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[33] **Germany**

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[54] **BUILDING BLOCK FOR ELECTRICAL OR ELECTRONIC CONSTRUCTION KITS**
 26 Claims, 10 Drawing Figs.

[52] U.S. Cl. **339/17,**
 35/19, 317/101, 339/31

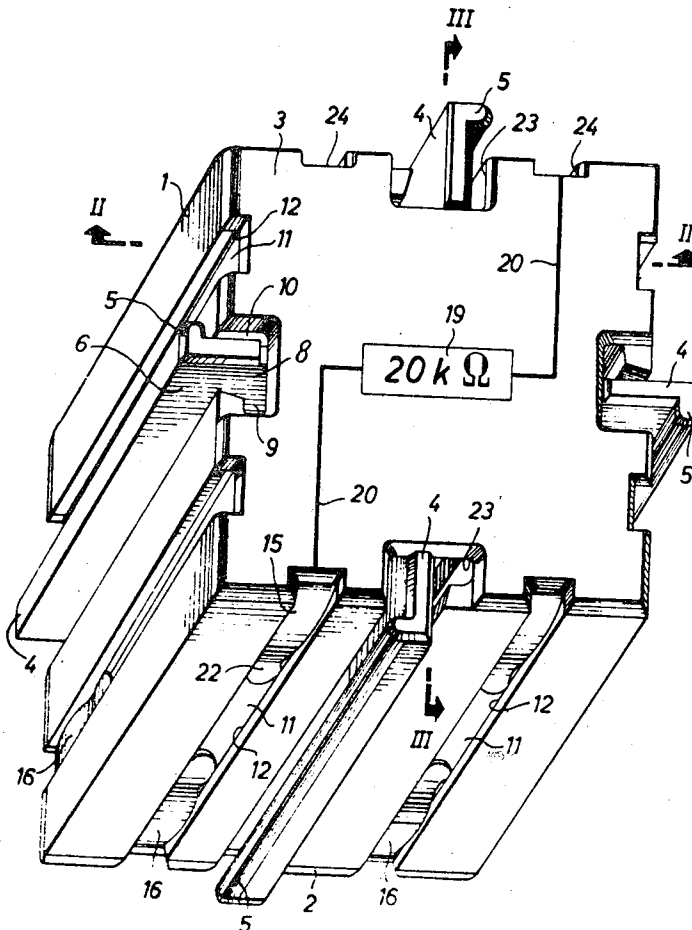
[51] Int. Cl. **H01r 23/08**

[50] Field of Search..... 339/17, 31,
 198 G; 317/101 CC, 101 D; 35/19.1; 46/241

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ABSTRACT: A building block for electrical or electronic construction kit is formed of a boxlike member having electrical contacts disposed on the outer surface thereof and contains electrical or electronic components within its interior portion. A plurality of blocks may be slideably attached together by an engaging web which protrudes perpendicular to the surface of the sides of the block from a recessed portion in the surface of the block. The shape of a section of the recessed portion and the protruding web coincide so that the blocks may be interlocked with each other.



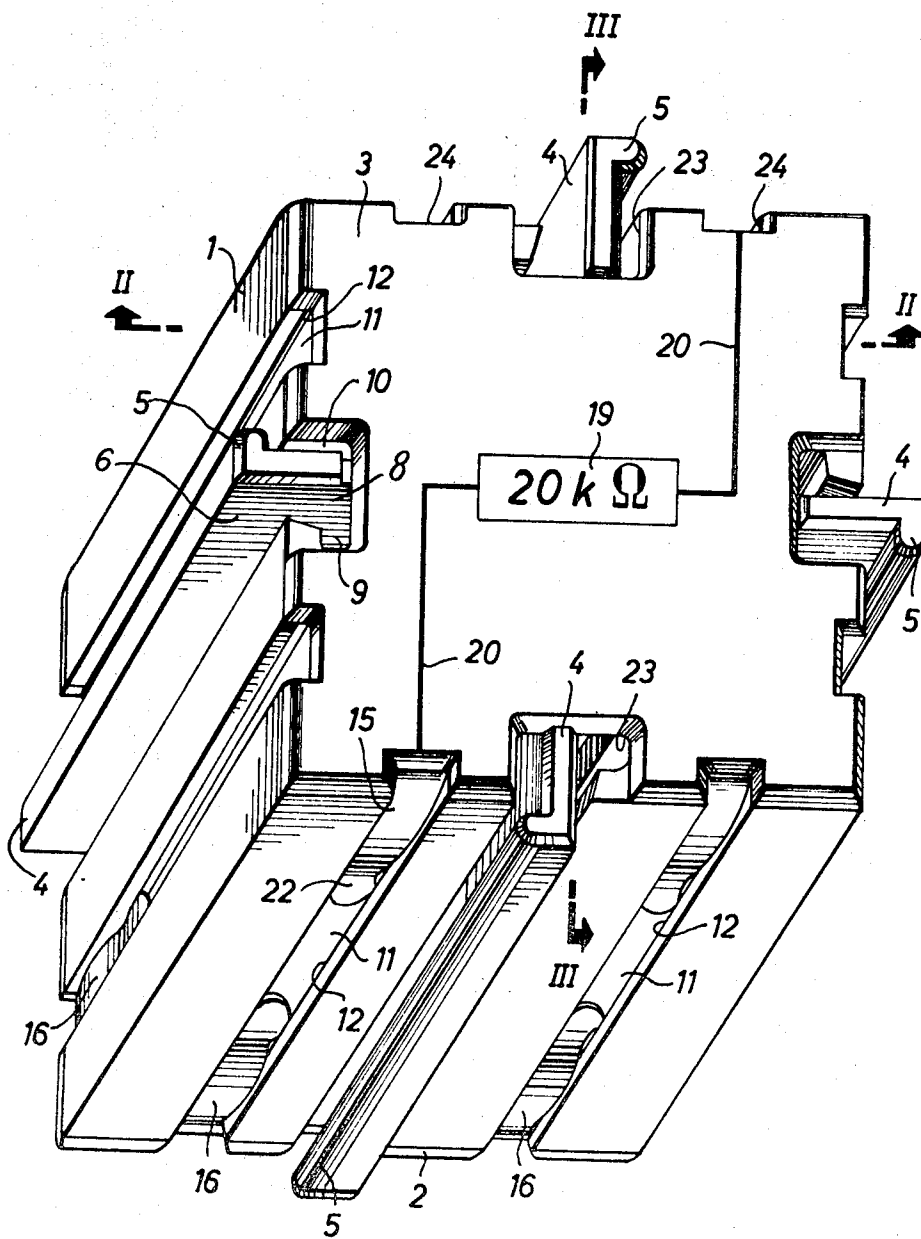


Fig. 1

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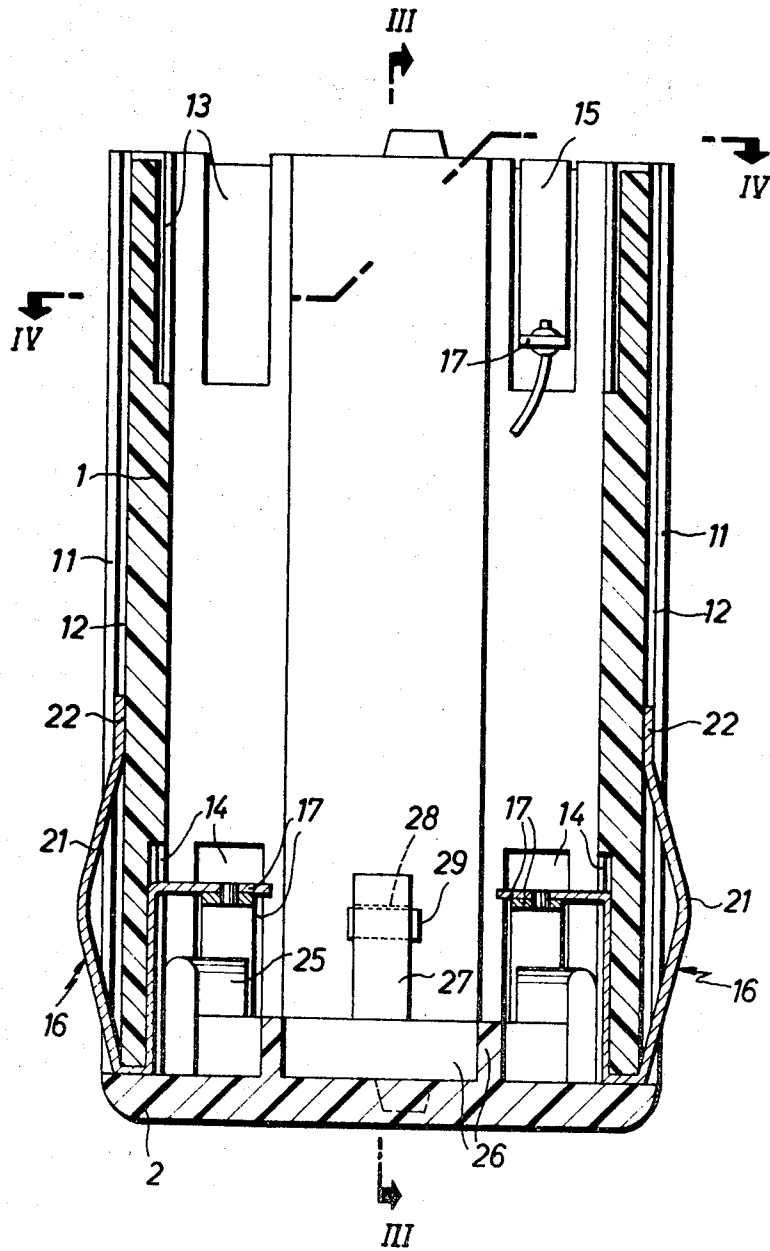


Fig. 2

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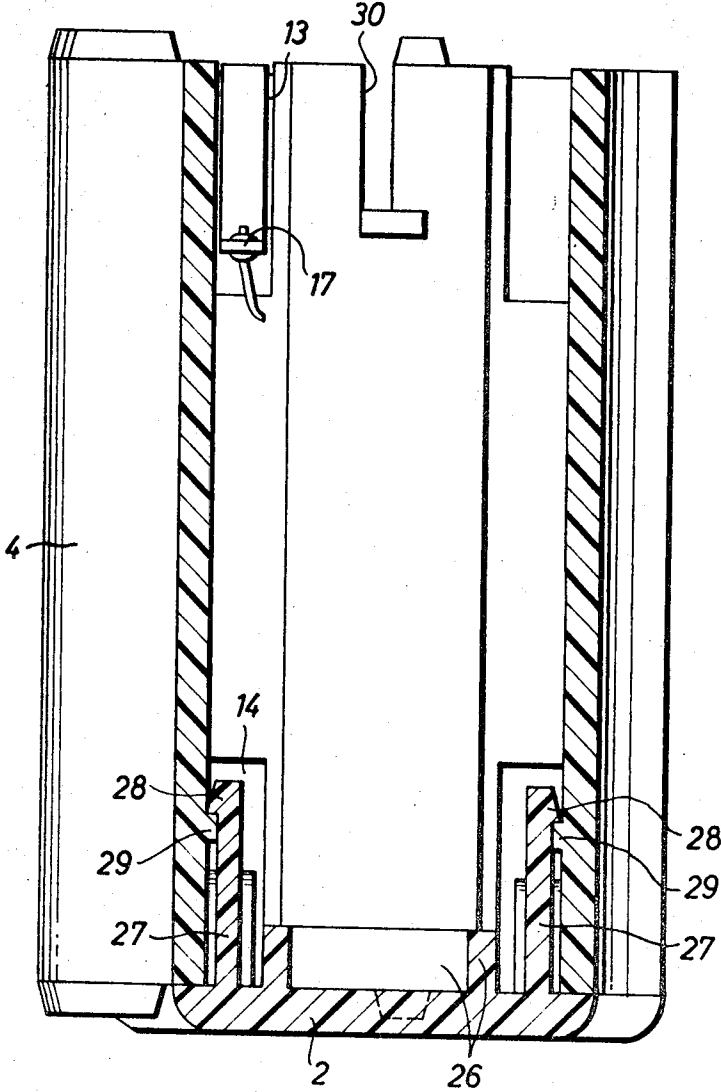


Fig. 3

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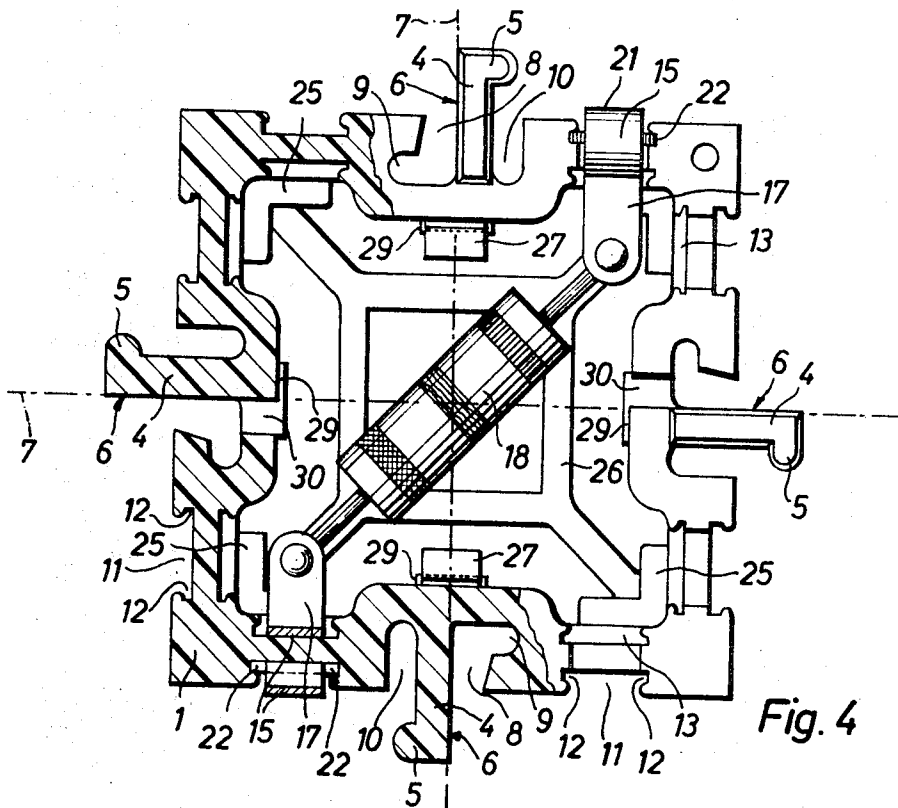


Fig. 4

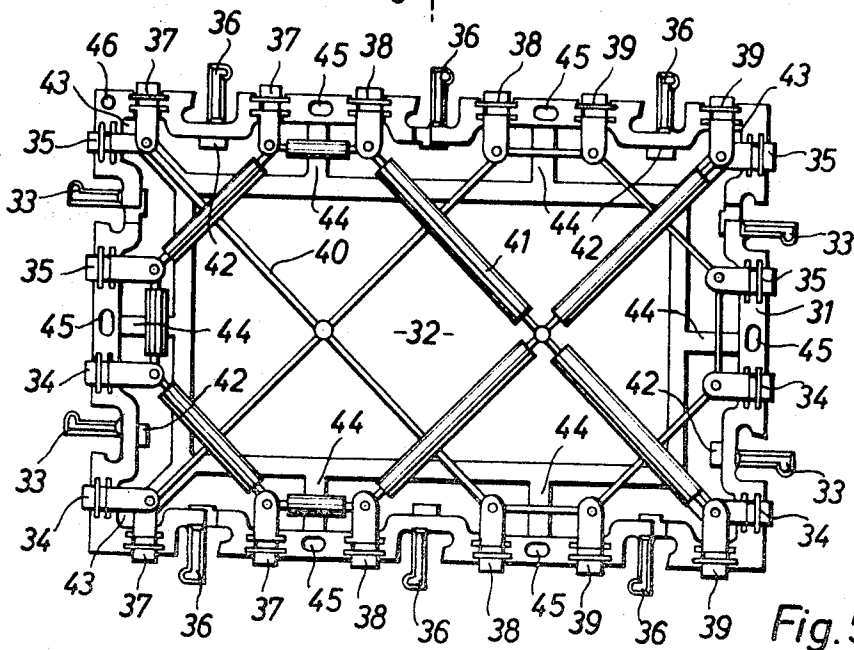


Fig. 5

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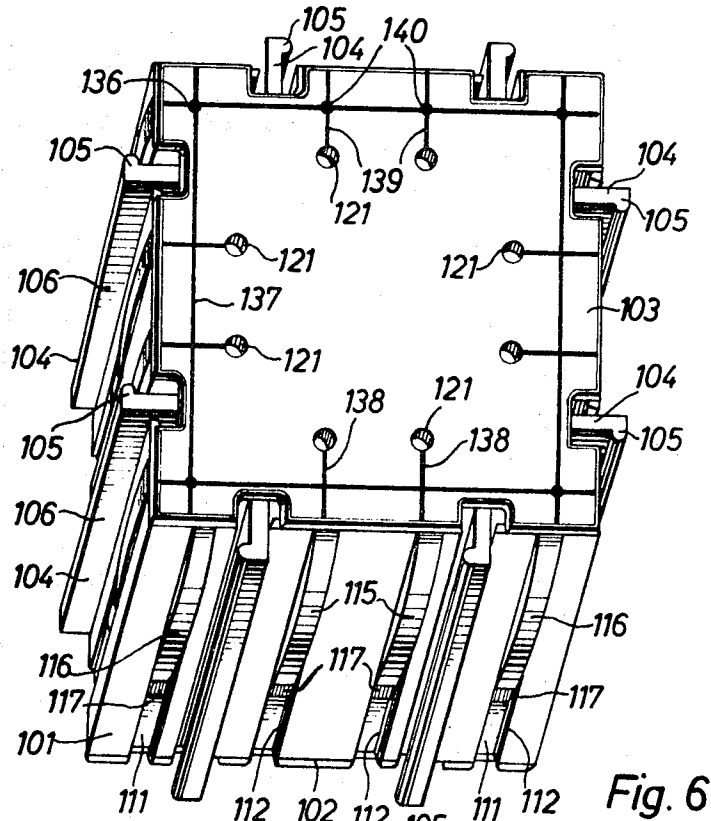


Fig. 6

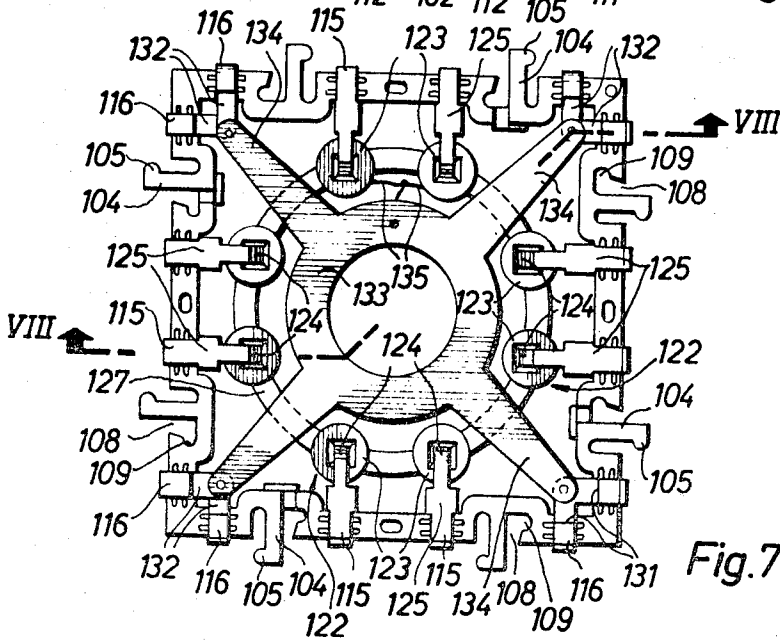


Fig. 7

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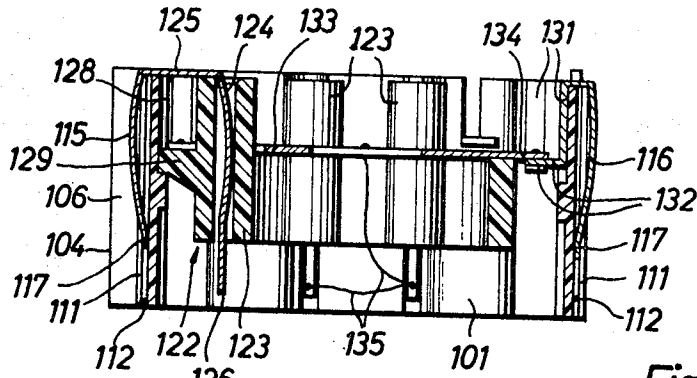


Fig. 8

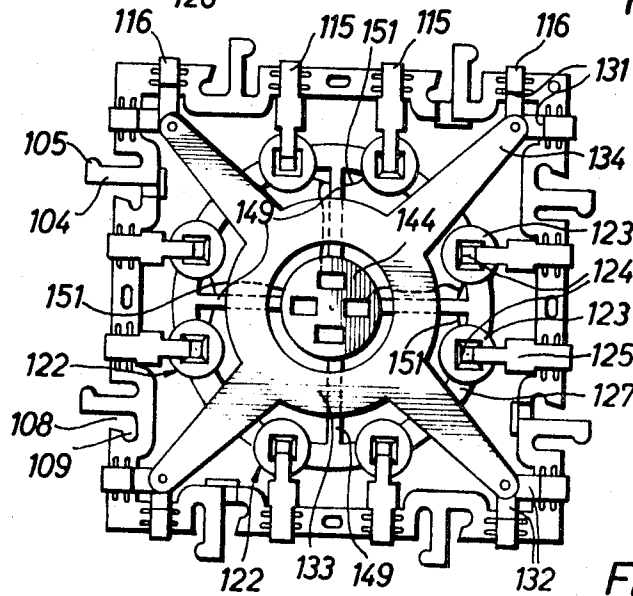


Fig. 10

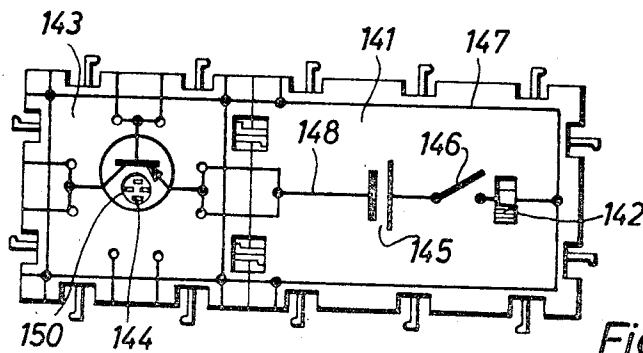


Fig. 9

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BUILDING BLOCK FOR ELECTRICAL OR ELECTRONIC CONSTRUCTION KITS

The present invention relates to a building block for electrical or electronic construction kits comprising a small box containing electric or electronic components or component assemblies and provided with contacts and retaining means at its sides, said retaining means enabling said small box to be connected with further identical building blocks in such a manner that the contacts disposed on mating sides of said small boxes are brought into contact with each other.

In a known construction kit employing similar building blocks, the sides of the small boxes made of plastic have been provided with small metal plates serving as contacts behind which magnets have been disposed in recesses in the small boxes. The building blocks are held together merely by the attractive power of the magnets, which simultaneously force the small metal plates serving as contacts against each other. It is a disadvantage of this known design of the building blocks that the blocks are easily displaced in parallel relation to the sides adhering to each other, such that they must be supported on a firm base in order to obtain structures of at least acceptable stability. In the known construction kit the building blocks are, therefore, placed on an iron plate and retained on said iron plate by means of magnets disposed at the bottom of the small boxes. The iron plate simultaneously serves as a bonding connection, small metal plates being disposed at the bottom of the small boxes to establish bonding contact with the iron plate. It is a disadvantage of these known building blocks that they cannot be combined into stable structures which retain their form and thus provide a useful apparatus that may be operated for prolonged periods of time. In addition, the building blocks of the known construction kit involve the risk of becoming detached from each other as a result of vibrations so that disturbances may occur even during short time tests and experiments. Thus the known construction kit is fit for use as a toy only, which while providing a certain instructive effect is of no use even as a demonstration kit for schools or the like because of the instability of the systems that may be built with it. A further disadvantage of the known arrangement lies in the fact that in order to provide for proper electrical contact a magnet is required for each contact in each of the two building blocks brought in contact with each other so that on the one hand each individual contact involves comparatively high costs while on the other hand only very few contacts may be accommodated on any one side. This causes considerable difficulties in building complex circuits, necessitating even the use of so-called dummy blocks containing only one continuous electric connection in order to enable connections to be extended in the manner required.

It is, therefore, an object of the present invention to provide a building block for electrical or electronic construction kits which enables a safe and durable connection to be established with adjacent blocks and which, in addition, permits a plurality of contacts to be disposed within a limited area so that with the aid of said blocks even complex circuits may be built at low cost, the circuits so built being very stable so that they may even be used as apparatus for practical applications for virtually unlimited periods of time without any risk of their falling asunder as a result of vibrations or the like.

According to the present invention this object is accomplished by an arrangement in which sliding connections are provided on the lateral surfaces of the small box perpendicular to the top and bottom surfaces and in which the contacts are formed by flexible blades extending in parallel relation to said sliding connections.

With the aid of said sliding connections very stable, self-supporting structures may be built in a very simple manner, said structures forming an integral whole, the stability of which cannot be affected by vibrations. The use of flexible blades extending in a direction parallel to said sliding connections provides for proper contact making with a straightfor-

ward construction of contacts by simply sliding the small boxes together. No additional measures are required to provide for electrical contact. Simultaneously this arrangement ensures that the contacts will properly bear against each other without hooking or otherwise disturbing each other. The building blocks according to the invention are, therefore, not only excellently suited for use as toys, where simplicity of assembly is of prime importance, but also as demonstration kits or as elements for apparatus that may be assembled and augmented on the unit box principle. Forming a self-supporting unit, any apparatus built with the aid of building blocks according to the invention may be used like any other ordinary apparatus and kept in operation for unlimited periods of time.

In one embodiment of the invention the lateral surfaces of the small boxes are provided with at least one web each having a reinforcement at its end and extending in the sliding direction perpendicular to said lateral surfaces, said lateral surfaces being additionally provided with relieved slots for the webs of adjacent boxes. A particularly advantageous construction is one in which the ends of the webs are all bent off so as to run parallel to the lateral surfaces of the small box and pointing in the same peripheral direction such that said reinforcements are formed by the bent-off ends. This embodiment of the invention offers the advantage that while any side of one box may be connected with any side of another box all boxes are prevented from being installed in the wrong position, i.e. with the bottom side up. A further advantage of unilaterally bent-off webs lies in the fact that in a further embodiment of the invention the webs may be disposed so that the webs of adjacent, assembled boxes are positioned back to back. The webs are then preferably disposed at the bottom of the slots serving to receive the webs of adjacent boxes such that the total height of the webs is twice that of the portion of said webs projecting from the outer surface of the box. This ensures improved flexibility of the webs and provides for a better compensation of tolerances.

In a preferred embodiment of the invention the small box consists of a cylindrical basic body forming the lateral walls and sealed by a lid at both ends. In this embodiment of the invention the flexible blades take the form of leaf springs bent into hairpin shapes which are slid over the rims of the cylindrical basic body and retained by the lids. This embodiment of the invention combines great simplicity of construction with particular ease of assembly. The components or component assemblies disposed within the cylindrical basic body of the small box may be soldered to the inner legs of the hair pin-shaped leaf springs in a simple manner.

In order to positively prevent the ends of the leaf springs from catching each other, a further embodiment of the invention provides for the legs of the leaf springs to be engaged, at least on the outside, by slots extending in parallel relation to the sliding connections, the ends of said legs bearing against the bottom of said slots while their center sections convexly project from said slots. In this embodiment of the invention the contact springs are brought in contact with each other with the curved portions projecting from the slots only. This arrangement ensures that the springs will smoothly slide past each other and simultaneously make proper contact. A particularly advantageous construction is one in which the slots are provided with relieved portions for the springs and in which the springs are provided with enlarged ends which are engaged by the edges of said slots so that the ends of the springs are prevented from leaving the slots.

The lids of the preferred embodiment of the invention may have flexible blades at their inner sides which extend into the interior of the basic body and are provided with projections directed towards the inner wall of the basic body, said projections being engaged by corresponding projections on the inside of the basic body. The lid may then be secured to the basic body by simply pressing it onto the latter. In order to enable the lid to be detached again, the lateral walls of the basic body are preferably provided with openings enabling the flexible blades to be forced back. The inner side of the lid may

further be provided with projections which fit in recesses of the basic body and/or seat against the inner side of the basic body, said projections serving to fix the location of the lid with respect to the basic body and vice versa. This results in a very high rigidity of the box even if a relatively thin-walled construction is adopted for the basic body. The lid may furthermore be provided with recesses in the area of the contact springs in order to provide for scanning of the contacts. These recesses need only be large enough to enable a plug to be inserted. Thus voltages may be tapped and other measurements taken at certain points of a circuit assembled from said building blocks. This feature is a distinct advantage both for checking the performance of assembled apparatus and for demonstrating certain functions when using these building blocks in a demonstration kit.

Obviously the building blocks according to the invention may be constructed in different sizes. It is advisable to use as basic form a building block with a square base provided with a sliding connection and two contact spring tracks disposed in parallel relation thereto on each lateral surface, the sliding connection being preferably arranged between the contact tracks disposed on one side of the small box, one of said tracks accommodating a contact spring for a continuous positive electric bonding connection and the other a contact spring for a continuous negative electric bonding connection. This simple arrangement enables both a positive and a negative bonding connection to be provided which extends across the entire circuit assembly from building block according to the invention so that dummy blocks may be dispensed with. In the preferred embodiment of the invention described above, the bonding contacts are preferably disposed at the lower edge and the functional contact at the upper edge of the small box. Apart from the aforementioned basic form, building blocks may be used in which at least one pair of opposite sides is an integral multiple of the sides of the basic form as regards size and shape, preference being given to boxes having twice, four times, or six times the size of the basic form.

In one embodiment of the invention the lid of the small box is provided with jacks for connection of the electrical or electronic components, each of said jacks being conductively connected to one or more flexible blades.

The use of such jacks enables the individual building blocks to be provided with electrical or electronic components or component assemblies as may be desired, after which these components or component assemblies may be interconnected in the desired manner by sliding the corresponding building blocks together. Wiring diagrams on the lids of the building blocks neatly show the circuits established without any need of laboriously sorting out the individual lines as in arrangements employing flying leads. Furthermore, the risk of incorrect connections is considerably reduced, less time is needed for combining the individual blocks into a system, and the completed assembly requires less space.

As the jacks serve to connect electrical or electronic components, a further version of this embodiment of the invention provided for jacks designed for directly receiving and contacting wires, preferably with diameters ranging from approximately 0.3 to 1 mm. Such wires are used on all commercially available electrical or electronic components, such as resistors, capacitors, coils, small lamps with soldered connections, semiconductor components and the like. In order to establish a safe mechanical and electrical connection with the building block and its contact-making flexible blades, it is enough to simply insert the connecting wires of such components into the jacks provided for the purpose. If necessary, the jacks may be interconnected by means of ordinary shorting links made of normal jumper wire.

In a preferred version of this embodiment of the invention, one sleeve each made of insulating material is disposed inside the building block underneath each of the plug holes provided in the lid and one or more of the flexible blades are provided with collector strips projecting into the jack and connected to the flexible blade disposed on the lateral surface of the box by

means of a web extending in parallel relation to the lid. In this manner, a direct metallic connection with the flexible blade or blades associated with the jack is established by inserting a component into a jack. At the same time, this arrangement results in a very simple construction of the building block, since the jack contacts and the flexible blades may be punched out of a single strip of sheet metal in a very simple manner and assembled with equal ease. Thus, this version of the present invention provides for a particularly simple, inexpensive, and, at the same time, particularly dependable construction of the building block according to the invention. It is advisable to provide one jack each for at least a number of the flexible blades of each building block, said jacks being disposed along straight lines extending in parallel relation to the sides of the small box. This arrangement thus provides a very neat fashion of associating the jacks with the individual flexible blades.

In order to simplify production, the sleeves of a building block may be joined together into an insert-type body may be produced in a simple fashion from plastic material by a casting or molding process and need then only be inserted in the small box. This arrangement, too, results in a very simple and inexpensive method of production.

In a particularly preferred version of this embodiment of the invention the insert-type body is formed by eight sleeves interconnected by a ring-shaped web, each of said sleeve locations being provided with a perpendicular projection extending up to the adjacent wall.

In order to increase the number of possible connections to a building block according to the present invention which is provided with jacks, the collector strips may be disposed so as to project from the sleeves in a downward direction. The ends of the collector strips projecting from the sleeves may then be used as soldering tabs for adding further components or establishing desired connections. In this manner, the number of possible applications of such building blocks is further increased. In addition special building blocks may be provided with a socket for an electronic tube or transistor, the connections of said socket being connected to corresponding jacks. These connections may also be established with the collector strips projecting from the sleeves, for example.

It is not necessary that all flexible blades of a building block provided with jacks be associated with said jacks. On the contrary, it is advisable to conductively interconnect, also in this case, a certain number of the flexible blades with which the building block is equipped in order to establish a through connection. These connections provide the possibility of leading a specific potential, e.g. earth, through all building blocks. A particularly simple connection of the flexible blades is achieved with the aid of a sheet metal star with arms extending between the jacks. Obviously, either one or a plurality of jacks may be connected to the through connection.

Further details and embodiments of the invention will become apparent from the following specification, in which the invention will be described and explained in greater detail, reference being made to the embodiments shown by way of example in the accompanying drawing. In other embodiments of the invention the features apparent from the specification and the drawing may be applied individually or in any desired combination. In the accompanying drawing

FIG. 1 is a perspective view of a building block according to the invention,

FIG. 2 is a section taken along the line II-II through the building block according to FIG. 1, but without the upper lid,

FIG. 3 is a section along the line III-III through the building block according to FIG. 1, but again without the upper lid,

FIG. 4 is a partial section and a partial top view along the line IV-IV in FIG. 2 of the building block according to FIG. 1 without lid, and

FIG. 5 is a top view of a building block without lid and without upper contact springs, of a size six times the size of the building block according to FIG. 1,

FIG. 6 is a view of a further building block according to the invention with a total of eight jacks,

FIG. 7 is a top view of the building block according to FIG. 6 with the lid removed,

FIG. 8 is a section taken along the line VIII-VIII through a building block according to FIG. 7,

FIG. 9 is a top view of two further building blocks according to the invention, of which one is provided with a transistor socket while the other is equipped with a switch for power supply, and

FIG. 10 is a top view, similar to that shown in FIG. 7, of the building block with a transistor socket according to FIG. 9.

The building block shown in FIGS. 1 to 4 consists of a cast or molded cylindrical body 1 made of plastic which forms the lateral walls of a small box with a square base and sealed by a lid 2 or 3 respectively at both ends. The cylindrical basic body of the small box is provided with a web 4 extending, on each side, in the longitudinal direction of said basic body and ending in a reinforcement 5 formed by a bent-off portion extending parallel to the outer surface of the basic body 1. The bent-off portions 5 all point in the same peripheral direction, viz clockwise in the representation according to FIGS. 1 and 4. The webs 4 are, in each case, disposed so that their backs 6 facing away from the bent-off portions 5 lie in the central longitudinal planes 7 of the basic body 1. The back 6 of each web is followed by a slot 8 with relieved portion 9 adapted to receive the web of an adjacent building block. Conversely, the web 4 of the block shown fits in the corresponding slot of an adjacent block so that the two webs lie back to back. In addition, a slot 10 is provided on that side of the web 4 in which the bent-off portion 5 is pointing, said slot having the same depth as slot 8 so that the web 4 is disposed at the bottom of a wide slot 8, 10 and has a length approximately twice that of the web portion projecting from the outer surface of the basic body 1. The webs 4 are thus provided with good flexibility and permit of greater dimensional tolerances without adversely affecting the good fit of assembled blocks.

On the outside of the basic body 1, a continuous slot 11, extending in parallel relation to the web 4 and provided with small relieved portions 12 at its edges, is disposed on either side of said web 4 on each side of said basic body 1. Opposite said slots 11 corresponding slots 13 and 14 extending from the upper and lower rims respectively of the basic body 1 over only part of its height are disposed on the inside of the lateral walls. These slots accommodate contact springs 15 and 16, which are formed by leaf springs bent into hairpin shapes and slid over the upper and lower rims respectively of the basic body 1. These leaf springs need not be inserted in all of the slots provided but only at those points where they are actually required in accordance with the design of the component or component assembly accommodated in the small box. In the building block shown in FIGS. 1 to 4 only two diagonally opposed leaf springs 15 are provided at the upper rim of the small box, the inner, bent-off ends 17 of said springs being soldered to a resistance 18. Accordingly, the symbol 19 of such a resistance is provided on the upper lid 3 of the building block and the lines 20 indicate the points at which the connections of the resistance are led out of the box with the aid of the contact springs 15. At the lower rim of the basic body 1, on the other hand, all slots 11 are occupied by contact springs 16 connected in diagonally opposed pairs in order to provide bonding connections, of which the contact springs disposed on one diagonal line may form the negative earth while those disposed on the other diagonal line may form a positive earth. The outer legs 21 of the contact springs 14 and 16 are curved into a convex shape so that their central sections project from the slots 11 while their ends 22 are bottomed in the slot. Said ends 22 are provided with enlargements so that their edges are engaged by the relieved portions 22 of the slots. This prevents the ends from escaping from the slots 11 and becoming hooked with the ends of the contact springs of adjacent building blocks.

The lids 2 and 3 consist of essentially flat plastic parts which are placed on the ends of the cylindrical body 1 with a flat seat and the rims of which are flush with the rims of said basic

body. At the points where the slots 9, 10 and the webs 5 are located, the lids are provided with corresponding recesses 23 at their edges. Additional smaller recesses 24 are provided above the slots 11 for the contact springs 15 and 16. Together with the corresponding recesses in the lids of adjacent building blocks these recesses provide openings for the insertion of contact pins by means of which voltages may be measured and signals controlled at any desired point of a circuit assembled from such building blocks. This arrangement also provides the possibility of shunting certain portions of the circuit in order to observe the resulting changes.

For centering on the basic body 1 the lids 2 and 3 are provided with angular guide webs 25 at their corners. These guide webs fit in the inner corners of the basic body 1 thus providing accurate guidance for the lid. Furthermore, the lid is provided with a reinforcing rib 26 at its inner side. The lid is secured to the basic body by means of flexible blades 27 projecting from flexible blades 27 projecting from the inner side of the lid, said blades being provided with projections 28 which are directed towards the inner wall of the basic body for engagement by corresponding projections 29 on the inner side of the basic body 1. The lids may thus be secured by simply pressing them onto the basic body, but cannot be readily detached again if the projections are designed accordingly. For applications where it is desired that the lid should be removable, the walls of the basic body 1 may be provided with openings 30 which are disposed opposite the flexible blades 27 and enable a tool to be inserted for forcing the blades back from the projections on the inside of the small box.

Like the basic body 1 of the small box the lids 2 and 3 may be made from a suitable plastic by a molding process.

The embodiment of the invention shown by way of example in FIGS. 1 to 4 represents an elementary building block of a specific system, i.e. a building block of a 118 size. It is obvious that building blocks may be made which are a multiple of said standard size. A building block having six times the size of the standard block is shown in FIG. 5 on a reduced scale as compared with FIGS. 1 to 4. This building block, too, consists of a basic body 31 sealed by lids 32 at both its ends. Two opposite lateral walls of the basic body 31 are provided with two webs 33 with two adjacent spring slots 34 and 35 each while three such arrangements of webs 36 and spring slots 37, 38, and 39 respectively disposed on either side of said webs are provided on the remaining sides. Here again, all spring slots at the lower rim of the basic body 31 are occupied by springs connected by lines 40 and 41 in the manner shown such that one half of the springs form the contacts of a negative earth while the other half of the springs form the contacts of a positive earth. The upper rim is provided with the number of contact springs required to establish the desired connections between the component assembly disposed within the small box and the components or component assemblies in adjacent building blocks. A wiring diagram on the upper lid of the building block indicates the use of the existing contacts.

In the same way as in the embodiment of the invention according to FIGS. 1 to 4 the lids are placed flat onto the ends of the cylindrical basic body 31 and retained by means of flexible blades 42 engaged by corresponding projections on the inner side of the basic body 31. Apart from angular guide webs 43 which fit into the corners of the basic body the lid is provided with supports 44 on its inner side, said supports being formed by webs bearing with their ends against the inner sides of the lateral walls of the basic body 31, thus preventing the walls of the small box from being deformed. In addition, the end faces of the walls of the basic body 31 are provided with holes 45 engaging pins on the inner side of the lid in order to accurately fix the location of the walls of the basic body with respect to the rim of the lid. Furthermore, an upright pin 46 engaged by a corresponding depression of the lid in order to prevent the lid from being installed with its sides in an inverted position may be provided at one corner of the basic body. This feature is important to ensure accurate correspondence between the wiring diagram on the lid and the contacts of the building block.

The building block shown in FIGS. 6 to 8 also consists of a cast or molded square basic body 101 made of plastic, which is sealed at both ends by a lid 102 or 103 respectively and provided with two webs 104 extending, on each side, in the longitudinal direction of said basic body and ending in the bent-off portions 105. The backs 106 of said webs are followed by slots 108 with relieved portions 109, said webs 104 with said bent-off portions 105 and said slots 108 with said relieved portions 109 forming the sliding connection first above described. Furthermore, a slot 111 extending in parallel relation to the web 104 is disposed on either side of said web 104 on the outside of the basic body 101. The edges of said slot 111 are provided with slightly relieved portions 112 and accommodate the flexible blades 115 and 116, the enlarged ends 117 of which are engaged by said relieved portions 112 of said slots 111.

In the embodiment of the invention according to FIGS. 6 to 8 the building block is provided with a total of eight jacks associated with the flexible blades 115 disposed between the webs 104 on each side of the basic body 101. The lid 103, which is engaged by projections on the inside of the basic body 101 with the aid of flexible blades not shown in detail and which is thus secured to the basic body, is provided with eight corresponding holes 121. The jacks 122 themselves are disposed inside the basic body 101 underneath the lid, as shown in detail in FIGS. 7 and 8. Each jack 122 consists of a plastic sleeve 123 and a spring strip 124, which passes through said plastic sleeve and the width of which corresponds to the inside width of the square bore of said plastic sleeve 123. The collector strip 124 is curved in such a manner that its upper and lower ends are in contact with an internal surface of the sleeve 123 while its central portion bears against the opposite internal surface of the sleeve. The dimensions of the sleeve 123 are such that wires of approximately 0.3 to 1.0 mm. may be inserted into the sleeve and that proper contact with such wires is positively ensured.

The collector strips 124 and the flexible blades 115 are made from a single piece of spring sheet and interconnected by a web 125 extending in parallel relation to, and underneath, the lid. The lower end 126 of the collector strip 124 projects from the sleeve 123 in a downward direction and affords the possibility of establishing conductive connections with said collector strip 124.

The eight sleeves 123 of the embodiment shown by way of example are interconnected by a ring-shaped web 127 to form an insert-type body, in which said sleeves 123 are so disposed that the two sleeves associated with the collector blades 115 on one side of the basic body 101 are located on a straight line parallel to that side. At the location of each sleeve 123, said insert-type body is provided with projections 129 extending perpendicularly to the adjacent wall of the basic body 101 and engaged by slot-type recesses 128 disposed on the inside of said basic body 101. The projections 129 rest on shoulders formed by the lower ends of the recesses 128. The length of said recesses 128 and the arrangement of said projections 129 is such that the insert-type body formed by the sleeves 123 and the ring-shaped web 127 ends immediately underneath the lid, as clearly shown in FIG. 8, so that the insert-type body will be securely retained in the basic body 101 after the lid has been positioned.

The flexible blades 116 disposed at the corners of the basic body 101 are provided with sections 131 bearing against the inside of said basic body 101. The lower ends 132 of said flexible blades 116 are bent-off towards the inside and dimensioned in such a manner that the ends of the flexible blades 116 disposed at the same corner of the basic body overlap each other as clearly shown in FIGS. 7 and 8. Said ends 132 are interconnected by a sheet metal star 133, which is disposed above the ring-shaped web 127 of the insert-type body provided with the sleeves 123 and the arms 134 of which extend diagonally between adjacent sleeves 123 into the corners of the basic body 101, the ends of said arms resting on the bent-off ends 132 of the flexible blades 116 disposed in the corners of the basic body. The ends of the arms 134 are con-

ductively connected to the ends 132 of the flexible blades 116, e.g. soldered or welded. Accordingly, all flexible blades 116 have the same potential and enable this common potential to be led through all interconnected building blocks. In order to enable electrical or electrical or electronic components to be connected to this potential, two of the jacks 122, in FIGS. 6 and 7 the upper two jacks, are connected to this potential by connecting the lower ends 126 of the collector strips 124 disposed inside said jacks to the sheet metal star 133, preferably by means of flexible wires 135. As will be noted from FIG. 6, the routing of the wires is indicated by corresponding lines on the lid 103 of the building block. The edge lines 137 provided with a dot 136 at the intersections indicate that all of the contact-making springs 116 are conductively interconnected, while the lines 138 and 139 extending from the holes 121 to the contact-making springs 115 demonstrate the connection of the jacks 122 disposed underneath said holes 121 with the adjacent flexible blades 115. The dots 140 at the intersections of the lines 130 originating at the upper two holes 121 with the edge line 137 demonstrate that the two corresponding jacks and the two corresponding flexible blades are conductively connected to the flexible blades 116 disposed at the corners.

The building block described above may be connected to any desired circuit elements by simply inserting the connecting wires of such circuit elements into corresponding jacks. The great number of jacks provided enables a great number of connections to be made so that even complex circuits may be built up with the aid of such a building block in a simple manner without any need of a confusing array of flying leads and/or a complex setup and time-consuming soldering work, the more so as the use of building blocks of a different size and a different number of jacks is also possible. Considering that, in addition, internal connections between the jacks and the through connected potential may be easily established by the user of the building block according to his requirements, the building blocks according to the present invention afford virtually unlimited possibilities for the composition of test setups and the like. It will be apparent that in particular all jacks need only be connected to the associated contact-making springs.

On the other hand, special building blocks such as shown in FIGS. 9 and 10 may be provided for specific applications. FIG. 9 shows a battery by building block 141 with a switch 142 connected to a building block 143, which is provided with a transistor socket 144. One pole of the battery indicated by the symbol 145 on the lid of the building block 141 is connected to the flexible blades disposed in the corners of the building block 141 by means of the lines 147 via the switch 142, the symbol 146 of which is also represented on the lid. The other pole of the battery 145 is connected to the two central flexible blades on one side of the building block 141 by means of the lines 148. Thus, the corner contacts of the building block 143 with the transistor socket 144 are supplied with the one battery voltage and the two centrally disposed contacts with the other.

The building block 143 with the transistor socket is of substantially the same construction as the building block according to FIGS. 6 to 8, except that it is additionally provided with the transistor socket 144. As may be noted from FIG. 10, the transistor socket 144 may be connected to the ring 127 by means of four webs 149 in such a manner that it will be disposed in the interior of the basic body 101 in concentric relation to said ring 127 and projecting into the central opening of the contact star 133. Again, the insert-type body comprising the transistor socket 144 with webs 149, jacks 122, and the ring 127 is retained in its position by the lid 103 of the building block (not shown). The lid 103 features a central opening 150 providing access to the socket 144. As indicated by the transistor symbol 155 on the lid of the building block 143, three base contacts each are connected to one pair of jacks on one side of the building block. Again, the connections may be established by means of preferably flexible wires 151, as indicated in FIG. 10, which connect the base contacts with

the ends 126 of the collector strips 124 projecting from the jacks. It will be noted that, for example, the building block 143 enables the most diversified circuit components to be connected in parallel and, with the aid of the nonoccupied jacks, also in series with the transistor by simply plugging the relevant lines into the relevant jacks.

It shall be understood that the present invention is not restricted to the embodiments shown by way of example, but that deviations therefrom are possible without exceeding the scope of the invention. Apart from the fact that building blocks may be used which are any desired integral multiple of the standard body the building blocks as such may be designed in a different fashion. The only important point is that the building blocks be provided with sliding connections running parallel to each other which enable the blocks to be assembled by sliding them together and that the contacts be designed so that a proper contact is obtained when the blocks are slid together. On the other hand, the embodiments of the invention described by way of example distinguish themselves by their simplicity of construction, particularly their ease of assembly, their dependability in operation, and the possibility of providing continuous bonding connections. The invention also enables a circuit composed of building blocks according to this invention to be extended into arrangements of any desired form, e.g. a remote control system for a vehicle or the like, with the aid of building blocks, to which no components are connected.

This also applies to the building blocks equipped with jacks, which may have any desired size and be provided with any desired number of jacks interconnected in any desired form.

We claim

1. A building block for electrical or electronic construction kits comprising a boxlike member within which electrical or electronic components are disposed, said boxlike member being provided with conductive contacts and with connecting means for slideably engaging said boxlike member with another boxlike member, said connecting means comprising at least one slot formed in at least one of said surfaces of said boxlike member within which a web member is disposed, a section of said web member is disposed.

2. A building block according to claim 1, characterized in that said extending section of said web member includes a reinforced portion at its end and extends in the direction of the sliding motion.

3. A building block according to claim 1 characterized in that the end of said web member is bent-off parallel to said lateral surface of said boxlike member in the same peripheral direction.

4. A building block according to claim 1, characterized in that said web member is disposed so that the web members are of adjacent, assembled boxlike members lie back to back.

5. A building block according to claim 1, characterized in that said web member is disposed at the bottom of said slot serving to receive the web members of adjacent boxlike members.

6. A building block according to claim 1, characterized in that said boxlike member comprises a cylindrical basic body forming the lateral walls and sealed at both ends by a lid and in that said contacts comprise flexible blades formed by leaf springs bent into hairpin shapes which are slid over the rims of said cylindrical basic body and retained by said lids.

7. A building block according to claim 6, characterized in that said leaf springs include legs which are engaged, at least on the outside, by contact slots extending parallel to said connecting means, the ends of said leaf springs bearing against the bottom of the slots while their central sections convexly project from said contact slots.

8. A building block according to claim 7, characterized in that said contact slots have relieved portions and in that said leaf springs are provided with enlarged ends which are engaged by the relieved portions.

9. A building block according to claim 7, characterized in that said lids are provided with flexible blades on their inner sides, said legs extending into the interior of the basic body

and are provided with projections directed towards the inner wall of said basic body, said projections being engaged by corresponding projections on the inside of said basic body

10. A building block according to claim 9, characterized in that projections for fixing the location of the lid with respect to the basic body are provided at the inner side of said lid, said projections extending into recesses of said basic body and/or bearing against its inner side.

11. A building block according to claim 6, characterized in that said lid is provided with recesses in the area of said leaf springs enabling said leaf springs to be scanned.

12. A building block according to claim 6, characterized in that the basic body and/or the lid is made of plastic.

13. A building block according to claim 1, wherein said conductive contacts comprise two contact spring tracks extending parallel to said connecting means on each of the lateral surfaces of said boxlike member and are each formed by a contact spring for a continuous positive bonding connection in one track and a contact spring for a continuous negative bonding connection in another track, and wherein said tracks are provided with additional contact springs for establishing functional connections.

14. A building block according to claim 13, characterized in that bonding contacts are disposed at the lower rim and the functional contacts at the upper rim of said boxlike member.

15. A building block according to claim 13, characterized in that said connecting means is disposed between the contact tracks provided on a lateral surface of the small box.

16. A building block according to claim 1, characterized in that at least one pair of opposite lateral surfaces includes a plurality of said connecting means.

17. A building block according to claim 6, characterized in that jacks for connecting the electrical or electronic components are disposed in the lid of said boxlike member, each of said jacks being conductively connected to one or more of said flexible blades.

18. A building block according to claim 17, characterized in that said jacks are designed for directly receiving and contacting wires, preferably with diameters ranging from approximately 0.3 to 1 mm. diameter.

19. A building block according to claim 17, characterized in that inside the building block one sleeve each, made of insulating material, is disposed underneath a plug hole provided in a lid and in that one or more of said flexible blades are provided with collector strips projecting into said sleeve and connected to the flexible blade disposed on the lateral surface of said boxlike member by means of a web piece extending in parallel relation to the lid.

20. A building block according to claim 17, characterized in that a predetermined number of the existing flexible blades are associated with one jack each and in that said jacks are disposed along straight lines extending in parallel relation to the sides of said boxlike member.

21. A building block according to claim 19, further including interior sleeves joined together by means of connecting webs and recesses to an insert-type body in the lateral walls of said boxlike member.

22. A building block according to claim 21, characterized in that said insert-type body is formed by eight sleeves interconnected by an insert-type web and in that a projection perpendicularly extending towards, and up to, an adjacent wall of said boxlike member originates at the locations of each of said sleeves.

23. A building block according to claim 22, further including collector strips whose lower ends project from said sleeves.

24. A building block according to claim 1, further including a socket for an electronic tube or transistor, the base contacts of said socket being connected with corresponding jacks within said block.

25. A building block according to claim 17, wherein said flexible blades are interconnected by means of a through connection characterized in that said through connection is formed by a sheet metal star with arms extending between the jacks.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,594,689 Dated July 20, 1971

Inventor(s) Rudolf Hopt et al.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 10, after line 75, insert

26. A building block according to claim 25, characterized in that at least one of said jacks are connected to said through-connection.

Signed and sealed this 21st day of September 1971.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Acting Commissioner of Patents