

ELECTRONIC PARTS STORAGE CASSETTE

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to an electronic parts storage cassette having a form of storing a plurality of electronic parts in a case which is used for supplying a plurality of electronic parts to a mounting machine for mounting electronic parts, and more particularly to an improvement in the structure of the case.

Description of the Related Art

An electronic parts storage cassette which is interesting for this invention is disclosed in, for example, Japanese Patent Publication No. 6-20910. Fig. 7 is a perspective view showing such conventional electronic parts storage cassette.

Referring to Fig. 7, an electronic parts storage cassette 1 includes a case 2 which is formed of, for example, resin. The case 2 is preferably transparent. A storage space is formed inside of the case 2 in which a plurality of, for example, chipped electronic parts are stored. A discharge port 3 for discharging these electronic parts is provided in the case 2 so as to communicate with the storage space.

The discharge port 3 can be closed and opened by means of a lid (not shown) contained in the case 2. The lid is formed of a flexible plate, and slidably provided between a position along the discharge port 3 and the top surface of the case 12. An open/close operating member 4 for performing the open/close operation of the lid is located on the top surface of the case 2. The open/close operating member 4 can reciprocates within a recessed portion 5, and the lid is opened and closed in accordance with the reciprocating motion of the open/close operating member 4.

The cassette 1 constituted as described above is removably attached to a hopper 6 provided to the mounting machine in order to supply a plurality of electronic parts to the mounting machine, as shown in Fig. 8. Referring to Fig. 8, there is shown the above-mentioned electronic parts 7 and a storage space 8 formed inside of the case 2. The

cassette 1 is attached to the hopper 6 with the discharge port 3 directed to the hopper 6.

To enable such attachment as described above, the case 2 of the cassette 1 includes an attaching portion 9 at the end portion thereof where the discharge port 3 is formed. The attaching portion 9 is provided with a pair of ribs 10 (only one rib is shown in Fig. 7). On the other hand, the hopper 6 is provided with a fitting portion 11, only a portion thereof is shown in Fig. 8. When the ribs 10 are slidably fitted to grooves (not shown) provided in the fitting portion 11, the cassette 1 is attached to the hopper 6.

The cassette 1, when attached to the hopper 6 as described above, the discharge port 3 is directed downward while inclining the length of the cassette 1 at about 45 degrees. After the attachment of the cassette 1 to the hopper 6 in this way, the open/close operating member 4 is operated to open the lid. This allows the electronic parts to pass through the discharge port 3 to be temporarily reserved in a reserve space 12 formed in the hopper 6. Communicating with the lower end portion of the reserve space 12, an alignment passage 13 is provided. The alignment passage 13 performs the function of aligning the electronic parts in a row while directing them toward a predetermined direction.

The electronic parts 7 discharged out of the alignment passage 13 of the hopper 6 are directed toward a fixed direction. The electronic parts 7 are transported on a suitable circuit board while being maintained by a vacuum suction chuck (not shown) and then, mounted on the circuit board.

The above-mentioned electronic parts storage cassette 1 is shipped from parts manufacturers to assembly manufacturers with the electronic parts stored therein. At the assembly manufacturers end, the cassette 1 is attached to the hopper 6 or the like which is to be provided to the mounting machine so as to supply electronic parts 7 to the mounting machine. The cassette 1 after the complete discharge of the electronic parts, i.e. the case 2 is removed from the hopper 6, and the attachment of another cassette 1 to the hopper 6 is repeated. Since the case 2 after the usage as described above is relatively expensive, and causes environmental issues when disposed by burning and the like, it is usually returned to the parts manufacturers for the purpose of using repeatedly.

However, when the case 2 is repeatedly used as described above, not only the cost of transportation from the parts manufacturers to the assembly manufacturers but also the

cost of transportation from the assembly manufacturers to the parts manufacturers are required. Thus, the repeated use of the case 2 is a factor preventing the cost-reduction of the electronic parts storage cassette 1 itself. Particularly, when the electronic parts storage cassette 1 is shipped abroad, the cost of transportation for returning the case becomes considerably expensive. Thus, the case 2 is not returned from abroad frequently.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an electronic parts storing cassette which can solve the above-mentioned problems.

This invention is directed to an electronic parts storage cassette for supplying a plurality of electronic parts to a mounting machine for mounting electronic parts which comprises a plurality of electronic parts, and a case including a storage space formed inside thereof for storing the plurality of electronic parts, a discharge port for discharging the electronic parts being communicated with the storage space, and an attaching portion for removably attaching the case to the mounting machine with the discharge port directed to the mounting machine. In order to solve the above-mentioned technological problems, this invention is characterized by comprising the following constitution.

That is, the case can be divided into a case body member providing the storage space and an adaptor member providing the discharge port and the attaching portion.

The case body member is formed of a sheet material and has an opening at one end portion thereof.

On the other hand, the adaptor member includes a socket portion for receiving the end portion of the case body member where the opening is formed so that the opening is communicated with the discharge port.

Paper is preferably used as a sheet material for forming the above-mentioned case body member.

This invention is also directed to the case body member and the adaptor member, respectively, which constitute the above-mentioned electronic parts storage cassette.

According to an electronic parts storage cassette of this invention, a state of supplying a plurality of electronic parts from the case body member to the mounting machine through

the adaptor member can be realized by inserting the end portion of the case body member into the socket portion of the adaptor member while attaching the adaptor member to the mounting machine. The case body member is removed from the adaptor member after the discharge of the electronic parts is completed, and another case body member storing electronic parts is attached to the adaptor member.

Therefore, according to the electronic parts storage cassette relating to this invention, the assembly manufacturers may receive the supply of only the case body member storing electronic parts from the parts manufacturers while reserving for the adaptor member. Since the case body member is formed of, for example, paper, it is cheap and can be thrown away after the discharge of the electronic parts is completed. Therefore, the case body member is particularly useful for shipping abroad the electronic parts. In addition, when a material such as paper which does not cause environmental issues even if it is burnt is used as a sheet material for constituting the case body member, it can be burnt without any problems after it is thrown away.

Furthermore, since the case body member according to this invention is equivalent to the conventional electronic parts storage cassette from which the discharge port and the attaching portion are removed, it can be reduced in bulk and weight as compared with the conventional electronic parts storage cassette. Therefore, also at this point, the reduction in the cost of transportation can be expected. The case body member according to the present invention may be used repeatedly.

Still further, according to the present invention, the adaptor member including the attaching member for removably attaching the cassette to the mounting machine is used. Therefore, when the attaching portion of the adaptor member is structured in common with the structure of the attaching portion of the conventional electronic parts storage cassette, the electronic parts storage cassette according to this invention can be applied as it is to the conventional mounting machine without adding design changes thereto.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view showing the appearance of an electronic parts storage cassette according to an embodiment of the present invention;

Fig. 2 is a front view showing a state where the electronic parts storage cassette shown in Fig. 1 is attached to a hopper of a mounting machine;

Fig. 3 is a perspective view singly showing a case body member included in the electronic parts storage cassette shown in Fig. 1;

Fig. 4 is an end view showing a case body member to be used in another embodiment of the present invention;

Fig. 5 is a perspective view showing an end portion of a case body member to be used in still another embodiment of the present invention;

Fig. 6 is a perspective view showing an end portion of a case body member and a lid to be used in yet another embodiment of the present invention;

Fig. 7 is a perspective view showing the appearance of a conventional electronic parts storage cassette; and

Fig. 8 is a front view showing a vertical cross section of the electronic parts storage cassette shown in Fig. 7 when attached to a hopper of a mounting machine.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 1 is a perspective view showing the appearance of an electronic parts storage cassette 21 according to an embodiment of the present invention. As shown in Fig. 2, the cassette 21 can be used by being attached to the hopper 6 of the mounting machine, similar to the conventional cassette 1.

The cassette 21 comprises a plurality of, for example, chipped electronic parts (not shown) and a case 22 having a storage space formed inside thereof for storing these electronic parts. The case 22 can be divided into a case body member 23 which is singly shown in Fig. 3 and an adaptor member 24.

The adaptor member 24 is formed of, for example, resin similar to the case 2 of the conventional cassette 1. The adaptor member 24 has the shape substantially similar to that of the conventional case 2 shown in Fig. 7 which is cut off leaving only the end of the discharge port 3 side. That is, the adaptor member 24 includes a discharge port 25 corresponding to the discharge port 3 shown in Fig. 7, an attaching portion 26 corresponding to the attaching portion 9, a pair of ribs 27 corresponding to the ribs 10 and a socket portion

28 for receiving the end portion of the case body member 23. The socket portion 28 may have such a size as to cover substantially the whole of the case body member 23. It is not necessary for the adaptor member 24 to be provided with the lid and the open/close operating member 4 with which the conventional cassette 1 is provided.

The case body member 23 is, as well shown in Fig. 3, formed of a sheet material such as a paper as a whole. A window 29 may be preferably formed in at least one of the side surfaces of the case body portion 23, and a transparent sheet 30 such as cellophane may be stretched over the window 29 so that the electronic parts in the case body member 23 can be seen from the outside and the number of remaining electronic parts can be known.

Perforations 31 are formed in one end surface of the case body member 23 and an area surrounded by the perforations 31 is to be a lid 32. When the perforations 31 are torn off to open the lid 32 in the direction shown by an arrow 33 and bring the lid 32 to the position such as shown by the imaginary line, an opening 34 is formed at the one end portion of the case body member 23.

As shown in Fig. 2, by sliding the attaching portion 26 to fit the ribs 27 into the fitting portion 11 of the hopper 6, the adaptor member 24 is attached to the hopper 6. Then, the lid 32 of the case body member 23 is opened and one end portion of the case body member 23 is inserted into the socket portion 28 in such a way that the electronic parts contained in the case body member 23 are kept from spilling. At this time, the opening 34 formed in the case body member 23 is communicated with the discharge port 25 of the adaptor member 24. Thus, as in the case of the conventional cassette 1 shown in Fig. 8, a plurality of electronic parts can be supplied from the case body member 23 into the hopper 6 through the adaptor member 24.

Upon completion of the discharge of the electronic parts from the case body member 23 as described above, the case body member 23 is removed from the adaptor member 24 and typically disposed of as it is. And, in order to supply additional electronic parts to the hopper 6, another case body member 23 storing electronic parts is attached to the adaptor member 24.

Figs. 4, 5 and 6 show another embodiments of the cassette body member, respectively.

According to a case body member 35 shown in Fig. 4, perforations 36 are formed in such a way that they surround about a half area of one end surface of the case body member 35, and the portion surrounded by the perforations 36 is a lid 37. Therefore, when the lid 37 is opened, about a half area of the end surface is to be an opening.

In Figs. 3 and 4, the lids 32 and 37 may be completely separated from the remaining portions of the case body members 23 and 35.

According to a case body member 38 shown in Fig. 5, a flap-like lid 40 is rotatably provided so as to close an opening 39 provided at one end portion of the case body member 38. The lid 40 is provided with rising walls 41 at the periphery thereof, and a slit 42 is formed in a free end side thereof. On the other hand, a tongue piece 43 is provided at the position opposite to the slit 42. In order to close the lid 40, the rising walls 41 are inserted to the inside of the peripheral walls defining the opening 39 and then, the tongue piece 43 is inserted into the slit 42. This can maintain a closing state of the lid 40 relatively strong. After the tongue piece 43 is pulled out of the slit 42 to open the lid 40, the end portion of the case body member 38 where the opening 39 is formed is inserted into the socket portion 28 shown in Figs. 1 and 2 of the adaptor member 24.

An opening 45 formed in one end portion of a case body member 44 shown in Fig. 6 is closed by a lid 46 which is provided as a separate member. The lid 46 is formed of, for example, resin and has a U-shaped cross section as a whole. The lid 46 is provided with engaging portions 47. When the engaging portions 47 are snapped into mating slots 48 formed in a case body member 44, the opening 45 is closed by the lid 46. When the lid 46 is somewhat strongly removed from the case body member 44, the opening 45 is formed, and in this state, the case body member 44 is attached to the adaptor member 24 shown in Figs. 1 and 2. The lid 46 may be formed of paper in place of resin.

WHAT IS CLAIMED IS:

1. An electronic parts storage cassette for supplying a plurality of electronic parts to a mounting machine for mounting electronic parts, comprising:

a plurality of electronic parts; and

a case including a storage space formed inside thereof for storing said plurality of electronic parts, a discharge port for discharging said electronic parts being communicated with said storage space, and an attaching portion for removably attaching the case to the mounting machine with said discharge port directed to the mounting machine,

wherein said case can be divided into a case body member providing said storage space and an adaptor member providing said discharge port and said attaching portion,

wherein said case body member is formed of a sheet material and has an opening at one end portion thereof, and

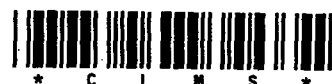
wherein said adaptor member includes a socket portion for receiving the end portion of said case body member where said opening is formed so that said opening is communicated with said discharge port.

2. An electronic parts storage cassette according to claim 1, wherein said sheet material includes paper.

3. A case body member for supplying a plurality of electronic parts to a mounting machine through an adaptor member including an attaching portion for removably attaching the case body member to the mounting machine for mounting the electronic parts, a discharge port for discharging the electronic parts and a socket portion for defining a space communicated with said discharge port,

wherein said case body member is formed of a sheet material, and

wherein said case body member is provided with a storage space formed inside thereof for storing a plurality of electronic parts and an opening to be closed by an openable lid at one end portion thereof, and wherein said one end portion is allowed to be received by said socket portion so that said opening is communicated with said discharge port.



4. An adaptor member for attaching a case body member including a storage space formed inside thereof for storing a plurality of electronic parts and an opening for discharging the electronic parts at one end portion thereof to the mounting machine in order to supply a plurality of electronic parts to the mounting machine for mounting the electronic parts,

wherein said adaptor member includes an attaching portion for removably attaching said case body member to the mounting machine, a discharge port for discharging the electronic parts and a socket portion for receiving the end portion of said case body member where said opening is formed.

