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CIRCUIT CARD EXTRACTOR

Filed Nov. 9, 1966

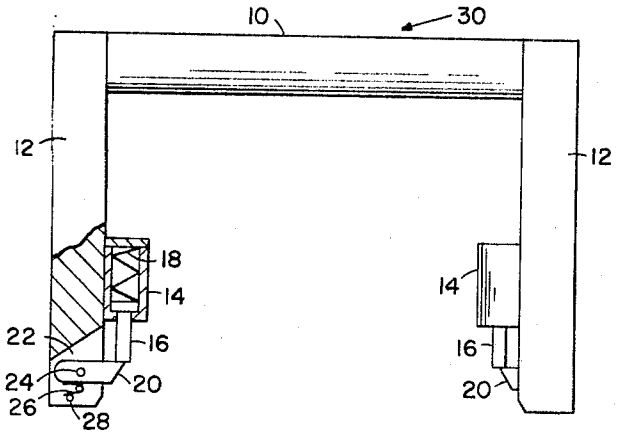


FIG. 1

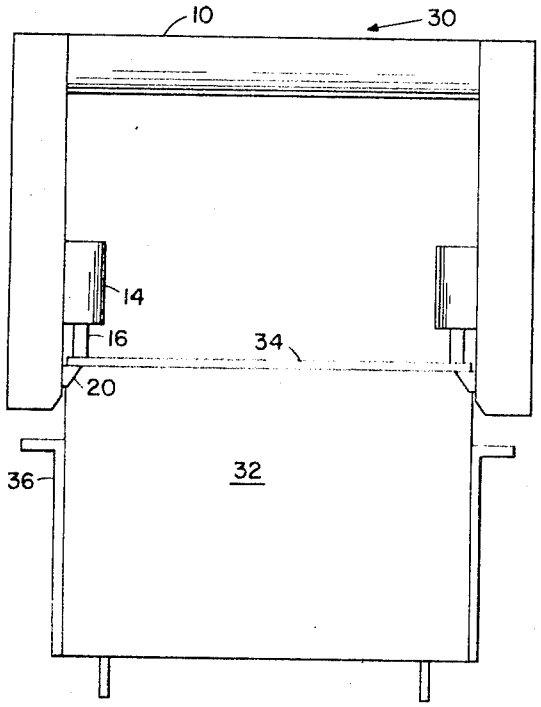


FIG. 2

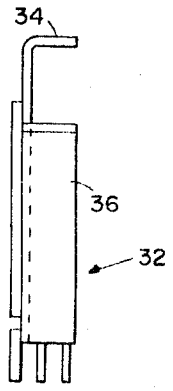


FIG. 3

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CIRCUIT CARD EXTRACTOR

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ABSTRACT OF THE DISCLOSURE

A plurality of posts each having a spring-loaded plunger resting on the top of a spring-biased pawl. The posts are mounted on a handle with the pawls facing each other. To remove a circuit card, the pawls are placed on the top of the lip of the circuit card and the posts are then pressed downwardly. The pawls recess into the posts until they pass the lip of the circuit card. The pawls then return to their normal position. This leaves the pawls beneath the lip of the circuit card and the plunger on the top of the lip of the circuit card. The circuit card can then be moved by pulling upwardly on the handle.

This invention relates to an extractor and more particularly relates to a circuit card extractor for removing circuit cards from a chassis.

The development of printed circuit cards and, thus, circuit card chassis led to the need for a device or means for easily removing the circuit cards from the chassis without damage to the circuit cards.

An object of this invention is to provide a circuit card extractor which is simple in design.

Another object of this invention is to provide a circuit card extractor which can be easily manufactured.

Yet, another object of this invention is to provide a circuit card extractor that securely engages the circuit card ensuring a safe removal of the circuit card from the circuit card chassis.

The card extractor is simple in design. Basically, it has a handle with two posts attached thereto. Included within the projected portion of each post in a spring-loaded plunger which rests on a pawl. As the posts of the card extractor are pressed downwardly over the top of the circuit cards, the pawls recess horizontally into the post and the plunger recesses vertically into the post far enough to allow the pawls to return from the recessed position to their normal position which places the pawl under the top portion of the circuit card with the plunger on the top portion of the circuit card. The circuit card extractor is now ready to extract the card.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawing in which like reference numerals designate like parts throughout the figures thereof and wherein:

FIGURE 1 is a view of the circuit card extractor partly in cross section;

FIGURE 2 is a view of the circuit card extractor engaging a circuit card; and

FIGURE 3 is an end view of the circuit card of FIGURE 2.

The preferred embodiment of the present invention is

very simple in construction. The handle **10** is a round aluminum bar which is pinned at each end to one end of an aluminum post **12**. At the other end of each aluminum post is a projected portion **14**, cylindrical in shape. Included within the projected portion of each post is a plunger **16** which is biased by a spring **18** against pawl **20**. The post area **22** immediately above pawl **20** is recessed so that the pawl may be pivoted into the post. The pawl is rotatably mounted on pivot pins **24**. The pawl is also biased to return to a horizontal position whenever pressure is removed therefrom. Spring **26** is supported by two support pins **28** with one end thereof circling about one of the support pins to rest against and bias the pawl.

The interaction of the pawls and the plungers in attaching the extractor **30** to a printed circuit card **32** will be described with reference to FIGURE 3. Initially, the extractor is located directly over the printed circuit card, then it is brought down on a top flange **34** of a heat sink **36** and sufficient force is applied to simultaneously force the pawls into the recessed portion of the post and to force the plungers up the walls of cylinder **14**.

The flange **34** is dimensioned such that as it moves the plungers upward, a point will be reached where the spring-loaded pawls will be free of the flange, and the released spring tension will then cause the pawls to revert to their normal position, but now with the flange between the plungers and the pawls. As the downward force on the extractor handle is removed, the relieved spring-loaded plungers will force the flange securely against the pawls. An upward force is then exerted on the extractor handle sufficient to pull the printed circuit card from the chassis (not shown). Once removed, the extractor is disengaged from the printed circuit card by laterally moving the flange away from the plungers and pawls.

While in accordance with the provisions of the statutes, We have illustrated and described the best forms of the invention now known to us, it will be apparent to those skilled in the art that changes may be made in the form of the apparatus disclosed without departing from the spirit of the invention as set forth in the appended claims, and that in some cases, certain features of the invention may sometimes be used to advantage without a corresponding use of other features. Accordingly, we desire the scope of our invention to be limited only by the appended claims.

What we claim is:

1. An extractor comprising: a handle; a plurality of post members secured to said handle; and respective spring-loaded means secured to each said post member for positively engaging an element to be extracted.

2. An extractor as set forth in claim **1** wherein each said spring-loaded means comprises a spring-loaded pawl, said pawl being pivotedly mounted in its respective post.

3. An extractor as set forth in claim **2** wherein each said spring-loaded means further includes a cylinder and a spring-loaded plunger disposed therein.

4. An extractor as set forth in claim **3** wherein each cylinder is disposed adjacent its respective pawl so that each plunger is forced against its respective pawl.

5. An extractor as set forth in claim **4** wherein each respective spring-loaded pawl and each respective spring-loaded plunger is mounted in opposing relationship.

6. An extractor as set forth in claim **5** wherein said posts are affixed such that said pawl and plunger of one post faces the pawl and plunger of said other post.

(References on following page)

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References Cited

UNITED STATES PATENTS

2,667,094	1/1954	Potter	81—9.5
3,136,040	6/1964	Bauer et al.	
3,224,082	12/1965	Moulin.	
3,317,989	5/1967	Cull	29—206 X

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3,377,689	4/1968	Kimmett	29—206 X

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