaging either the body 20 or the card-like structure even though the removal procedure may be more difficult. Thus, the body 20 may be re-used as desired. Of course, use of the handle 20 is not limited to insertion into and extraction of card-like structures from end-use housings. The handles may also be used for handling such card-like structures during the manufacture, testing or repair thereof. It is to be understood, therefore that although the invention has been described with particular reference to a specific embodiment thereof, the form of the invention illustrated and described in detail is to be taken as the preferred embodiment thereof. Various changes and modifications of that embodiment may be resorted to without departing from the broad principles of the invention as disclosed herein.

CLAIMS

1. Means for handling card-like structures, comprising a body including complementary first and second body members joined together by flexible hinge means, the first and second body members defining a channel between them when the body is folded about said hinge means and the first body member including a pin projecting from one major face thereof being arranged and adapted to extend across the channel and be received in a cooperating aperture formed in the second body member when the body is folded about its hinge means and means being provided for retaining the pin within the aperture.

2. Means for handling card-like structures comprising a unitary body including a first body member, a second body member com-

plementary with the said first body member, and flexible hinge means joining the first body member and the said second body member along opposing parallel edges, the said first and second complementary body members defining a channel therebetween when the unitary body is folded about the hinge means, wherein the said first body member includes a pin projecting therefrom normal to one major face of the said first body member and having a groove therein and the said second body member contains an aperture therein adapted to receive the pin when the unitary body is folded about the hinge means with the pin projecting across the channel, the aperture containing means therein for mating with the groove to securely lock said pin within said aperture.

3. Handling means as claimed in Claim 2 wherein the said means for mating with the groove comprises a flexible latching flap extending from the side wall of the aperture in the direction of the free end of the pin when the pin is inserted in said aperture.

4. Handling means as claimed in Claim 2 or Claim 3 wherein the groove in the pin is defined by a first wall substantially normal to the axis of the pin and a second wall inclined with respect to the said axis, the first wall being nearer the free end of the pin.

5. Handling means as claimed in any one of Claims 1-4, in which each of the first and second body members includes an integral elongate beam portion of increased thickness along one edge, the beams of the two body members being in spaced parallel relationship when the unitary body is unfolded and being joined by the hinge means which extends across the space between them, the two body members with their respective beams and the hinge means being integral parts of the unitary body.

6. Handling means as claimed in Claim 5, in which when the body is folded about the hinge means the two beams abut one another along opposed sides and together form the base of the channel.

7. Handling means as claimed in Claim 5 or Claim in which each beam projects longitudinally at at least one end beyond the remainder of its associated body portion, so as to form a lever end.

8. The combination of a card-like structure having substantially rectangular dimensions with a handling means as claimed in any one of Claims 1-7 the card-like structure having first and second oppositely facing major faces and being formed with an aperture spaced from two intersecting edges which define a corner of the card, the body of the handling means being folded about a portion of the card-like structure which lies nested in the channel and the handling means being pivotally connected with the card-like structure by means of the pivot pin which extends through

the said aperture therein, and is received in the aperture in the second body portion and is locked therein by the said locking means, whereby, the said handling means constitutes a pivoted handle which can rotate pivotally through a substantially angle relative to the card-like structure.

9. The combination claimed in Claim 8 wherein the said aperture in the card-like structure is substantially equidistant from the said two intersecting edges, and wherein the pivoted handle can rotate pivotally through approximately 90° relative to the card-like structure about the axis of the pin.

10. In combination, (a), a card-like structure having substantially rectangular dimensions and first and second opposed major faces and an aperture passing therethrough at a location substantially equidistant from first and second intersecting edges; (b), pivotable handle means comprising a unitary body including first and second substantially rigid complementary body members having opposed parallel edges joined by a flexible hinge member and defining a channel between the said first and second complementary body members, a pin extending from the said first complementary body member through the aperture in the card-like structure and into a mating aperture in the second complementary body member with the card-like structure nested within the channel; and (c) means for locking the pin within the mating aperture; the pivotable handle being rotatable relatively to the card-like structure through approximately 90° about the axis of the pin.

11. The combination claimed in Claim 10, wherein the said means for locking the pin within the mating aperture comprises a groove in the pin and flexible latch means disposed in the mating aperture for mating with the groove.

12. The combination claimed in Claim 11 wherein the groove is defined by a first wall substantially normal to the axis of the pin and a second wall inclined with respect to the said axis, the first wall being nearer the free end of said pin; and wherein the flexible latch means is a flexible flap extending from the inner wall of the mating aperture generally in the direction of the free end of the pin when the pin is received within the mating aperture, the free end of the flap abutting the said first wall of the groove.

13. A pivotable handle for a card-like structure, substantially as specifically described herein with reference to the accompanying drawings.

14. A card-like structure having a pair of pivoted handles, substantially as specifically described herein with reference to Figs. 3 and 4 of the accompanying drawings.

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