

Nov. 20, 1962

A. S. WILCOX

3,065,443

TEST SOCKET

Filed Dec. 29, 1959

FIG. 1

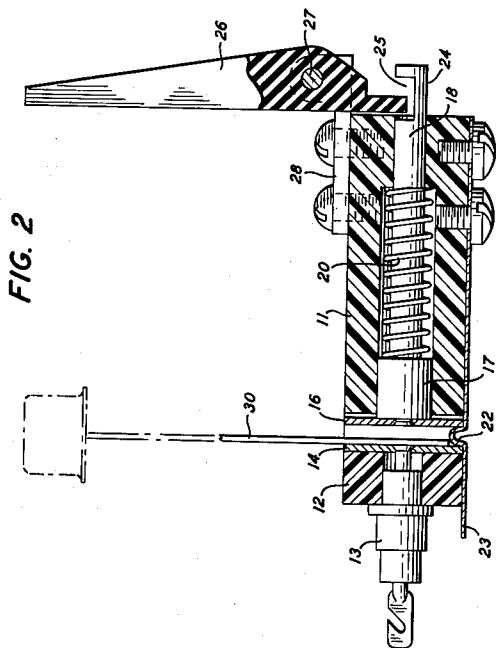
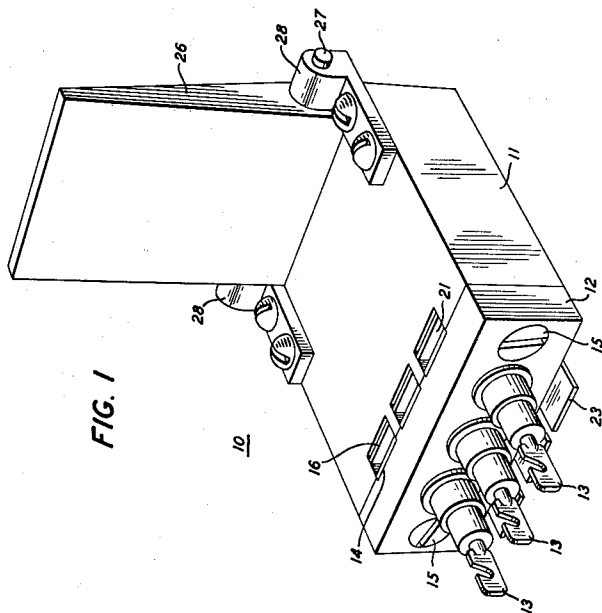


FIG. 4

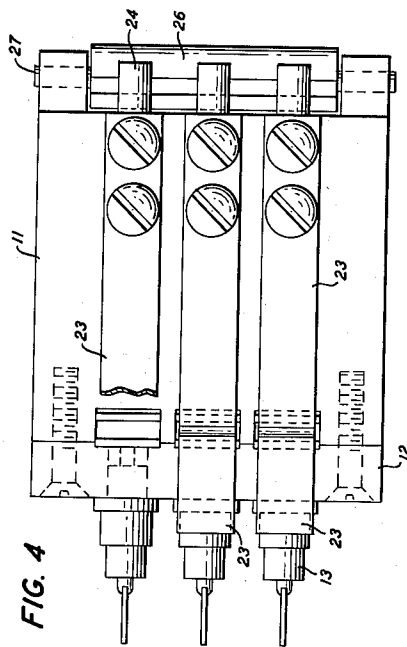
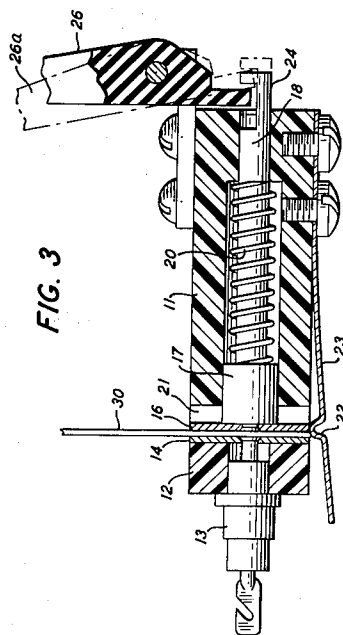


FIG. 3



INVENTOR
A. S. WILCOX
BY *John C. Morris*

ATTORNEY

1

3,065,443

TEST SOCKET

Alwin S. Wilcox, Whippany, N.J., assignor to Bell Telephone Laboratories, Incorporated, New York, N.Y., a corporation of New York

Filed Dec. 29, 1959, Ser. No. 862,716

9 Claims. (Cl. 339—150)

This invention relates to means for connecting wires or like terminal means of electrical devices to other electrical instrumentalities and, more particularly, relates to a test socket assembly for temporarily making connections to wires or to the terminals of a device to be tested.

In the testing of circuit elements such as, for example, transistors, it is necessary to make good electrical connection to each terminal wire for a sufficient period of time to perform the tests. The making of such connections is often rendered difficult because of wires which are deformed or have projecting bits of solder on them. Furthermore, it appears that presently available test sockets have relatively small openings for the insertion of terminal wires. In order that the wires may be firmly gripped, the noted devices have closely spaced contact elements between which the wires must be forced. The problem is particularly aggravated if the devices, such as transistors, are tiny with very fine wires.

With the foregoing difficulties in mind, it is an object of this invention to facilitate the insertion in and the removal from a connector, of wires or of the terminals or leads of electrical devices.

Another object is to improve the establishment of temporary connections to a circuit element which is to be tested.

The foregoing and other objects are accomplished by virtue of the novel features of a connector or socket assembly for the accommodation of several wires or terminals. In this socket, a connecting means for each terminal comprises juxtaposed conductive contact plates, one fixed and one movable. Each movable plate is biased toward the fixed plate but is in the nonclamping condition spaced from that plate by a separating element. This element or separator is biased toward insertion between the plates by suitable means such as a spring. With this arrangement, a terminal may be easily inserted between the spaced plates. The separating element is so located that the terminal forces it from between the plates after sufficient insertion to assure a good contact. Upon removal of the separator, the movable plate clamps the terminal against the fixed plate. To aid in easy removal of the terminals from the test socket, an operating member is provided for retracting the movable plates and allowing the separators to return to their positions between the plates. This operating member may be a lever.

A socket assembly as herein contemplated may comprise socket units for several terminals each electrically independent, individually biased, and individually operated to the closed or clamping condition. The lever for separating the plates is advantageously common to all of the socket units. As will be clear from the details hereinafter described, the noted lever may be moved in one direction to retract the movable plates and allow the detents or separators to return to their position between the plates; or may be moved in the opposite direction to push the movable plates inward forcing the separators out from between the plates.

The foregoing and other objects and features of this invention will be more clearly and fully understood from the following description of one exemplary embodiment as illustrated by the appended drawings, in which:

FIG. 1 is a perspective view of a socket or connector assembly for three wires or terminals;

2

FIG. 2 is a sectional view through one socket unit showing its condition prior to clamping of a terminal;

FIG. 3 is a sectional view like that of FIG. 2 but with the terminal clamped; and

FIG. 4 is a bottom view of the device with a part broken away to show an inner detail.

The particular socket or connector assembly chosen to illustrate the invention is for connecting to the three leads of a transistor and is, accordingly, made up of three socket or connector units.

The assembly 10 comprises a housing or block 11 having a cover 12 on its forward end, both being of a suitable insulating material such as a phenol fiber. Projecting from the cover 12 are the test terminals 13, each of which is secured to a fixed contact or connecting plate 14 on the inside of the cover.

With the cover secured in place by the screws 15, the fixed plates 14 are in juxtaposition to corresponding movable plates 16. Each plate 16 is secured to the head 17 of a plunger or rod 18. The plungers are slidably fitted through bores in the rear end of block 11 and project therefrom. The heads 17 fit slidably in deep counterbores in the block. Coiled springs 20 around each plunger are fitted between the head 17 and the back wall of the block 11.

In the forward end of the block 11 are slots 21 for each contact plate 16. Detents or separators 22 of latching member 23 are biased toward the plates 14 and 16 to hold these plates separated when inserted between them, as shown in FIG. 2. When the latch 23 is retracted, as in FIG. 3, the plate 16 is pushed toward the plate 14 to clamp a terminal between them in the connector unit.

The projecting end 24 of each plunger 18 is notched as at 25 to receive one end of a lever 26 common to all plungers and pivoted at 27 to the brackets 28 on the block 11. Thus, each end of the notch 25 acts as an abutment against which the lever may press to move the plunger 18 longitudinally in either direction as required.

When the cover 12 is in place on the block 11, the plates 14 and 16, along with the slots 21, define rectangular openings for the reception of terminals such as the wire 30.

In operating this connector, a terminal 30 is inserted between the plates 14 and 16 and pushed against the separator 22. The latch 23 is thereby moved outwardly and the plate 16 advances to clamp the wire 30 firmly against the plate 14. After completion of the required tests, the lever 26 is pulled forward, as at 26a, FIG. 3, to retract the plungers, thereby separating the plates and allowing the separator 22 to return to its position between the plates 14 and 16.

If desired or convenient, the separators 22 may be removed from their latching position by deflecting the lever 26 rearwardly which moves all of the plungers 18 and the plates 16 forwardly to cam the separators to the unlatched position. The separators may also be removed individually by deflection of appropriate latch 23 by pressure on its projecting end under a terminal 13.

Although the unlatching of a clamping contact "automatically" by means of an inserted terminal is the most advantageous way to operate this device, such operation does depend upon having terminals or wires 30 of sufficient length. If devices with shorter terminals are to be tested, one of the noted alternative methods of removing the separators may be used to permit clamping of the terminals.

What is claimed is:

1. An electrical connector comprising a housing including a block and a cover both of insulation, said block having its forward end plurally slotted to receive a corre-

sponding plurality of movable contacts, the cover fitting the slotted end of the block to define with the slots a row of wire receiving openings across the top of the housing, a plurality of terminals projecting from the cover and each having on its inner end a fixed contact facing a movable contact in one of the wire receiving openings, a rod secured to each movable contact with its other end projecting from the rear end of the block, a helical spring around the rod for urging the movable contact toward the fixed contact, a leaf spring on the bottom of the block for each wire receiving opening, each spring having thereon a separator for insertion between a fixed and a movable contact by the bias of the leaf spring, a lever pivoted to the rear end of the block and cooperating with abutments on the projecting end of each rod for longitudinally moving said rods, whereby a wire inserted in a wire receiving opening will eject the separator allowing the movable contact to clamp the wire against the fixed contact under the influence of the helical spring, and whereby suitable movement of the lever will retract the movable contacts allowing easy removal of the wires and reinsertion of the separators.

2. An electrical connector comprising a block and a cover both of insulation, said block having one end plurally slotted to receive a corresponding plurality of movable contacts, the cover fitting the slotted end of the block to define with the slots a row of wire receiving openings, a plurality of terminals on the cover each having on its inner end a fixed contact facing a movable contact, a rod secured to each movable contact with its other end projecting from the block, a first spring around the rod for urging the movable contact toward the fixed contact, another spring on the bottom of the block for each wire receiving opening, each spring including a separator for insertion between a fixed and a movable contact, a lever pivoted to the block and cooperating with the projecting end of each rod for longitudinally moving said rods.

3. An electrical connector comprising a block and a cover both of insulation, said block having in one end a slot to receive a movable contact, the cover fitting the slotted end of the block to define with the slot a wire receiving opening in the housing, a terminal on the cover and having on its inner end a fixed contact facing the movable contact, a rod secured to the movable contact with its other end projecting from the rear end of the block, a rod biasing spring for urging the movable contact toward the fixed contact, another spring on the block and including a separator for insertion between the fixed and the movable contact, and means secured to the block for longitudinally moving said rod.

4. An electrical connector comprising a fixed contact plate and a juxtaposed movable contact plate for firmly clamping a conductor inserted therebetween, means for urging the movable plate toward the fixed plate, a constituent separator means movable into and out of position between said contacts, means for biasing the separator means to a position between the plates to maintain a sufficient separation to allow easy insertion of a conductor between the plates, means to guide the conductor to impinge upon and remove the separator means from its position between the plates, and retracting means for withdrawing the movable plate allowing easy removal of the conductor and return of the separator means to its position between the plates.

5. An electrical connector comprising a fixed contact and a juxtaposed movable contact for firmly clamping a conductor inserted therebetween, means for urging the movable contact toward the fixed contact, a constituent separator means movable into and out of position be-

tween said contacts, means for biasing the separator means to a position between the contacts and retracting means for withdrawing the movable contact allowing return of the separator means to its position between the contacts.

6. A test socket assembly for receiving the leads of an electrical component, said assembly comprising a housing including a plurality of openings, each opening including a fixed contact and a facing movable contact, means for urging the movable contact toward the fixed contact, a constituent separator means insertable between the contacts for maintaining a space therebetween, biasing means for urging each separating means to a position between the contacts, each separating means being displaceable so that the movable contact will clamp the lead against the fixed contact, and means common to all of the movable contacts for effecting their withdrawal to allow removal of the leads and reinsertion of the separating means between the contacts.

7. A socket assembly for receiving the terminals of an electrical component, said assembly comprising a housing including a plurality of openings, each opening including a fixed contact and a facing movable contact, means for urging the movable contact toward the fixed contact, a constituent separating means insertable between the contacts for maintaining a space therebetween, biasing means for urging each separating means to a position between the contacts, each separating means being displaceable from between the contacts allowing the movable contact to clamp the lead between the fixed contact and means for effecting the withdrawal of the movable contacts.

8. A test socket comprising a first clamping means, a second clamping means movable into and out of engagement with said first clamping means, a constituent separating means movable into and out of a position between said first and second clamping means, said separating means for maintaining said second clamping means a spaced distance from said first clamping means said separating means biased for reinsertion between said clamping means, means for biasing said second clamping means toward said first clamping means so that when said spacing means is displaced from between the clamping means, said second clamping means moves toward said first clamping means and clamps the inserted lead therebetween.

9. An electrical connector comprising a body composed of a fixed contact plate and a juxtaposed movable contact plate for firmly clamping a conductor inserted therebetween, means for urging the movable plate toward the fixed plate, a separator means movable out of and biased for movement into position between the contact plates to maintain a sufficient separation to allow easy insertion of a conductor therebetween, means to guide the conductor to impinge upon and removed the separator means from its position between the plates, and constituent alternately operable means for closing the movable contact plate to remove the separator means and engage a conductor inserted between the plates or to withdraw the movable plate allowing easy removal of the inserted conductor and return of the separator means to its position between the plates.

References Cited in the file of this patent

UNITED STATES PATENTS

2,711,523	Willis	June 21, 1955
2,735,945	Colton et al.	Feb. 21, 1956
2,759,055	Foss	Aug. 14, 1956
2,787,772	Liaci	Apr. 2, 1957
2,811,700	Kuch	Oct. 29, 1957