

## Description

This invention relates to pluggable electronic cartridges used in typewriters and computers. More specifically, the invention relates to an extraction apparatus for pulling the cartridge connector from the electronic board of the host device.

## BACKGROUND OF THE INVENTION

As electronic typewriters become more sophisticated and provide ever increasing functions, the products are following the lead of personal computers in that the functions or features may be added to the basic typewriter by the attachment of an auxiliary device which contains the necessary code to control the typewriter in the desired manner.

The approaches that have been followed in adding function to typewriters includes the use of dedicated circuit boards which are contained within an enclosure which is then attached to the typewriter both electronically and physically. This approach is cumbersome and limits the operator to a few optional functions.

Computers and more recently typewriters have begun using cartridges for the addition of function and memory capacity. The cartridges are connected to the electronics of the typewriter or computer by engaging a connector and a land pattern of a circuit board. To insure adequate contact between the connector and the lands, the connector exerts a significant force on the land when the connection is made. This force also serves to impede the removal of the connector. The natural tendency of the operator is to insert and remove the cartridge by rocking the cartridge relative to the circuit board of the machine. This is undesirable, particularly with cartridges which require that the electronic circuitry be electrically grounded prior to making the functional connections, since the ground protection is typically designed for a straight push insertion, and extraction.

Additionally, it is desirable from a design standpoint, to have the cartridge contained within the machine housing as much as possible. This not only makes the appearance of the machine more pleasing, but also minimizes the possibility of causing a machine malfunction through undesired impact of the cartridge.

The desired low profile or minimal exposure of the cartridge requires that only a minimum of the cartridge be exposed to the grip of the operator and thus hinders the extraction of the cartridge due to the small grip area and the relatively high engaging force exerted by the connector on the circuit board lands

U.S. Patent 1,900,782 to C. M. May discloses a light plug which has a bellcrank lever movable by a

person's thumb to pull the plug from the electrical wall socket. This device, while well suited for the environment in which it is used, exerts a force well off the center of the plug blades and actually tend to induce rocking or tilting of the plug, which in the present environment is very undesirable, as described above. Another device is disclosed in IBM Technical Disclosure Bulletin Vol.27, no. 7B, December 1984, pages 4206 - 4209.

This document discloses a cover for an electronic cartridge, which is designed for insertion into a tray. The cover comprises a handle which is used to extract the cover (and the attached cartridge) from the tray. The handle has two arms the ends of which comprise mounting pins engaging mounting holes borne by the cover, and cams. When the handle is rotated about the pins (which constitute its axis of rotation when mounted on the cover), the cams ride on flanges in the tray and disengage the connector assembly allowing the cover (and the associated cartridge) to slide out freely.

## SUMMARY OF THE DISCLOSURE

The present invention is a cartridge preferably with either a circuit board land pattern or a connector on the circuit board exposed through an opening in the cartridge housing. Attached to the cartridge housing near the extremity that will remain exterior to the machine housing is a device for assisting the operator in the extraction of the cartridge from the machine housing. The extractor comprises a handle which in turn is connected to a camming surface oriented in such a way as to engage the machine housing, when pivoted. The camming surface is defined so as to engage the machine housing at a fixed point to effect extraction of the cartridge from the connection with the electronic circuit of the machine.

The handle is grasped by the operator and rotated to drive the camming surface around a pivot axis and in so doing, the cartridge is forced upward and outward from the machine housing. The line of force exerted on the cartridge by the camming surface is such that the connector is disconnected from the circuit board without exerting a rocking or twisting motion.

## DRAWING

Fig. 1 illustrates the cartridge positioned within the machine housing.

Fig. 2 illustrates a portion of the cartridge partially withdrawn from the machine housing, and showing the keying arrangement necessary to control undesired interchangeability of cartridges.

Fig. 3 is a section view of the cartridge and machine housing.

Fig. 4 illustrates the cam profile and the relation of the cam with machine housing at the point of engagement. Fig. 5 illustrates the cartridge of the invention with the edge connector exposed through an opening in the cartridge for mating with the edge connector of the machine.

#### DETAILED DESCRIPTION OF THE INVENTION

The cartridge 10 is the type of pluggable cartridge in which the program or software for a particular function or feature of a typewriter or computer may be packaged or which may contain additional memory capacity. The cartridge 10 is insertable into the machine housing 12 which has a cavity or sleeve 14 formed to guide the cartridge 10 during insertion and extraction.

The cartridge 10 may be provided with a connector 16 which is exposed to the exterior of the cartridge 10 or alternatively the circuit board 18 contained within the cartridge 10 may have a pattern of lands that will mate with a connector 20 as shown in Fig. 5. There is no significance to the choice of the location of the connector 16 or 20.

The sleeve 14 of the machine housing 12 comprises a plurality of walls or slide surfaces 22 which act to constrain the cartridge 10 except in a direction which would permit insertion or extraction. The sleeve 14 may be keyed by means of a channel or some other irregularity 36 which will permit the insertion of a cartridge 10 with a complimentary irregularity 34.

When the cartridge 10 is fully inserted as is the case in Fig. 1, the top of the cartridge 10 protrudes only slightly above the machine housing 12, providing only a small portion of the cartridge 10 to be grasped. In order to extract the cartridge 10 from the machine housing 12, and at the same time insure that the cartridge is not deflected or pushed to one side or the other with possible attendant electrical or physical damage to the circuit or the circuit board 18 or 19 and connector 16 or 20, it is desirable to pull the connection between the connector 16 or 20 and the mating circuit board 19 or 18 so that the direction of movement is parallel to the plane of the circuit board 18 or 19 and perpendicular to the connection edge of the circuit board 18 or 19.

Connectors 16 of the edge connector type illustrated require a relatively large force to ensure both physical and electrical engagement. Overcoming such force with a small gripping area can be further compounded by the fact that many operators may have long fingernails which will interfere with the securing of a good grip on the cartridge 10.

In order to easily extract the cartridge 10, and to insure that the extraction force was exerted in the desired plane, a camming member 23 is pivotally mounted on the cartridge, on the cartridge sides 24. The pivot 26 supports the camming member 23 so as to allow the rotation of the camming member 23 and the exertion of a force against the machine housing 12.

The increasing radius cam profile 30 of the camming member 23 is configured to have a constant point of engagement on the machine housing. The constant point of engagement prevents the shifting of the forces and a resulting rocking or twisting of the cartridge 10, relative to the circuit board 18 within the machine housing 12. As the camming member 23 is rotated to create an extraction force on the cartridge 10, the radius or rise of the cam profile 30 increases at such a rate as to maintain the point of engagement in a constant position as described above.

The camming member 23 is rotatable by exerting an upward force on handle 28 which extends from the camming member 23 and across the width of the cartridge 10, thus interconnecting the essentially identical camming members 23 on each side of the cartridge 10. The use of dual camming members 23 insures that the force exerted on the cartridge 10 will be balanced on pivots 26 on both sides of the cartridge 10.

The cartridge 10 may be one where it should only be inserted into a designated sleeve and in those instances, may be keyed with a ridge 34 or other similar surface irregularity. The ridge 34 or alternative surface irregularity may be referred to as key 34. The key 34 is configured to mate with a complimentary shape such as a slot 36 in the sleeve 14. Unless the key 34 and the slot 36 match and the key 34 enters the slot 36, the cartridge 10 cannot be inserted into the machine housing 12.

The cartridge 10 is inserted into the machine housing 12 by introducing the cartridge 10 into the sleeve 14 and pushing. Movement of cartridge 10 into sleeve 14 brings connector 16 or 20 into engagement with the circuit board 19 or 18. The sleeve 14 acts to prevent the cartridge 10 from being rocked to ease the connection to the circuit board 19 or 18 within the machine housing 12.

Should the operator desire to remove the cartridge 10 from the machine housing 14, the handle 28 is grasped and lifted to rotate the camming members 23 forcing the cam profiles 30 of the camming members 23 against the machine housing 12. The engagement point between the camming devices 23 and the machine housing 12 remains at a constant point on the machine housing 12, thereby insuring a constant directional force exerted to cause the extraction of the cartridge 10 and disconnection of the cartridge 10 from the

circuit board 19 contained within the machine housing 12. The constant engagement point on the machine housing 12 prevents a deflection of the cartridge 10 and the attendant risk of damaging either the circuitry on board 18 of the cartridge 10 or the circuitry on board 19 contained in the machine housing 12.

The handle 28 and the camming members 23 on the cartridge 10 eliminate the need for a substantial portion of the cartridge 10 to be exposed above the machine housing 12 for gripping purposes.

### Claims

1. An electronic cartridge (10) for insertion into a machine housing (12), of the type including walls enclosing electronic circuitry, an aperture through at least one of said walls of said cartridge for connecting said circuitry to electronic components exterior to said cartridge, and extraction means for aiding in disconnecting said electronic circuitry from said electronic components, said extraction means comprising one or two cam means (23) having a pivot axis (26) and a handle (28), characterized in that said pivot axis is fixed with respect to said cartridge and is mounted on the exterior of said cartridge when said cartridge is fully inserted into said housing said cam means comprising a cam surface profile of increasing radius for engagement with a follower surface of said housing, thereby defining a constant point of engagement on said cam surface profile during said disconnecting, the effective pivoting of said cam means being caused by the action of an operator raising said handle (28).
2. The electronic cartridge of claim 1, wherein said means for connecting said electronic circuitry further comprises a female circuit board edge connector (16) positioned within said cartridge and proximate said aperture, for engagement with a circuit conductor pattern on a circuit board (18) exterior to said cartridge.
3. The electronic cartridge of claim 1 or 2 wherein said means for connecting said electronic circuitry further comprises a circuit conductor pattern on said electronic circuitry positioned within said cartridge and proximate said aperture, for engagement with a female circuit board edge connector (20) on a circuit board exterior to said cartridge.

### Patentansprüche

1. Ein elektronisches Einschubmodul 10 für die Einführung in ein Gerätegehäuse 12 des Typs, der über Wände verfügt, die elektronische Schaltungen umschließen und über eine Öffnung in zumindest einer der Wände des Einschubmoduls, um die Schaltungen mit außerhalb des Einschubmoduls liegenden elektronischen Bauteilen zu verbinden, und über ein Herausziehmittel, um die elektronischen Schaltungen von den elektronischen Bauteilen zu lösen, wobei das Herausziehmittel ein oder zwei Nockenmittel 23 umfaßt, die über eine Drehachse 26 und einen Griff 28 verfügen und dadurch gekennzeichnet sind, daß die Drehachse in Beziehung zum Einschubmodul befestigt ist und an der Außenseite des Einschubmoduls liegt, wenn das Einschubmodul völlig in das Gehäuse eingeführt ist, wobei das Nockenmittel ein Nockenoberflächenprofil mit steigendem Radius umfaßt, um Druckkontakt auf eine anliegende Oberfläche des Gehäuses auszuüben, wobei während des Vorgangs des LöSENS der Verbindung ein konstanter Druckpunkt auf das Nockenoberflächenprofil bestehen bleibt und die Wirkung des Drehens der Nockenmittel dadurch herbeigeführt wird, daß ein Bediener den Griff 28 anhebt.
2. Das elektronische Einschubmodul nach Patentanspruch 1, wobei das Mittel zur Verbindung der elektronischen Schaltungen weiterhin einer Steckerleiste für Leiterplatten 16 umfaßt, die innerhalb des Einschubmoduls und nahe der Öffnung liegt, um mit einem Kontaktflächenmuster auf einer Leiterplatte 18 verbunden zu werden, die sich außerhalb des Einschubmoduls befindet.
3. Die elektronische Einschubmodul nach den Patentansprüchen 1 und 2, wobei das Mittel zur Verbindung der elektronischen Schaltungen weiterhin ein Kontaktflächenmuster auf der elektronischen Schaltung umfaßt, die innerhalb des Einschubmoduls und nahe der Öffnung liegt, um mit einer Steckerleiste für Leiterplatten 20 verbunden zu werden, die sich auf einer Leiterplatte außerhalb des Einschubmoduls befindet.

### Revendications

1. Une cassette électronique (10) à introduire dans le capot d'une machine (12), du type comprenant des parois entourant des circuits électroniques, une ouverture ménagée au travers d'au moins l'une desdites parois de ladite

cassette pour permettre la connexion desdits circuits à des composants électroniques extérieurs à ladite cassette, et des moyens d'extraction pour faciliter la déconnexion desdits circuits électroniques desdits composants électroniques, lesdits moyens d'extraction comprenant un ou deux moyens de guidage (23) comportant un axe de pivotement (26) et une poignée (28), caractérisée en ce que ledit axe de pivotement est fixe par rapport à ladite cassette et monté sur l'extérieur de ladite cassette lorsque ladite cassette est entièrement introduite dans ledit capot, lesdits moyens de guidage comprenant une surface de guidage à rayon croissant pour solliciter une surface de suiveur dudit capot, définissant par là un point de sollicitation constant sur ladite surface de guidage pendant ladite déconnexion, le pivotement effectif desdits moyens de guidage étant provoqué par l'action d'un opérateur soulevant ladite poignée (28).

2. La cassette électronique de la revendication 1 dans laquelle lesdits moyens pour connecter lesdits circuits électroniques comprennent en outre un connecteur femelle par la tranche (16) d'une carte de circuits disposée dans ladite cassette, à proximité de ladite ouverture, pour solliciter une configuration de conducteurs des circuits d'une carte de circuits (18) extérieur à ladite cassette.
3. La cassette électronique de la revendication 1 ou 2 dans laquelle lesdits moyens pour connecter lesdits circuits électroniques comprennent en outre une configuration de conducteurs de circuits sur lesdits circuits électroniques disposés dans ladite cassette et à proximité de ladite ouverture, pour solliciter un connecteur femelle par la tranche (20) d'une carte de circuits extérieure à ladite cassette.

45

50

55

5