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STRIP TERMINAL CONNECTOR

Filed June 17, 1948 2 Sheets-Sheet 1

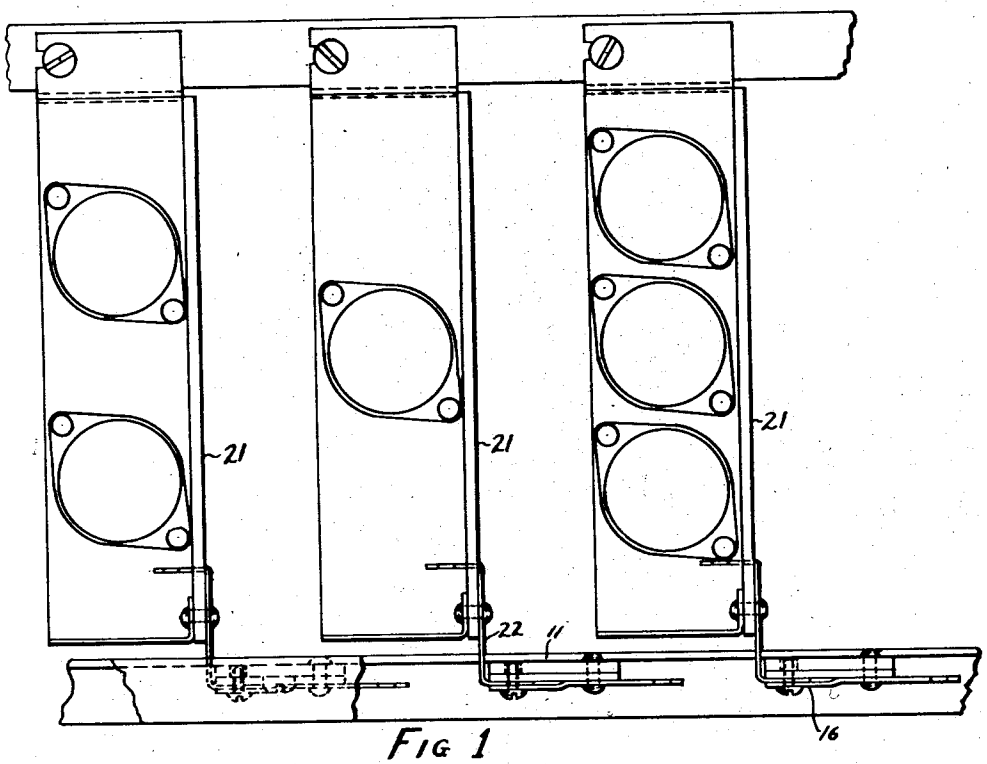


FIG 1

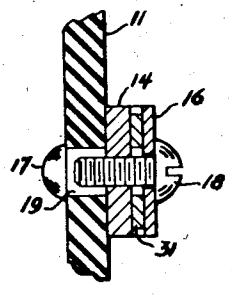


FIG 4

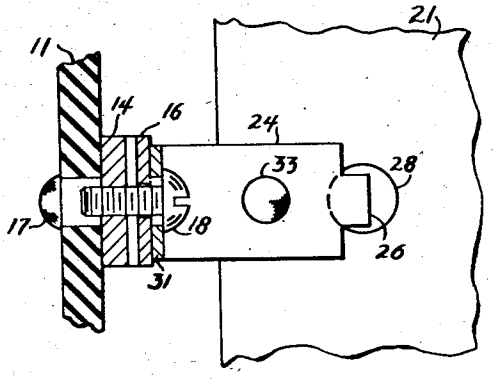


FIG 5

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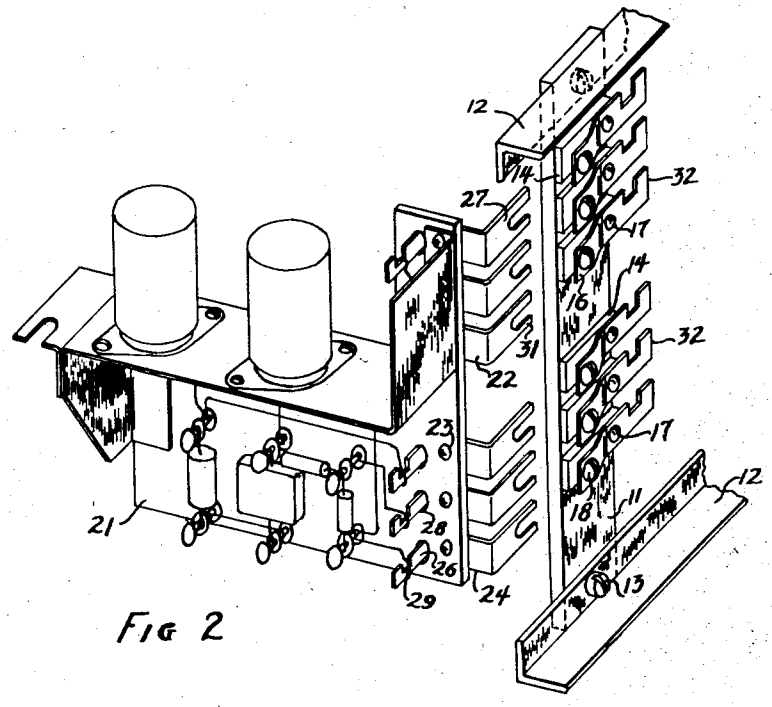


FIG 2

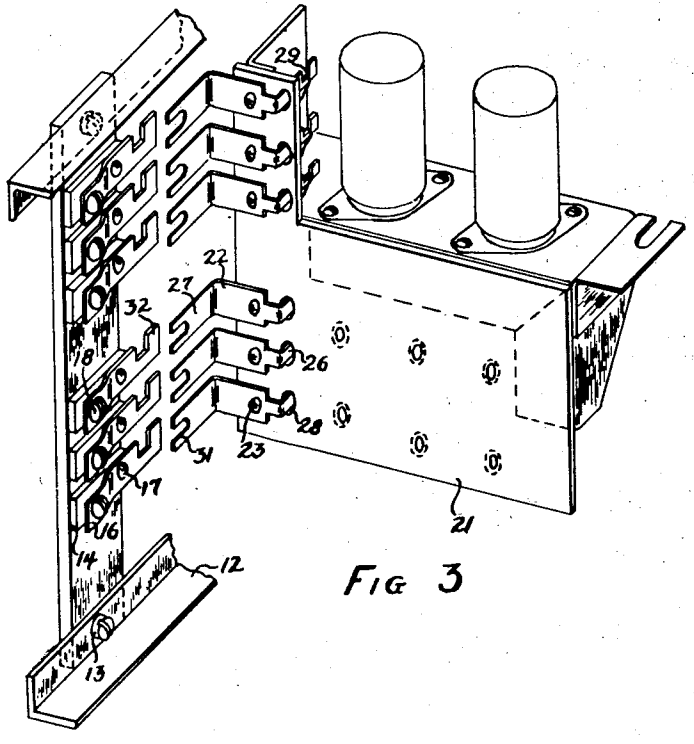


FIG 3

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STRIP TERMINAL CONNECTOR

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5 Claims. (Cl. 173—324)

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This invention relates to a terminal connector particularly adapted for use in complex electronic circuits, although not necessarily limited thereto.

Various electronic mechanisms such as Loran receivers, electronic computers, radar systems and communications receivers, to name but a few, require a large number of tubes and associated circuits and the systems considered in their entireties are quite complex with numerous interconnections between the elements thereof. In many cases, however, these circuits, complex in themselves, may be broken down into a number of subcircuits which are relatively simple and incorporate only a few tubes and their associated circuitry. Of course, the various subcircuits must be interconnected in various circuit arrangements to provide a complete system and it is a purpose of the present invention to provide a terminal connector which provides positive clamping connections and at the same time permits ready removal of any desired subcircuit either for repair or replacement.

Another purpose of the invention is to provide a terminal connection whereby the various subcircuits may be mounted on small cards and the various subcircuits interconnected into a relatively compact, lightweight complete assembly but nevertheless permitting ready access to the elements of any selected subcircuit for testing and repair purposes while the subcircuit is interconnected in circuit with the complete apparatus.

In accomplishing these purposes the various subcircuits of the desired electronic apparatus are mounted on small insulated cards which carry the tubes necessary and the related and necessary circuit elements interconnected to provide the desired subcircuit. The connections which are necessarily made to other parts of the complete assembly are brought out to a row of metallic connecting lugs and these lugs cooperate with terminal strips suitably spaced and fastened to the framework of the chassis which is to contain the apparatus. The proper connections are made between the appropriate terminal strips mounted on the chassis so that the mere insertion of a card containing the subcircuit in the assembly and the connection of its terminal lugs with the terminal strips properly connects the subcircuit in the entire system.

This permits easy repair of a defective system since if a stock of subcircuits are on hand, and in some cases numerous subcircuits will be duplicates of each other, it is only necessary to remove the defective subcircuit and install a new

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one in a matter of minutes. At the same time the design is such that each electrical contact connection is positively made without dependence on spring pressures which are ofttimes imperfect. The defective subcircuit may then be repaired at leisure or discarded as the circumstances warrant.

Occasions may arise, however, where the defective subcircuit may be required to be repaired or tested while it is connected in circuit with the entire assembly. The arrangement of subcircuits in their normal position in the chassis may be so compact as to render access to any particular portion impractical or impossible. In the instant invention the terminal lugs are bent at right angles to the card or support carrying the subcircuit and these right angled portions constitute the members which engage the terminal strip connectors. Any subcircuit may then be disconnected from its compacted position, brought to the outside of the chassis and reconnected to the terminal strip so that the particular subcircuit extends outwardly of the chassis permitting ready and easy access to every element and connection of the subcircuit while it is still connected in operative electrical relation to the complete system.

The exact nature of the invention will be more fully appreciated from the following description when considered in connection with the attached drawings, in which:

Figure 1 is a plan view of a chassis assembly illustrating the compacted arrangement of subcircuits when connected in their normal position of operation.

Figure 2 is an expanded view illustrating the normal position of connection of a subcircuit to a portion of the chassis.

Figure 3 is an expanded view illustrating the position of connection of a subcircuit to a portion of the chassis in the position of ready access for test or repair.

Figure 4 is a sectional view of a portion of the terminal strip with a connecting lug clamped in the normal position of operation.

Figure 5 is a sectional view of a portion of the terminal strip with a connecting lug clamped in the position of ready access to the elements of the subcircuit.

Referring particularly to Figs. 2 and 3 a terminal strip 11 composed of insulating material is fastened to the frame members 12 of a chassis by any suitable means such as by the threaded fastenings 13 as illustrated or by riveting if so desired.

Fastened to the terminal strip 11 is a series of

metallic contact strips 14 in spaced and insulated relation one from the other. These contact strips comprise one portion of the contact elements of the terminal strips the other portion being composed of the spring fingers 16 which are rigidly fastened to one end of the contact strips 14 by rivets 17 which also act as members for attaching the contact strips 14 and the spring fingers 16 to the terminal strip or block 11.

The opposite ends of the spring fingers 16 are bent in a direction away from the contact strips 14 so that they are normally spaced therefrom and the spring fingers 16 are made of resilient metallic material so that when pressure is applied they may be forced in a direction to approach the contact strips 14. The spaced ends of the spring fingers are apertured to permit screw members 18 to be passed through the spaced ends, the screw members being in threaded engagement with the contact strips 14 (see Figs. 4 and 5) but out of engagement with the apertures in the spring fingers 16 and apertures 19 formed in the terminal block 11 receiving the projecting ends of the screws 18.

The various electrical components which go to make up a desired subcircuit are mounted on a card or insulated support member 21 and the subcircuit elements interconnected by appropriately disposed connections. The circuit connections which must be made to other subcircuits and the like of the main assembly so that the whole may be connected into one interrelated system are brought out to a row of spaced connecting lugs 22 insulated from each other and rigidly fastened to the support member 21 along one edge thereof by fastening members such as rivets 23.

The contact lugs 22 have a body portion 24 which lies parallel to the face of the insulated support member 21 and is the portion through which the rivets 23 are passed and end portions 26 and 27 which are bent at right angles to the body portion 24 in opposite directions. The end portions 26 extend through apertures 28 formed in the support member 21 and their projecting ends are provided with notches 29 to which the electrical conductors of the subcircuit carried by the card 21 may be soldered.

The opposite ends 27 of the contact lugs 22 are bifurcated at 31 and these bifurcated end portions cooperate with the contact elements fastened to the terminal block 11 for providing the interconnections between various similar subcircuits of the main assembly, the individual contact strips 14 being interconnected with other similar contact strips carried by other terminal blocks by leads soldered to the end portions 32 thereof or by bus straps interconnecting individual contact strips.

In Fig. 2 the support member 21 is illustrated as in position for normal position in the chassis the terminal lugs being about to engage the contact strips 14.

When connected in this manner the bifurcated end portions 31 of the contact lugs 22 are inserted between the contact strips 14 and the spring fingers 16 so that the bifurcation lies on opposite sides of the screw 18. These screws are then tightened forcing the spaced ends of the spring fingers 16 towards the contact strip 14 tightly clamping the bifurcated end 31 between these elements and positively locking the terminal lug 22 to the appropriate contact strip and insuring good electrical contact at all times.

In this position of connection the spring fingers 16 act in the manner of washers in permitting clamping of the members without turning or offsetting because of the threading operation and at the same time obviate the usual disadvantage of washers in the proper placement thereof. That is to say, the normal position of the end portions of the spring fingers 16 is in spaced relation to the contact strips 14 and the bifurcated ends 31 may be slipped under each of the spring fingers 16 without having to individually place each member towards the head of the screws 18 as would be required when a number of loosely mounted washers were used.

In Fig. 4 a sectional view of this position of connection is illustrated and it will be noted that the electrical contact made between the bifurcated end 31 of the lug 22 and the contact strip 14 is limited only by the amount of pressure applied by tightening the screw 18. Good electrical contact is therefore insured at all times.

As heretofore stated, however, what has been here termed the normal position of engagement places the support member or card 21 in a very compacted relation with others of similar construction internally of the chassis. This is of advantage, of course, in providing an apparatus which utilizes a small space but at the same time makes the accessibility of the various circuits and their elements difficult if not impossible.

The present invention, however, permits any selected subcircuit to be hung outside of the chassis, as it were, and yet having the proper interconnections to the whole assembly so that ready access may be had thereto for testing and repair.

This alternative position of connection is illustrated in the expanded view of Fig. 3 and the sectional view of Fig. 5.

To remove the subcircuit from its position internally of the chassis, that is the so-called normal position, the screws 18 must be loosened to such an extent that the offset portion of the spring fingers moves away from its clamping engagement with the bifurcated ends 31 of the terminal lugs 22 sufficiently to allow them to be slipped out from their position between the spring fingers 16 and contact strips 14. The offset portions of the spring fingers 16 will then be spaced from the contact strips 14 by an amount equal to the thickness of the bifurcated ends 31 plus whatever movement was necessary to release the positive clamping action. Having removed the card 21 and the subcircuit carried thereby in this manner, the card is brought out from its position interiorly of the chassis, rotated 180° about a vertical axis and refastened to the terminal strip with the same lugs engaging the same contact strips as before but with the card and subcircuit now projecting outwardly of the chassis.

In this position of connection the bifurcated ends 31 are slipped under the heads of the screws 18 so that they are clamped between the heads of these screws and the spring fingers 16. In forcing the spring fingers 16 inwardly so that the bifurcated ends 31 may be accommodated between the outer force of the spring fingers 16 and the screws 18 an opposing force is exerted by the deflection of the spring fingers 16 which acts to clamp the terminal lugs thereto. This is a spring action engagement which is not as positive an electrical contact as the positive clamping of the lugs between the contact strips 14 and spring fingers 16 by the great force that may be exerted through the screws 18 when the mount and subcircuit are in the so-called normal position but

since this alternative position is a temporary one used only for testing and repair the loss in positive clamped contact is of no great moment and is offset by the facility of attachment. If, however, something more than the spring pressure exerted by the resiliency of the offset ends of the spring fingers 16 is desired, the operator may retighten each of the screws 18 to supply the more positive clamping pressure. As a purely temporary measure, however, this positive contact will not ordinarily be needed so that even the simple operation of tightening each screw need not be undertaken.

The terminal connector of the instant invention therefore accomplishes the purpose of providing two positions of connection, one in compacted arrangement so that space is conserved and the other for easy accessibility. At the same time the invention combines positive electrical contact with easy removability so that new subcircuits may be introduced to replace defective parts with a minimum of delay and with the use of the simplest tools. Additionally the various subcircuits are mounted on cards which provide natural flues or vents therebetween and the free circulation of air around each subcircuit greatly assists in cooling the circuit elements.

What is claimed is:

1. A chassis assembly comprising spaced support members, insulated terminal blocks connected between said spaced support members, a plurality of spaced electrical contacts carried by said terminal blocks, a plurality of insulated card elements having interconnected circuit elements constituting subcircuit assemblies affixed thereto, a plurality of metallic contact lugs projecting from one edge of said card elements and electrically connected to appropriate points in the circuit of the subcircuit carried thereby, means including said spaced electrical contacts and said metallic contact lugs whereby the circuits of one subcircuit may be electrically connected to the circuit elements of other subcircuits through said terminal blocks with the card elements projecting inwardly of the chassis in compact relation with respect to each other and whereby the same electrical connections may be made with selected card elements rigidly supported and projecting outwardly of the chassis so that ready access may be had to the circuits and elements carried thereby without disturbing the compact relation of the remaining card elements.

2. A chassis assembly comprising spaced support members, insulated terminal blocks connected between said spaced support members, a plurality of spaced electrical contacts carried by

said terminal blocks each of said electrical contacts including a contact strip affixed to said terminal block, a spring finger affixed at one end to said contact strip and spaced therefrom at its other end and clamping means for urging said spring finger towards said contact strip, a plurality of insulated card elements having interconnected circuit elements constituting subcircuit assemblies affixed thereto, a plurality of metallic contact lugs projecting from one edge of said card elements and electrically connected to appropriate points in the circuit of the subcircuit carried thereby whereby engagement of said contact lugs between said spring fingers and contact strips will make electrical connections between the circuits of one subcircuit with those of other subcircuits through said terminal blocks with the insulated card elements projecting inwardly of the chassis in compact relation with respect to each other and engagement of said contact lugs between said clamping means and said spring fingers will make the same electrical connections but with the selected insulated card elements projecting outwardly of the chassis in easily accessible position.

3. A chassis assembly according to claim 2 in which said metallic contact lugs comprise a body portion and an end portion disposed at an angle to said end portion.

4. A chassis assembly according to claim 3 in which the spaced electrical contacts are affixed to the surface of the insulated terminal block which is external to the chassis so that ready access may be had thereto.

5. A chassis assembly according to claim 4 in which the clamping means for urging the spring fingers towards the cooperating contact strips comprises threaded members which provide positive electrical contact between said spaced electrical contacts carried by said terminal blocks.

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