

TITLE OF THE INVENTION

Press Machine for Chip Type Electronic Components

BACKGROUND OF THE INVENTION

Field of the Invention

5 The present invention relates to a press machine for carrying out at least one of an operation for inserting chip type electronic components such as chip capacitors or chip resistors into receiving holes of a holding plate, an operation for transferring chip type electronic components
10 from a holding plate holding such chip type electronic components to another one, and an operation for pressing out chip type electronic components from receiving holes of a holding plate.

Description of the Background Art

15 In general, a holding plate elastically holding a number of chip type electronic components is employed for simultaneously applying electrodes onto end portions of the chip type electronic components, as described in U.S. Patent No. 4,395,184. This holding plate comprises a hard
20 substrate, a thin flat plate portion formed at a central portion of the hard substrate to be provided with a number of through holes, and a rubber-like elastic member which is embedded in a concave portion defined in the flat portion to be provided with receiving holes, passing
25 through the elastic member, in portions corresponding to

the through holes. This holding plate is adapted to form external electrodes on both ends of chip type electronic components in the following manner:

First, a guide plate, which is provided with a plurality of through holes in correspondence to the receiving holes of the holding plate, is arranged on the surface of the holding plate. Then chip type electronic components are inserted one by one into the through holes of the guide plate and downwardly pressed by press pins to be received in the receiving holes, so that the holding plate elastically holds the chip type electronic components to expose upper end portions thereof on its surface. The holding plate thus holding the chip type electronic components is then turned over and the downwardly exposed portions of the chip type electronic components are pressed against an electrode coating plate which is coated with electrode paste of silver or the like, so that electrodes are applied to the end portions of the chip type electronic components. After the electrodes are dried, a second holding plate is arranged under the first holding plate holding the chip type electronic components through a frame type spacer of a prescribed thickness. Then the chip type electronic components are transferred from the first holding plate to the second one by press pins which are similar to the

above, so that other end portions, provided with no electrodes, of the chip type electronic components are exposed. Thereafter electrode paste is applied to the other end portions of the chip type electronic components by an operation similar to the above, and then dried. Thus, electrodes are formed on both end portions of the chip type electronic components (refer to U.S. Patent No. 4,664,943).

In order to insert the chip type electronic components from the guide plate into the holding plate or transfer the same from a holding plate to another one, employed is a press machine having a number of press pins. U.S. Patent No. 4,395,184 discloses an example of such a press machine. This press machine comprises an upper plate which is vertically moved by a handle and a number of press pins which are downwardly projected from the upper plate. A mechanism for positioning a guide plate, a holding plate and a discharge plate in an overlapping state is provided under the upper plate.

A holding plate is adapted to form electrodes on chip type electronic components of various sizes in a range of 1.6 mm in length, 0.8 mm in width and 0.8 mm in thickness to 5.7 mm in length, 5.0 mm in width and 2.0 mm in thickness, for example. In order to insert or transfer chip type electronic components of different sizes into or

from the receiving holes of the holding plate, therefore,
it is necessary to use press pins of different diameters.
However, such press pins are generally integrated with the
press machine, and hence it is necessary to prepare a
5 plurality of press machines in response to the chip type
electronic components of various sizes, with
disadvantageous increase in cost.

Further, press pins are made of a hard metal such as
hardened steel, and those of about 0.5 mm in diameter may
10 be broken when the same are used by a little less than ten
thousand times. While a single press machine is generally
provided with about 2000 to 3000 press pins, the same
cannot be used if only one of the pins is broken. In this
case, it is necessary to disassemble the press machine in
15 order to exchange the broken press pin with a new one.
Thus, it takes much time to exchange the press pin while
stopping the press machine, leading to inferior
productivity.

SUMMARY OF THE INVENTION

20 Accordingly, an object of the present invention is to
provide a press machine which can efficiently replace
press pins in response to the type of chip type electronic
components and quickly exchange a broken press pin.

In order to attain the aforementioned object, the
25 press machine according to the present invention comprises

a table for horizontally supporting a holding plate in a home position, a pin head mounting member which is arranged above the table and supported to be rotatable about a horizontal axis, vertical means for vertically moving the pin head mounting member, a pin head, which is detachably mounted on the outer periphery of the pin head mounting member, having a plurality of press pins corresponding to receiving holes of the holding plate, and locking means for regulating rotation of the pin head mounting member in a prescribed position including a position for downwardly directing a surface of the pin head, projecting the press pins, in a horizontal state.

Preferably the pin head mounting member is provided on its sides with a plurality of mounting surfaces which can be provided with pin heads in the direction of rotation, and the locking means regulates rotation of the pin head mounting member in a position for downwardly directing a surface, projecting the press pins, of the pin head mounted on each mounting surface in a horizontal state.

It is assumed here that chip type electronic components are inserted into receiving holes of a holding plate, for example. In the initial state, a pin head having press pins corresponding to chip type electronic components in size is mounted on the mounting surface of

the pin head mounting member, which in turn is rotated to a position for downwardly directing the surface of the pin head projecting the press pins in a horizontal state and locked in this position by the locking member. In this state, a guide plate containing the chip type electronic components are placed on the holding plate, and these plates are integrally set on the table. Then the pin head mounting member is downwardly moved by the vertical means, so that the press pins are inserted in through holes of the guide plate, to press the chip type electronic components into the receiving holes of the holding plate.

According to the present invention, the pin head is detachable from the pin head mounting member. Thus, the pin head itself may be replaced in order to change the press pins, whereby the press body can be commonly applied to various sizes of chip type electronic components. In general, however, it is not easy to mount a considerably heavy pin head, which is provided with thousands of press pins, onto the lower surface of a pin head mounting member. According to the present invention, the pin head mounting member is rendered so rotatable that the pin head can be mounted at any arbitrary angle onto the upper surface of the pin head mounting member, for example. Thus, it is possible to remarkably improve workability.

When any press pin is broken, the pin head may simply

be exchanged with a new one without disassembling the
press machine, whereby it is possible to reduce the
exchange time, i.e., the stop time of the press machine.
The pin head having a broken press pin may be disassembled
5 in another place for exchanging the press pin.

When a plurality of pin heads can be mounted on the
pin head mounting member in the direction of rotation, the
following effects are attained: If a plurality of pin
heads having press pins which are different in diameter
10 from each other are mounted on respective mounting
surfaces of the pin head mounting member, it is possible
to cope with a change of production plan following type
change of the chip type electronic components by simply
rotating the pin head mounting member at a constant angle.
15 If a plurality of pin heads having press pins of the same
diameter are mounted on a mounting surface of the pin head
mounting member, it is possible to exchange a pin head
having a broken press pin by simply rotating the pin head
mounting member at a constant angle. Namely, it is
20 possible to further reduce the time for a change of
production plan as well as the exchange time.

In addition to the aforementioned operation for
inserting the chip type electronic components into the
receiving holes of the holding plate, the press machine
25 according to the present invention is also applicable to

an operation for transferring chip type electronic components from a holding plate holding the same to another one, and an operation for pressing out chip type electronic components from receiving holes of a holding plate.

The above and further features of the present invention are set forth with particularity in the claims and should become clearer from consideration of the following detailed description of an embodiment of the present invention given with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front elevational view schematically showing a press machine according to an embodiment of the present invention;

Fig. 2 is an enlarged view as viewed along the line II - II in Fig. 1;

Fig. 3 illustrates an upper portion of the press machine in detail;

Fig. 4 is a sectional view taken along the line IV - IV in Fig. 3;

Fig. 5 is an enlarged sectional view of the press machine shown in Fig. 1, which is applied to an operation for inserting chip type electronic components into receiving holes of a holding plate;

Fig. 6 is an enlarged sectional view of the press

machine shown in Fig. 5, which is in an intermediate stage of the operation for inserting the chip type electronic components into the receiving holes;

5 Fig. 7 is an enlarged sectional view of the press machine shown in Fig. 1, which is applied to an operation for transferring chip type electronic components from a holding plate to another one;

10 Fig. 8 is an enlarged sectional view of the press machine shown in Fig. 7, which is in an intermediate stage of the operation for transferring the chip type electronic components from the holding plate to the other one; and

15 Fig. 9 is an enlarged sectional view of the press machine shown in Fig. 1, which is applied to an operation for discharging chip type electronic components from a holding plate.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

20 Fig. 1 shows an embodiment of a press machine according to the present invention, which is applied to an operation for inserting chip type electronic components C into receiving holes a_1 of a holding plate A, an operation for transferring chip type electronic components from a holding plate holding the same to another one, or the like. The holding plate A is similar in structure to that disclosed in Japanese Patent Publication No. 3-44404
25 (1991).

The inventive press machine is formed by a press body 1 which is set in a horizontal position, a table 2 which is horizontally movably supported on the body 1 through a guide rail 3 and a uniaxial unit 4, a press head portion 5 which is vertically movably supported with respect to the body 1, and a vertical cylinder 6, serving as a press machine driving portion, for vertically driving the press head portion 5.

Fig. 2 shows a mechanism for moving the table 2. The guide rail 3 is longitudinally set on the upper surface of the body 1, and a slide bearing 10 is provided on the lower surface of the table 2 to slidably engage with the guide rail 3. The uniaxial unit 4 comprises a ball screw 11 and a guide rail 12, and a slide bearing 13 is mounted on the lower surface of the table 2 to slidably engage with the guide rail 12. A nut 14 is fixed to the slide bearing 13, to be fitted with the ball screw 11. The ball screw 11 is rotated/driven by a stepping motor 15, which is provided on the body 1. When the stepping motor 15 is driven, therefore, it is possible to longitudinally move the table 2 while maintaining the same in a horizontal state, and the position of the table 2 can be arbitrarily set by a pulse signal which is inputted in the stepping motor 15. A detecting plate 16 is fixed to the rotary axis of the stepping motor 15, and a position detector 17

of a photointerrupter is provided in correspondence thereto. The detecting plate 16 and the position detector 17 are adapted to confirm an initial position of the table 2 in an auxiliary manner.

5 The table 2 can be stopped at a set position shown by two-dot chain lines and two working positions shown by one-dot chain lines and solid lines in Fig. 2. The two working positions are provided for pressing a single holding plate A twice, for the reason described below.

10 A pair of set pins 18 are provided on both sides of the upper surface of the table 2 to engage in set holes a, (see Fig. 5) which are formed on both side portions of the holding plate A, thereby setting the holding plate A on a constant position of the table 2. In operation, the table
15 2 is brought into the set position for receiving the holding plate A thereon, and then retracted to the working positions for prescribed pressing operations. Thereafter the table 2 is again brought into the set position, for discharging the holding plate A.

20 Figs. 3 and 4 illustrate the press head portion 5 in detail. A pair of vertical shafts 20 are vertically movably supported on both sides of the working positions of the press body 1 through slide bearings 21. Lower ends of the vertical shafts 20 are coupled to a rod of the
25 vertical cylinder 6, serving as a press machine driving

portion, which is driven for vertically moving the vertical shafts 20. Nuts 22 are fitted with intermediate portions of the vertical shafts 20, and stoppers 23 for setting lower limit positions are detachably mounted on the upper surface of the body 1 for position-controlling the lower surfaces of the nuts 22.

A spindle 25 is fixed by bolts 26 to the upper ends of the vertical shafts 20 in a horizontally extending state. This spindle 25 is formed by a stepped shaft having a central portion of the maximum diameter, in-between portions of an intermediate diameter, and both end portions of the minimum diameter. A pair of pin head mounting members 27 and 28 are rotatably mounted on the in-between portions by bearings 29 and 30. Each of the pin head mounting members 27 and 28 is in the form of a rectangular sleeve having four mounting surfaces 27a or 28a on its periphery. Pin heads 31 to 34 are detachably mounted on the mounting surfaces 27a and 28a of the pin head mounting members 27 and 28 by bolts 47 to extend across the mounting surfaces 27a and 28a.

A gear 35 is fixed to an end of the first pin head mounting member 27, to be fitted with a pinion 37 which is fixed to an end of an operation shaft 36. A handle 38 is mounted on the other end of the operation shaft 36, which is rotatably supported by a pair of brackets 39 fixed to

an end upper surface of the spindle 25. The handle 38 is driven to rotate the pin head mounting member 27 through the pinion 37 and the gear 35, thereby integrally rotating the four pin heads 31 to 34 which are mounted on the pin
5 head mounting member 27.

The second pin head mounting member 28 is provided in its mounting surfaces 28a with locking grooves 40 to 43, so that a locking pin 44 is inserted in any one of these locking grooves 40 to 43 for positioning the pin heads 31
10 to 34 at intervals of 90°. In other words, it is possible to lock one of the pin heads 31 to 34 in a downwardly directed horizontal state. The locking pin 44 is reciprocally inserted in a support member 45 which is fixed to the other end upper surface of the spindle 25, to
15 be fixed in a position engaging with one of the locking grooves 40 to 43 by a set screw 46 mounted on the upper surface of the support member 45.

The pin heads 31 to 34 are similar in structure to each other. Fig. 5 shows the internal structure of the
20 pin head 33. This pin head 33 comprises a backing plate 48 which is detachably mounted on the mounting surfaces 27a and 28a of the pin head mounting members 27 and 28 by bolts 47 (Fig. 4), a pin plate 49 which is fixed to the lower side of the backing plate 48, flanged press pins 50
25 which are slidably inserted in holes of the pin plate 49,

and a stripper plate 51 for guiding forward end portions of the press pins 50. The press pins 50 are suspended from the pin plate 49 at flange portions 50a, which are moved up to positions to be in contact with a horizontal surface 48a of the backing plate 48 when reactive press force acts on the press pins 50. The press pins 50, which are thus slidable with respect to the pin plate 49, can be easily extracted when the pin plate 49 is detached from the backing plate 48. Thus, the press pins 50 can be easily exchanged with new ones. Guide shafts 52 are slidably inserted in four corners of the backing plate 48, so that head portions 52a of first ends thereof are inserted in recesses 53 of the pin head mounting members 27 and 28 and second ends are fixed to the stripper plate 51. The backing plate 48 is provided on centers of both end portions thereof with spring holes 54 for receiving second ends of springs 55, whose first ends are supported by the stripper plate 51. The stripper plate 51 is downwardly urged by repulsion of the springs 55, and prevented from displacement by the head portions 52a of the guide shafts 52.

Each of the pin heads 31 to 34 is vertically moved in a position shown by slant lines in Fig. 2. Each pin head has a width W which is equivalent to that of the holding plate A and a depth S (along movement of table 2) which is

smaller than that of the holding plate A. The reason for this is as follows: If the holding plate A holds a large number of chip type electronic components C, the pin head is exposed to extremely strong reactive force when the same is adapted to press all chip type electronic components C at a stroke, to require strong driving force. Thus, the press machine is increased in size, and it is difficult to attain accuracy. Further, an excess load is applied to the holding plate A, to crack or deform the same. Such disadvantages can be removed if the depth S of each pin head is made smaller than that of the holding plate A and the pin head or the holding plate A is relatively moved in the direction of depth to press the chip type electronic components C a plurality of times.

According to this embodiment, the depth S of each pin head is half that of the holding plate A, while the table 2 is moved between the two working positions which are shown by one-dot chain lines and solid lines in Fig. 2, to press a half of the holding plate A in the former position and then press the remaining half in the latter position. Thus, it is possible to press holding plates A having different depths with a single pin head, so far as the holding plates A have receiving holes a_1 of constant pitches and widths. If it is possible to press the holding plate A by the press pins 50 twice, the depth of

the holding plate A may not be integer times that of the pin heads 31 to 34, but may be freely varied. Further, the pin heads 31 to 34 can be reduced in depth, size and weight, to be easily mounted on/detached from the pin head mounting members 27 and 28.

An operation of the inventive press machine for inserting chip type electronic components into receiving holes of a holding plate is now described with reference to Figs. 5 and 6.

First, a holding plate A and a guide plate B are set on the table 2, which is located in the set position. At this time, the set pins 18 are inserted in set holes a_2 of the holding plate A to set the holding plate A on a prescribed position of the table 2, while pins b_1 projected from the lower surface of the guide plate B are inserted in the set holes a_2 of the holding plate A in an opposite manner to the set pins 18, thereby registering the guide plate B with the holding plate A. Chip type electronic components C are stored in through holes b_2 of the guide plate B so that lower surfaces thereof are supported by upper surfaces of receiving holes a_1 provided in the holding plate A. The upper end portions of the through holes b_2 provided in the guide plate B are tapered while cavities b_3 whose depths are smaller than the lengths of the chip type electronic components C are formed in the

lower surface of the guide plate B. The cavities b_3 , which are adapted to prevent the chip type electronic components C from contact with the guide plate B in removal thereof, are provided at need. After the holding plate A and the
5 guide plate B are set in the aforementioned manner, the table 2 is slid to one of the working positions, to locate the press pins 50 immediately above the through holes b_2 of the guide plate B as shown in Fig. 5.

The vertical cylinder 6 downwardly moves the pin head
10 33, so that the stripper plate 51 comes into pressure contact with the upper surface of the guide plate B to prevent the plates A and B from upward movement and the press pins 50 are inserted into the through holes b_2 of the guide plate B to press the chip type electronic components
15 C into the receiving holes a_1 of the holding plate (see Fig. 6). The press pins 50 are slightly retracted when the forward ends thereof strike the chip type electronic components C, so that the flange portions 50a are in contact with the horizontal surface 48a of the backing
20 plate 48 and the press pins 50 are thereafter pressed by the backing plate 48. When the chip type electronic components C are pressed into prescribed positions, the nuts 22 (Figs. 3 and 4) come into contact with the stopper 23, to define the lower limit position of the pin head 33.

25 Then the vertical cylinder 6 moves up the pin head

33, so that the press pins 50 are first upwardly moved by the pin plate 49 and then the stripper plate 51 is separated from the guide plate B.

Electrode paste of silver or the like is applied to the projected portions of the chip type electronic components B which are elastically received in the receiving holes a_1 of the holding plate A in the aforementioned manner. The electrode paste may be applied to the chip type electronic components C with a roll as disclosed in U.S. Patent No. 4,395,184, or with a coating plate as disclosed in U.S. Patent No. 4,664,943.

An operation of the inventive press machine for transferring chip type electronic components from a holding plate to another one is now described with reference to Figs. 7 and 8.

As shown in Fig. 7, a holding plate A' holding no chip type electronic components, a frame type spacer D, and a holding plate A downwardly holding chip type electronic components C, which are provided with electrodes on first ends thereof, are set in an overlapping manner on the table 2, which is located in the set position. The spacer D is provided with pins d_1 and d_2 for engaging with holes a_2 and a_2' of the holding plates A and A', so that the same is correctly registered with the holding plates A and A'. The holes a_2' of the lower

holding plate A' is made to receive the set pins 18 of the table 2, which in turn is moved to one of the working positions.

5 In a similar manner to the above, the chip type electronic components C are transferred from the receiving holes a_1 of the upper holding plate A to the receiving holes a_1' of the lower holding plate A' by the press pins 50, as shown in Fig. 8. The transferred chip type electronic components C are held by the holding plate A' 10 to outwardly project the second ends, which are not yet provided with electrodes. Then, electrode paste is applied to the projected second ends by a prescribed method.

15 An operation of the inventive press machine for discharging chip type electronic components from a holding plate is now described with reference to Fig. 9.

First, a discharge plate E and a holding plate A' are set in an overlapping manner on the table 2, which is located in the set position. In this case, the set pins 20 18 of the table 2 are received in holes e_1 which are provided in the discharge plate E and pins e_2 projected from the upper surface of the discharge plate E are received in holes a_2' which are provided in the holding plate A', whereby the discharge plate E and the holding 25 plate A' are correctly registered on a prescribed position

of the table 2. Thereafter the table 2 is moved to one of the working positions.

Similarly to the case of the inserting operation, chip type electronic components C received in receiving
5 holes a_1' of the holding plate A' are downwardly pressed by the press pins 50 into a concave portion e_3 of the discharge plate E. Thus, the chip type electronic components C provided with electrodes on both end portions thereof are collected in the discharge plate E.

10 In the aforementioned press machine, the press pins 50 may be replaced by those which are different in diameter, for pressing chip type electronic components C of different sizes. In order to cope with this, a plurality of pin heads having press pins of different
15 diameters are previously mounted on at least two of the four mounting surfaces of each pin head mounting member, so that an arbitrary one of the pin heads 31 to 34 is downwardly directed by rotation. At this time, the stopper 23 is replaced by that of a different thickness,
20 in order to simultaneously change the lower limit position of the press pins 50. In order to cope with breakage of any press pin 50 upon repetition of the press operation, further, pin heads having press pins of the same diameter are previously mounted on at least two of the four
25 mounting surfaces, so that a new pin head is downwardly

directed by rotation to take place of the pin head whose press pin is broken. Thus, the pin head can be easily exchanged without substantially stopping the press machine.

5 The locking pin 44, which is received in one of the locking grooves 40 to 43 provided in the mounting surfaces 28a of the pin head mounting member 28, can stop the pin heads 31 to 34 every 90°, thereby downwardly locking arbitrary one of the pin heads 31 to 34 mounted on the
10 mounting surfaces 27a and 28a in a horizontal state. Thus, it is possible to prevent the press pins 50 from inclination in the press operation. On the other hand, the mounting surfaces 27a and 28a can be upwardly locked when the pin heads 31 to 34 must be mounted on or detached
15 from the pin head mounting members 27 and 28, whereby it is possible to easily mount the pin heads 31 to 34 even if the same are considerably heavy, to reduce the operation time.

20 The present invention is not restricted to the aforementioned embodiment. For example, the pin head mounting members 27 and 28 are not restricted to the aforementioned half-split type sleeves which are rotatably mounted on the spindle 25, but may be formed by integral type sleeves. Alternatively, the spindle 25 may be
25 rendered rotatable to be provided with pin head mounting

surfaces.

Further, the locking means may be formed by a locking pin which is driven by a solenoid, in place of the manually driven locking pin 44. Although the pin head
5 mounting members 27 and 28 are rotated by the manually operated handle 38, the same may be rotated by an electric motor. It is possible to automate a change of production plan through a solenoid and an electric motor.

While the plate A and the plate B, the plate A and
10 the table 2, the spacer D and the plates A and A', the discharge plate E, the table 2 and the plate A', etc. are registered with each other through engagement of pins and holes, one of the members may be provided with a working face for registering a side surface of the other member in
15 each of such combinations.

According to the present invention, as hereinabove described, the pin head can be detached for type change or exchange of the press pins without disassembling the press machine and can be rotated with respect to the pin head
20 mounting members at an angle for facilitating the operation, whereby it is possible to efficiently carry out a change of production plan as well as exchange. Further, the press body is commonly applicable to various sizes of chip type electronic components, whereby the cost can be
25 reduced. When a plurality of pin heads can be mounted on

the pin head mounting members in the direction of rotation, it is possible to cope with a change of production plan and exchange by simply rotating the pin head mounting members at a constant angle. Thus, the time
5 for a change of production plan as well as the exchange time can be further reduced.

Although the present invention has been described and illustrated in detail, it is clearly understood that the same is by way of illustration and example only and is not
10 to be taken by way of limitation, the scope of the present invention being limited only by the terms of the appended claims.



CLAIMS:

1. A press machine for chip type electronic components for carrying out at least one of an operation for inserting chip type electronic components into receiving holes of a holding plate, an operation for
5 transferring chip type electronic components from a holding plate to another one and an operation for pressing out chip type electronic components from receiving holes of a holding plate, said press machine comprising:

10 a table for horizontally supporting a holding plate in a home position;

a pin head mounting member being arranged above said table and supported to be rotatable about a horizontal axis;

15 vertical means for vertically moving said pin head mounting member;

a pin head, having a plurality of press pins corresponding to receiving holes of said holding plate, being detachably mounted on the outer periphery of said pin head mounting member; and

20 locking means for regulating rotation of said pin head mounting member in a prescribed position including a position for downwardly directing a surface of said pin head, projecting said press pins, in a horizontal state.



2. A press machine for chip type electronic components in accordance with claim 1, wherein said pin head mounting member is provided on its side portions with a plurality of mounting surfaces capable of being provided with pin heads in the direction of rotation, and said locking means regulates rotation of said pin head mounting member in a position for downwardly directing a surface, projecting press pins, of said pin head mounted on each said mounting surface in a horizontal state.

3. A press machine for chip type electronic components in accordance with claim 1 or 2, wherein said pin head comprises a backing plate which is detachably mounted on said pin head mounting member and a pin plate, having holes for receiving said press pins, which is mounted with a prescribed space from said backing plate, and said press pins are provided with flange portions and received in said holes of said pin plate so that said flange portions engage with said pin plate, to be supported by said pin plate.

4. A press machine for chip type electronic components in accordance with claim 3, wherein said pin head further comprises a stripper plate which is provided to be oppositely approachable to/separable



from said pin plate, said stripper plate having holes for slidably receiving said press pins.

5 5. A press machine for chip type electronic components in accordance with any preceding claim, wherein said table is so horizontally movable as to move said holding plate between a working position located immediately under said pin head and a set position sidewardly displaced from said working position.

10 6. A press machine for chip type electronic components in accordance with claim 5, wherein said working position includes two positions.

15 7. A method of transferring a plurality of miniature components held in receiving holes of a first plate to a second plate, the method comprising:
 securely locating said first plate in a working position;

20 selecting a pin head comprising a plurality of press pins from a selection of pin heads mounted on a horizontally rotatable pin head mounting means, and securely positioning said pin head above said first plate;

 vertically moving said pin head in a first



direction so that said press pins pass through said receiving holes of said first plate and engage said components, thereby transferring said components from said first plate to said second plate; and

5 vertically moving said pin head in a second direction opposite to said first direction so that said press pins are withdrawn from said receiving holes in said first plate.

8. A method in accordance with claim 7, wherein
10 said components are transferred to a second plate which comprises a plurality of receiving holes for receiving said components.

9. A press machine for transferring a plurality of miniature components held in receiving holes of a
15 first plate into a second plate, the press machine comprising a pin head mounting member arranged to be rotatable about a horizontal axis and to provide means for holding at least two pin heads, each pin head having a plurality of press pins corresponding to the
20 receiving holes of a first plate, the machine being arranged such that the pin head in use can be replaced without dismantling the machine but instead, by simply rotating another pin head into a working position.



10. A method or machine substantially as described herein with reference to the accompanying drawings.
