United States Patent

[11] 3,563,391

[72] Inventors **Marvin D. Weltha**
Marion;
Howard J. Bronson, Jr., Cedar Rapids, Iowa

[21] Appl. No. **772,784**
[22] Filed **Nov. 1, 1968**

[73] Assignee **Collins Radio Company**
Cedar Rapids, Iowa
a corporation of Iowa

---

[54] **CARD GUIDE**
3 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **211/41,** 312/140.3, 317/101
[51] **Int. Cl.** **H05k 7/14**
[50] **Field of Search** 211/41, 184; 339/17M, 176MP; 317/101DH; 312/137, 140.1, 140.4, 140.3

[56] **References Cited**

UNITED STATES PATENTS

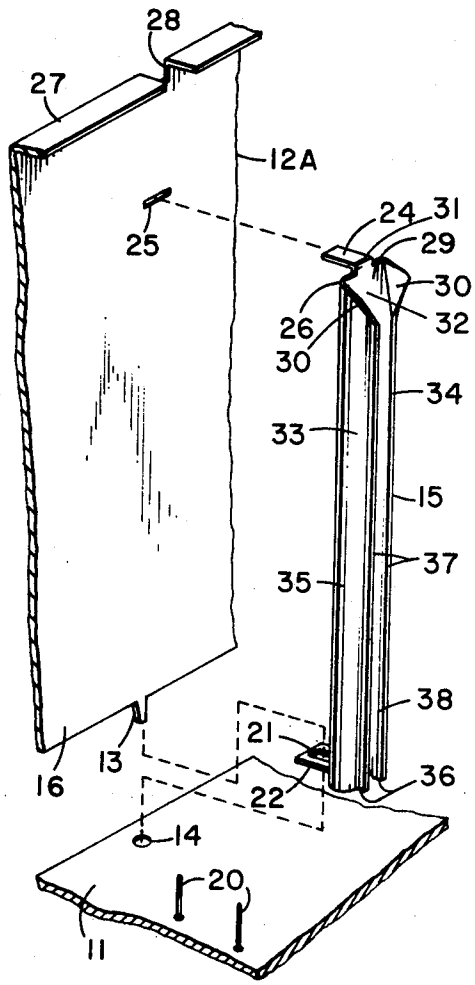
1,677,544	7/1928	Brainard	211/184UX
1,711,030	4/1929	Pifer	211/184X
1,760,456	5/1930	Palmenberg	211/184X
2,697,631	12/1954	Miller	211/184UX
2,812,225	11/1957	Traxler	312/140.3
2,863,567	12/1958	Friar	211/184X
3,026,453	3/1962	Marks	317/101DH
3,258,650	6/1966	Fiege	317/101DH
3,349,924	10/1967	Maurer	211/41X
3,368,117	2/1968	Pond	317/101DH

FOREIGN PATENTS

230,972	1/1964	Austria	317/101DH
298,092	7/1954	Switzerland	312/140.4

Primary Examiner—Roy D. Frazier
Assistant Examiner—Abraham Frankel
Attorneys—Warren H. Kintzinger and Robert J. Crawford

ABSTRACT: A circuit board guide mount affixed to parallel spaced sideplates with mechanical indexed mounting for both ends of each guide mount and with adhesive used between each guide mount and its sideplate for obtaining the mounting strength required through an extended service life with repeated insertion and withdrawals of circuit cards or boards.



Patented Feb. 16, 1971 3,563,391

2 Sheets-Sheet 1

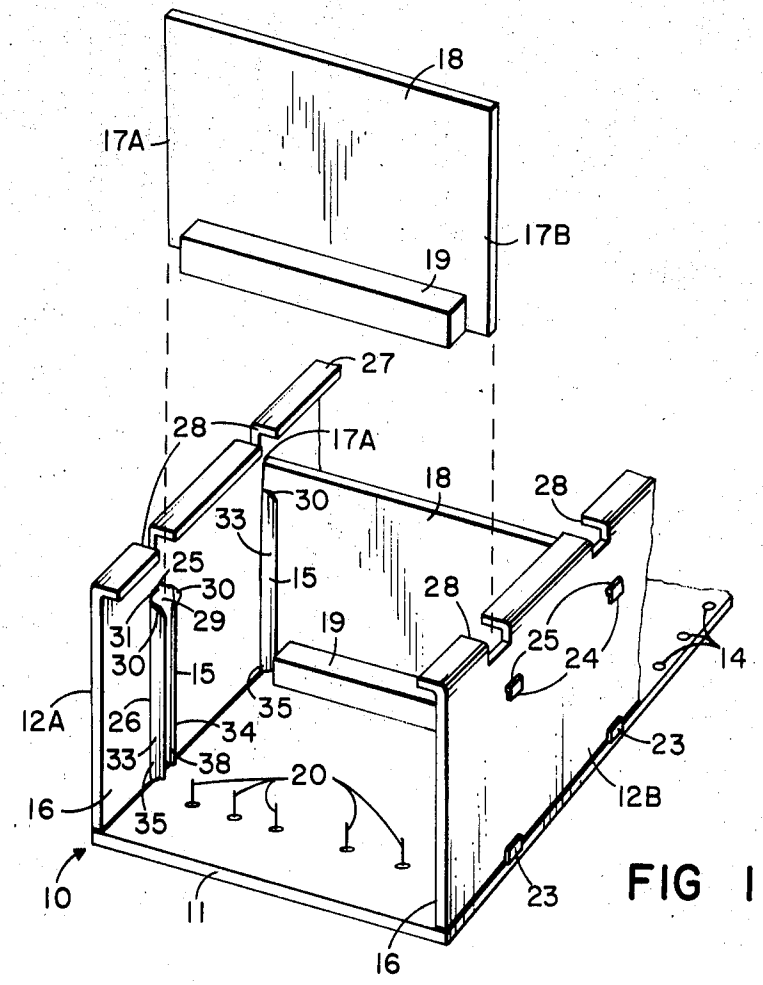


FIG 1

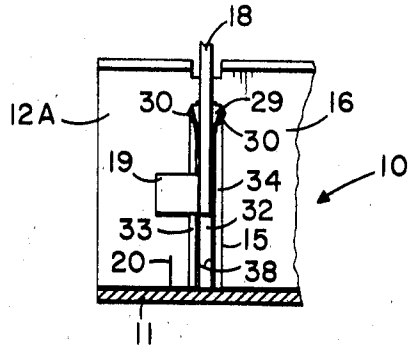


FIG 2

INVENTORS
HOWARD J. BRONSON, JR
MARVIN D. WELTHA
BY
Warren H. Kintzinger
ATTORNEY

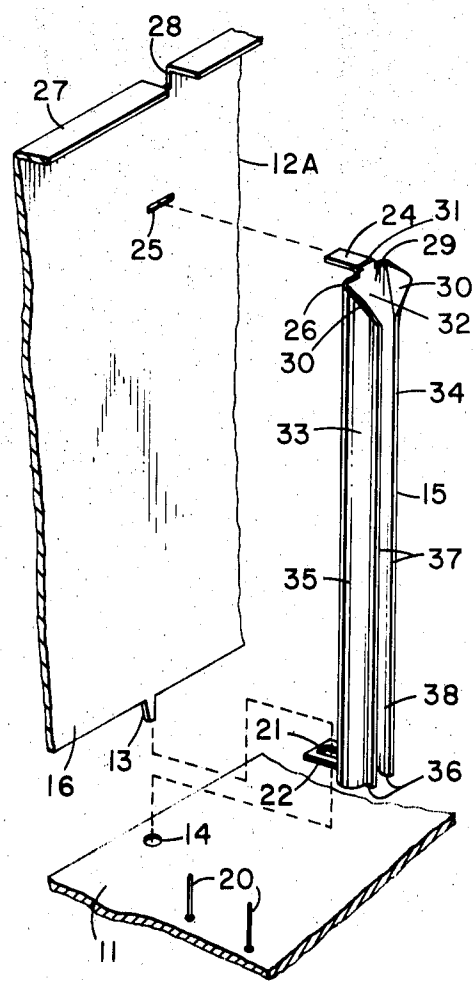
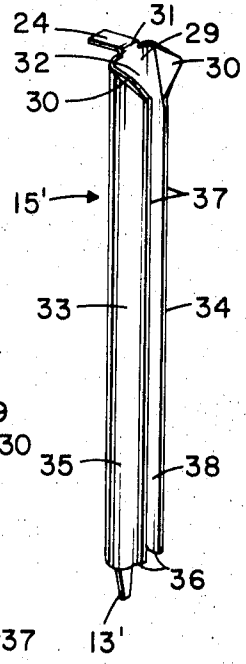


FIG 3

FIG 4



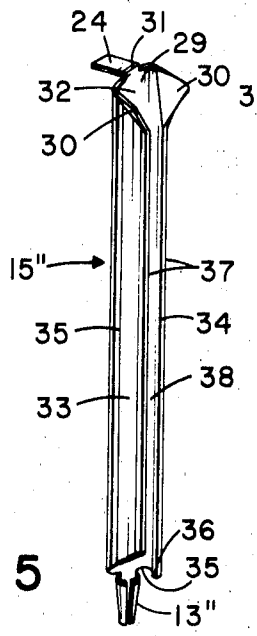


FIG 5

INVENTORS
HOWARD J. BRONSON, JR
MARVIN D. WELTHA
BY
Warren H. Kintzinger
ATTORNEY

CARD GUIDE

This invention relates in general to retainer racks or holders for printed circuit boards, and in particular, to a circuit card (or board) guide for receiving and guiding edges of a board or card being inserted for connection with blind connectors and the long term mounting of such boards or cards in equipment card racks or boxes.

Electronic circuit and component mounting structures in the form of circuit cards and boards have been faced with problems of proper alignment and encounter many other problems particularly when a plurality of such boards are inserted in a card rack or box to form an equipment box or module. Alignment of boards during insertion is particularly important with proper guiding of mating connectors a must, and this requires a prerequisite degree of care and skill in effectively funneling one connector into the engagement area of its mate. Further, with many equipments, the space limitations imposed on funneling devices in the instant case card (or board) guides is quite severe. Also among the problems faced are acceleration forces incumbent with some installation environments along with, in many mounting schemes, unacceptable vibration and resonance amplification rattling. It is, therefore, a principal object of this invention to provide a circuit card (or board) guide and mount enabling close connector alignment and insertion mating, occupying minimal space, with sufficient strength as a mount to adequately resist shock and vibration loading, and that eliminates rattling with the cards snugly and securely supported.

A further object is to provide such a card guide and mount capable of repeated insertion and removal of cards (or boards) without any material adverse diminution of the initial guide and mount capabilities through a greatly extended service life.

Features of this invention useful in accomplishing the above objects include a guide mount used by pairs one on each of the inner walls for each board of two spaced parallel sideplates for mounting of circuit boards traversing the space between the sideplates. It is guide mount providing close connector alignment and guided insertion mating, that occupies minimal space, optimizes circuit board spacing factors, and has sufficient resilient holding mount force and mounting strength to generally quite adequately resist shock and vibration loading and minimize, if not eliminate, rattling of cards or boards mounted thereby Each guide mount includes an upper card edge insertion guiding ramped throat, and a back portion with indexing structure at both ends. It is a guide mount made of relatively thin, highly resiliently flexible yet strong material, for example, thin beryllium copper generally less than 100 th of an inch of thickness with opposite sidewalls formed to extend upward from the back portion thereof in relatively large inwardly directing parallel radius curved portions for minimized stress concentrations and long service life as a mount with, in some cases, repeated insertion and extraction of circuit cards. The sidewalls also include a more sharply curved reverse bend outwardly from the larger curved portions to advantageously present opposing parallel inner radius rounded edges to clamp opposite sides of a circuit card edge in the desired mounting thereof. An adhesive is used between the back portion of each card guide mount and the respective inner wall of the two spaced parallel sideplates in maintaining structural integrity and to provide the mounting strength required through an extended service life with repeated insertion and withdrawal of circuit boards or cards.

Specific embodiments representing what are presently regarded as the best modes for carrying out the invention are illustrated in the accompanying drawings.

In the drawings:

FIG. 1 represents a perspective view of a circuit board receiving rack with card (or board) mounting sideplates, equipped with circuit board edge guide mounts, mounted on a bottom circuit connector plane plate;

FIG. 2, a partial cutaway view showing a circuit board in a partially guide inserted state with a connector box supported in proper alignment with connector pins projecting from the bottom circuit connector plane plate;

FIG. 3, an enlarged exploded detail view of one sideplate, a circuit board, and the board edge guide-mount embodiment of FIGS. 1 and 2;

FIG. 4, another board edge guide-mount embodiment; and,

FIG. 5, still another board edge guide-mount embodiment.

Referring to the drawings: the card or board retainer rack or holder box **10** of FIGS. **1**, **2**, and **3** includes a bottom circuit connector plane plate **11** and spaced parallel sideplates **12A** and **12B** that are mounted thereon to form the U-shaped box **10** therewith. Other than tang projections **13** of sideplates **12A** and **12B** that are received in openings **14** of bottom plate **11**, the mounting details of the sideplates **12A** and **12B** to the bottom plate **11** to structurally form the U-shaped box **10** are of a conventional nature and not shown. Edge guide mounts **15** are mounted on the inner facing walls **16** of the spaced parallel side plates **12A** and **12B** in precisely located positions and closely controlled orientation for receiving, guiding, and providing long term mounting of respective edges **17A** and **17B** of circuit cards or boards **18** as they are inserted or removed and while mounted fully inserted in place. The boards **18** are shown to include connector boxes **19** for mating connection with connector pins **20** mounted to project vertically upward from the top of bottom plate **11**.

Please note that the tank projections **13** of the sideplates **12A** and **12B** are inserted through alignment openings **21** in tabs **22** of the respective guide mounts **15** and any additional projecting overlapping ears **23** of tabs **22**, if any, may be bent up the outside of the sideplates **12A** and **12B** as shown in FIG. **1**. This construction with the tabs **22** clipped over tank projections **13** advantageously provides close indexing for the guide mounts **15** and also mechanical fastening therefor. Further, with the tang projections **13** being received in carefully and accurately located openings **14** of the bottom plate **11**, the sideplates **12A** and **12B** are properly positioned relative to the bottom plate **11** with the guide mounts **15** in proper position on the sideplates for guiding boards **18** to fully inserted position in the holder box **10** and while being inserted for proper connector mating between connector boxes **19** and connector pins **20**. Tabs **24** at the upper ends of guide mounts **15** are inserted through index slot openings **25** of the sideplates **12A** and **12B** for further close indexing and mechanical fastening of the guide mounts **15** to the sideplates **12A** and **12B**. An adhesive such as **EC2214** Hi-Flex (005-1609-00) is also used to glue the backs **26** of the guide mounts **15** to the inner walls **16** of the side plates **12A** and **12B**, and with the guide mounts **15** having been formed from beryllium copper sheeting approximately 0.0060 inches thick advantageously thereby attaining a desired balance of resiliency in deformation and mounting strength. Please note, however, that other materials could be used both for the guide mounts **15** themselves, and also as adhesive in the mountings to the side plates and in some instances solder could be the adhesive.

The upper inwardly formed over edges **27** of the sideplates **12A** and **12B** are provided with oversize slot openings **28** in general alignment with the top throat ends **29** of the respective guide mounts **15** for easy insertion of card or board edges **17A** or **17B** to the top throat ends **29** of guide mounts **15**. For optimized ease and reliability in guided insertion of card or board edges **17A** and **17B** to the top throat ends **29**, guide mounts **15** are provided with bent over upper opposite side corners **30** angled advantageously for ramp guided easy card or board edge insertion. A further aid to easy board insertion is the top radius rounded edge **31** transition from the back base portion **32** of the guide mounts **15** to tabs **24** as compared to sharp upper edges existent with some other card mounting guides. Each guide mount **15** is provided with opposite sidewalls **33** and **34** formed to extend outwardly from the back base portion **32** thereof and from the respective inner facing wall of a sideplate **12A** and **12B** with an inwardly curving relatively large radius portion **35** for minimized stress concentration and optimized resilient deflection capabilities in clamping

of a card or board edge. The sidewalls also include an outwardly directed bend **36** closely adjacent the outer edges **37** of the sidewalls **33** and **34** in order that a card or board edge **17A** or **17B** mounted therein be advantageously clamped between opposing parallel inner radius rounded edges **38** of the sidewall bends **36** rather than disadvantageously between sharp outer clamp edges.

Referring now to the guide mount **15'** embodiment of FIG. **4** portions thereof the same as with the embodiment of FIGS. **1, 2,** and **3** are numbered the same as a matter of convenience and this is done also with the embodiment of FIG. **5**. With the approach of FIG. **4**, tang extensions **13'** from the guide mounts **15'** themselves replace the tangs **13** of the side plates **12A** and **12B** of FIGS. **1, 2,** and **3** for alignment positioning of the guide mounts **15'** and the sideplates they are mounted on.

The guide mount **15''** embodiment of FIG. **5** is quite similar to the embodiment of FIG. **4** with, however, the integral tang extension **13''** being a roll formed and tapered tang extension of guide mount **15''** in place of the flat tang extension **13'** of guide mount **15'** of FIG. **4**. Please note that with some racks or boxes the side plates **12A** and **12B** are replaced with side plates having an outward extending formed over upper edge in place of inwardly extended formed over edges **27** with slot openings **28**.

Thus, there is hereby provided a card guide mount resiliently gripping opposite sides of a circuit card or board edge with the mount used in pairs to mount opposite edges of cards or boards traversing the space between spaced parallel side plates mounting the circuit board guide mounts. The circuit board guide mounts are advantageously particularly adapted for guiding the insertion of and full inserted movement of boards, and for the proper mating insertion connection of blind connectors between connector elements mounted on boards and mating connector elements on a circuit connector plane plate also serving as a mount for the spaced parallel side plates. It is a guide mount structure substantially eliminating vibration resonance and rattle encountered with some other circuit board guide and mount structures while permitting considerably improved closer spacing of cards and boards and permits use of a greater range of card and board size than with many mounts presently in use. Further, positive mechanical alignment is advantageously assured for the card guide mounts at the bottom or circuit connector plane plate ends thereof and also for the spaced parallel side plates carrying the card guide mounts.

Whereas this invention is here illustrated and described with respect to several embodiments thereof, it should be realized that various changes may be made without departing from the essential contributions to the art made by the teachings hereof.

I claim:

1. A circuit board edge guide mount designed to be individually supported on inside facing opposite walls of spaced parallel sideplates to provide insertion guidance for and mounting of the opposite edges of circuit boards mounted between and generally transversing the space between the sideplates, including: a guide mount of flexible material having a longitudinally extended back portion from a board edge entrance end to a bottom end; first index means adjacent the entrance end; second index means adjacent the bottom end; opposite sides extending out from said back portion generally in spaced parallel relation through most of the length of said guide mount and presenting card edge opposite side engaging parallel edges; with board edge entrance ends of said opposite sides formed outwardly to present a ramped board edge entrance guide throat at the board edge entrance end of the guide mount; wherein, said first index means is a bent over position indexing and mount tab at the board edge entrance end of the guide mount for position indexing and mounting insertion in a guide mount indexing and mounting slot provided therefor in a sideplate; said guide mount is mounted on sideplates in turn mounted on a bottom circuit plate including position indexing openings; and indexing projections in the form of extensions from said sideplates provided with guide mount and sideplate assemblies for precise position indexing of said guide mount and sideplate assemblies upon index and mounting insertion of said index projections into said indexing openings of said bottom circuit plate.

2. The circuit board edge guide mount of claim **1** wherein, said second index means is a bottom tab with an index opening for clipping said bottom tab over one of said indexing projections of a sideplate for close indexing and mechanical fastening of the guide mount on a sideplate.

3. The circuit board edge guide mount of claim **2** wherein, said indexing projections are tang extensions; and with the tang extensions in tapered form.