

May 28, 1968

TAKASI NOJIRI
BLOCK CIRCUIT UNIT

3,386,010

Filed April 12, 1966

6 Sheets-Sheet 1

FIG. 1

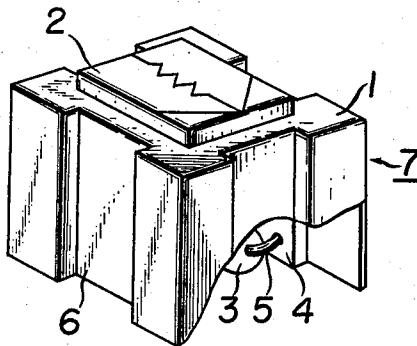


FIG. 2

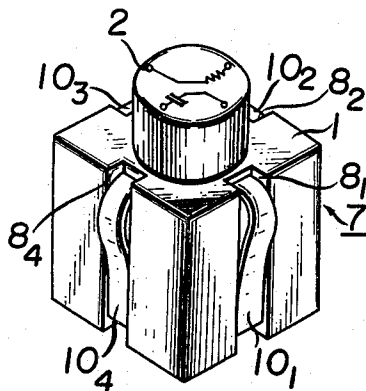
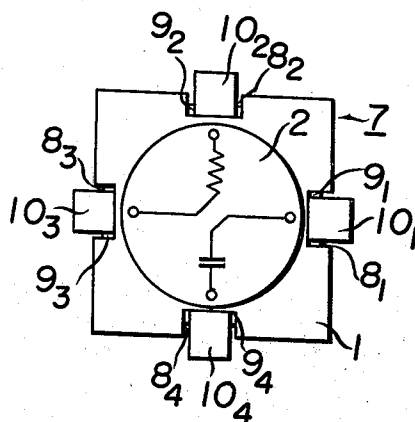


FIG. 3



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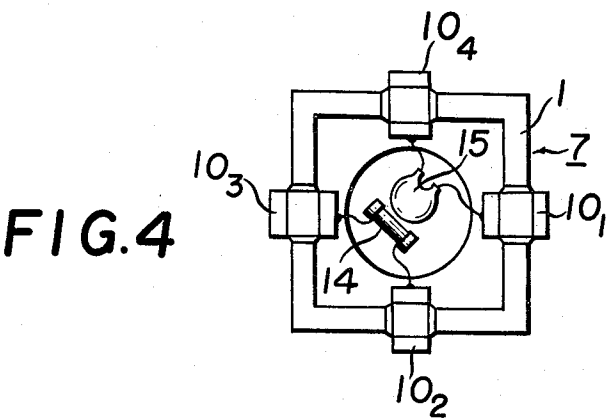
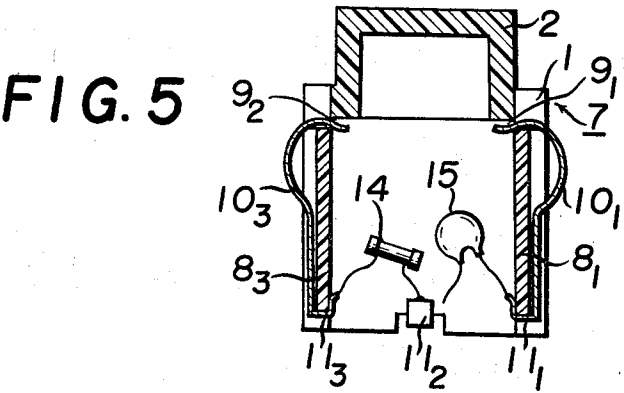
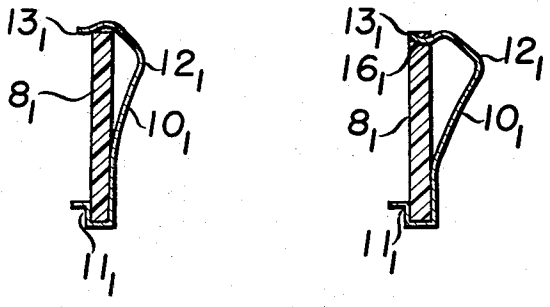


FIG. 6(A) FIG. 6(B)



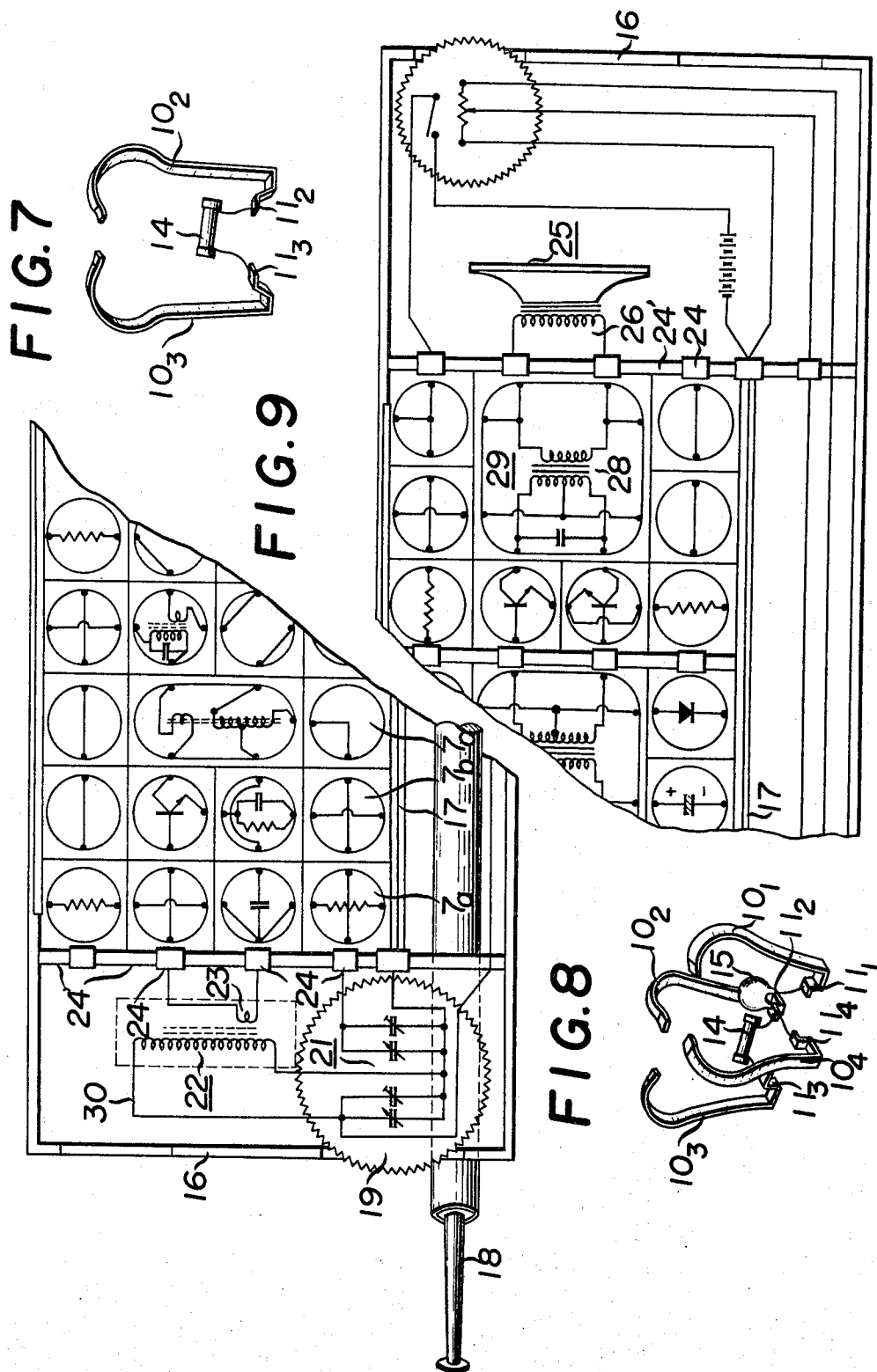
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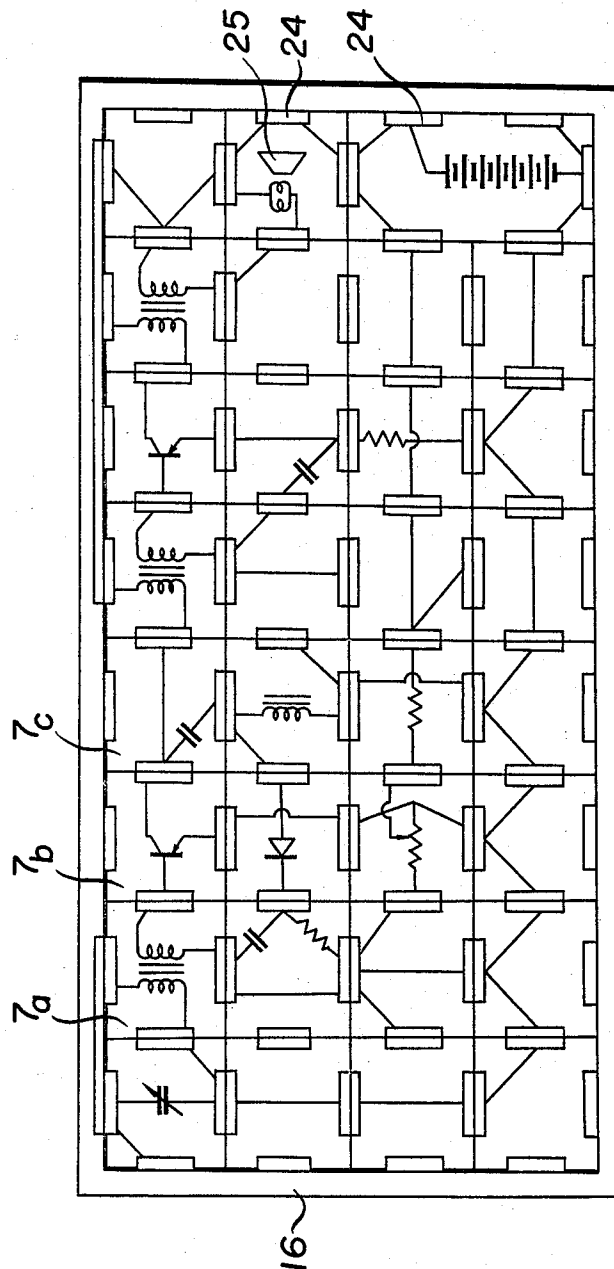
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FIG. 10



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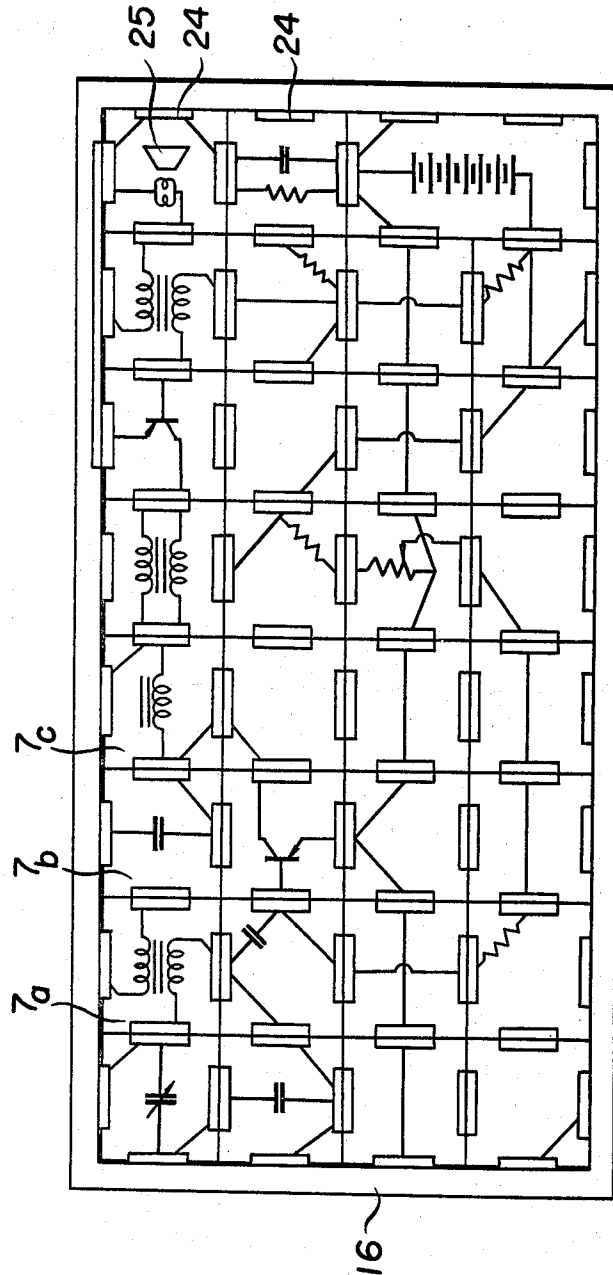
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FIG. 11



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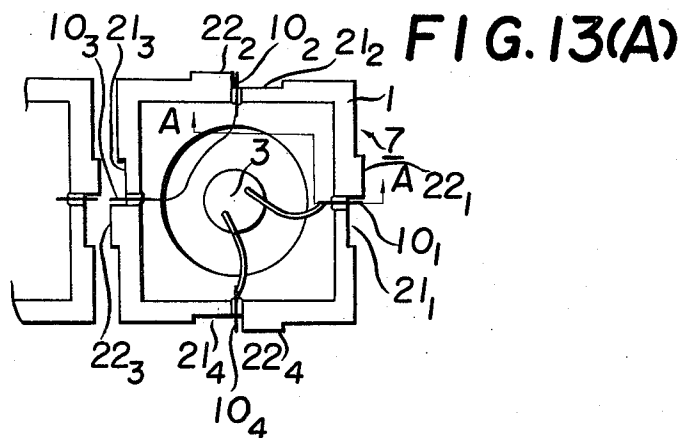
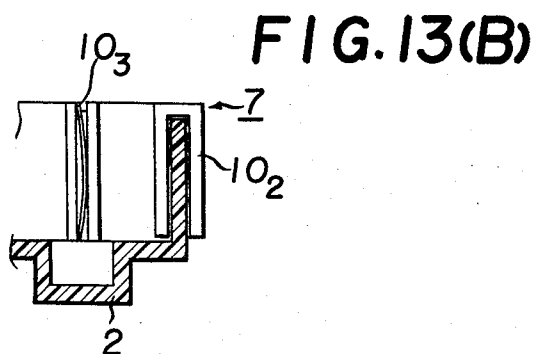
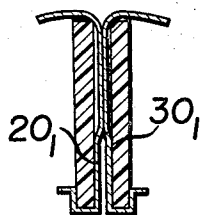


FIG. 12



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BLOCK CIRCUIT UNITTakasi Nojiri, 135 Oaza Haguro Aza Koyasu,
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Filed Apr. 12, 1966, Ser. No. 542,080

3 Claims. (Cl. 317-101)

ABSTRACT OF THE DISCLOSURE

A box structure, preferably a cube, contains circuit elements; the cube is formed with recesses at four circumferential sides, having spring strips located therein and connected to the internal circuit elements, the connection being indicated on the top of the cube so that circuits can be built up by pressing cubes together, the spring strips resiliently deforming to make a good contact and the top indicating the assembled circuit.

This invention relates to a block circuit unit comprising a block insulator carrying circuit elements such as resistors and capacitors.

In the manufacture of transistorized radio sets and amplifiers, it has been the conventional practice to solder transistors, capacitors and other circuit elements on a print base. In experimental and trial production of electrical devices, the above circuit elements are usually connected by connecting their terminals to an experimental circuit board. When connection of circuit elements is made by means of soldering, the elements are subject to the influence of heat conducted from soldering iron to the elements. This is particularly the case with transistors which are heat sensitive and readily tend to change their characteristics upon application of heat. When transistorized radio sets are used as the teaching material in schools the same circuit elements may be repeatedly removed, and inserted. Thus, the circuit components are affected by heat of soldering iron every time they are inserted in the circuit. Also connection by soldering is troublesome and is contrary to the demand for the simplification of assembly.

Wiring of an experimental circuit board, through the treatment with the soldering iron is not required, may result in mechanical and electrical and instability due to unevenness in size of circuit components and long and short lead lines. The concentration and intercrossing of a number of lead lines are apt to bring about misconnection and demand very intricate and painstaking labour.

The prime object of this invention is to provide a block circuit unit in order to simplify wiring assemblage for electric devices by using prefabricated blocks constituting circuit elements.

Another object of this invention is to provide a block circuit unit with which any person who has knowledge of electricity can build electric devices.

A further object of this invention is to provide a block circuit unit which permits simplification of assembly of electric devices and thus contributes greatly to the spread of scientific concepts.

Still further object of this invention is to provide a block circuit unit which can be easily inserted into or replaced from the circuit in the assembly of electric devices.

These and other features and objects of the invention will become more apparent from the following description regarding exemplary embodiments thereof taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view, partly broken away, of a preferred embodiment of the block circuit unit according to this invention;

FIG. 2 is a perspective view illustrating another em-

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bodiment of the block circuit unit according to the invention;

FIG. 3 is a plan view of the block circuit unit shown in FIG. 2;

FIG. 4 is a bottom view of the block circuit unit shown in FIG. 2;

FIG. 5 is a sectional view taken along a central plane parallel to the opposite sides of the block circuit unit shown in FIG. 2;

FIG. 6(A) is a side section illustrating a conducting strip for use in the block circuit unit shown in FIG. 2;

FIG. 6(B) is a side section illustrating a modification of the conducting strip shown in FIG. 6(A);

FIGS. 7 and 8 are perspective views respectively showing the states of electrical connection of the block circuit unit shown in FIG. 2;

FIG. 9 is a plan view of a transistor radio set using block circuit units shown in FIG. 2;

FIGS. 10 and 11 illustrate the application of block circuit units shown in FIG. 1 in two-crystal transistor radio set and transistor microphone respectively;

FIG. 12 illustrates the state of contact of the conducting strip shown in FIG. 2;

FIG. 13(A) is a bottom view of another modification of the block circuit unit according to the invention; and

FIG. 13(B) is a section taken along line A-A of FIG. 13(A).

Referring now to the drawings, and particularly to FIG. 1, the block circuit unit according to this invention comprises an insulating box member of cubic or block form, generally designated by numeral 1. Said box member 1 may be made of any suitable material but it is preferable to use synthetic resin, hard rubber or like insulating material. At the top of said box member 1 there is provided an indicating part 2 which indicates the state of electrical connection of circuit elements 3 contained in said box member 1. The indication may be made by any suitable means such as sticking of a plate or disc or it may be made integral with the box by forming a stepped portion.

Also the indicating portion 2 may be so constructed that the state of connection of the circuit elements within the box member 1 is visible from the outside by cutting off the upper wall portion of the box 1 and fitting a transparent plate member over the cut portion, which arrangement is very convenient for the observation of the inside of the box. At each inside surface of the insulating box member 1 was welded a conducting strip 4 and thereto is connected a lead line 5 of the circuit elements 3. Each outside surface of the insulating box member 1 is formed with a recess portion 6 and therein is affixed another conducting strip which is in turn electrically connected to said conducting strip 4. Alternatively, that portion of a conducting strip attached on the inner surface of the insulating box member 1 which is extending from the end of the box member may be folded back around the end and the end of that portion may be attached within recess 6. Thus, block circuit unit generally designated by 7 has each outside surface formed with a recess. However, this is not limited to this shape but a block circuit unit, not shown, having outside surfaces formed with projections or ridges or that it may cooperate with the previously mentioned block circuit unit may also be fabricated.

FIG. 2 shows another variety of the block circuit unit according to this invention and the like parts as that shown in FIG. 1 are designated with like numerals. As is apparent from the figure, the indicating part 2 is formed to be of a columnar or cylindrical form so that it may also serve as the knob. Therefore, this structure permits easier assembly and disassembly of electric devices than the case using the block circuit units of FIG. 1.

As shown in FIGS. 2 through 4, the insulating box member 1 is formed with vertical recesses 8₁ to 8₄ at the center of outside surfaces and openings 9₁ to 9₄ are formed at the top end of these recesses. In the recesses 8₁ to 8₄ are fitted with resilient conducting strips 10₁ to 10₄ which are particularly illustrated in FIG. 6(A). The conducting strip 10₁ is bent so as to form an engaging portion 11₁ which snugly fits the end of the wall of the insulating box member 1. The remaining portion of the conducting strip 10₁ is curved to form an arch portion 12₁ the top end thereof constituting engagement portion 13₁ and is inserted through the opening 9₁. Though the conducting strip 10₁ only is described by way of example, the same conducting strips are fitted at all sides of the box member too.

This arrangement is illustrated in FIG. 5; engaging portions 11₁, 11₃ of conducting strips 10₁, 10₃ are connected to lead lines of circuit elements 14, 15 such as resistors, capacitors and so forth. The circuit elements 14, 15 are connected to conducting strips 10₁ to 10₄ as shown in FIGS. 7 and 8 before these elements are placed within the insulating box member 1 in accordance with the wiring diagram of electric devices to be constructed, each lead line of the circuit elements 14, 15 is connected to the proper one of the engagement portions 11₁ to 11₄ and then these conducting strips are attached on the insulating box member 1 as described above.

FIG. 6(B) shows another variety of the block circuit unit where the engagement portion 13₁ of conducting strip 10₁ is insertedly secured in an opening 16₁ formed near the top of the recess 8₁ instead of inserting through the opening 9₁ as shown in FIGS. 5 and 6(A).

In the above description, circuit elements are resistors and capacitors alone, but any elements necessary for electric devices such as transistors, inductors, and if necessary, lead lines may also be employed.

An example of the application of block circuit units 7 in an electric device is now described.

FIG. 9 shows a plan view of a transistor radio set comprising an assembly of block circuit units of FIG. 2. A collapsible casing 16 is provided with a metal plate 17. Rows of block circuit units 7_a to 7_n are assembled in accordance with a wiring diagram so that said metal plate becomes at an earth potential. By this arrangement block circuit units 7_a to 7_n conducting strips 20₁, 30₁ of adjoining elements are in close contact with each other as shown in FIG. 12. The casing 16 is also provided with an extensible antenna 18 and a dial 19. The dial 19 is operative for adjustment of a variable capacitor 21 which cooperates with a coil 22 to form a resonant circuit.

The output terminals of the transformer including the coil 22 are connected to conducting members 24 suitably separated from each other by insulators 24' and appropriate conducting strips belonging to said block circuit units are connected to said conducting members 24. A coil 26 for a speaker 25 is connected via conducting members 24 suitably separated from each other by insulators 24' to block circuit units 29 constituting an output transformer 28.

Thus a transistor radio set can be constructed very easily.

It is, of course, to be understood that when the block circuit units according to this invention should be connected with other parts by means of lead lines owing to the designing of the device, lead lines or other ordinal circuit elements may be additionally employed as is seen from the figure.

The surface dimension of the block circuit units may be made twice, four times or suitable integral multiple of the ordinary square surface of the unit such as that designated at 29 in the figure.

FIGS. 10 and 11 show similar applications of this invention in a two-transistor radio set and a transistor microphone respectively, using block circuit units as shown in FIG. 1. In these figures like parts as that of FIG. 9 are also designated by like symbols.

FIG. 13(A) illustrates a further variety of block circuit unit according to this invention.

As is seen from the figure, the outside surfaces of the insulating box member 1 are respectively formed with recesses 21₁ to 21₄ and ridges 22₁ to 22₄. At the border of ridges and recesses conducting members 10₁ to 10₄ of inverted U shape are closely fitted to the box member 1, as shown in FIG. 13(B).

As is previously described, the circuit elements generally indicated by 3 contained within the insulating box member 1 are appropriately connected to the conducting members 10₁ to 10₄. When a number of these block circuit units are assembled in the above described way, adjacent units engage with one another while permitting electrical connection of adjacent conducting members. When this arrangement of block circuit units is applied in a movable or portable electric device, it strongly resists against shocks and vibrations since it has its mechanical strength enhanced by the engagement of adjacent units.

With the block circuit units as has been described the assembly and disassembly of electric devices are extremely simplified since it is only required to insert or remove individual block circuit units and soldering can be dispensed with.

From the foregoing description it will be apparent that, according to this invention the assembly of electric devices may be carried through with increased efficiency since soldering of circuit elements is replaced by mere insertion of individual block circuit units. Also, by using these units any person who has poor scientific knowledge can easily construct electric devices, so these units are revolutionally effective in the spreading of scientific concept. Further, the block circuit units according to this invention can also find application as teaching material in schools, so that their range of application is very extensive.

Although preferred embodiments of the invention have been described, it will be understood that various modifications thereof may be made without departing from the scope and spirit of the invention as defined by the appended claims.

What is claimed is:

1. A circuit unit block comprising a hollow box member of insulating material, said box member being of rectangular cross-section and having a top face and side faces;

longitudinal recesses formed in said side faces;

conducting members provided at the side faces of said box member and located within said recesses, said conducting members being of resilient material and bowed outwardly of said side faces;

circuit elements including lead lines disposed within said box member and connected to said conducting members;

and indicating means provided at the top face of said box member symbolically representing the circuit elements, including lead lines, within the box member.

2. Circuit unit block as claimed in claim 1, wherein at least part of the top face is of transparent plastic material.

3. Circuit unit as claimed in claim 1, wherein said conducting members are flat resilient strips fitting, when compressed, in said longitudinal recesses.

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