Feb. 16, 1971 KIYOJI YAMANAKA ET AL 3,564,482

HOOK TYPE SURFACE MOUNTED CONNECTOR

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Fig. 2

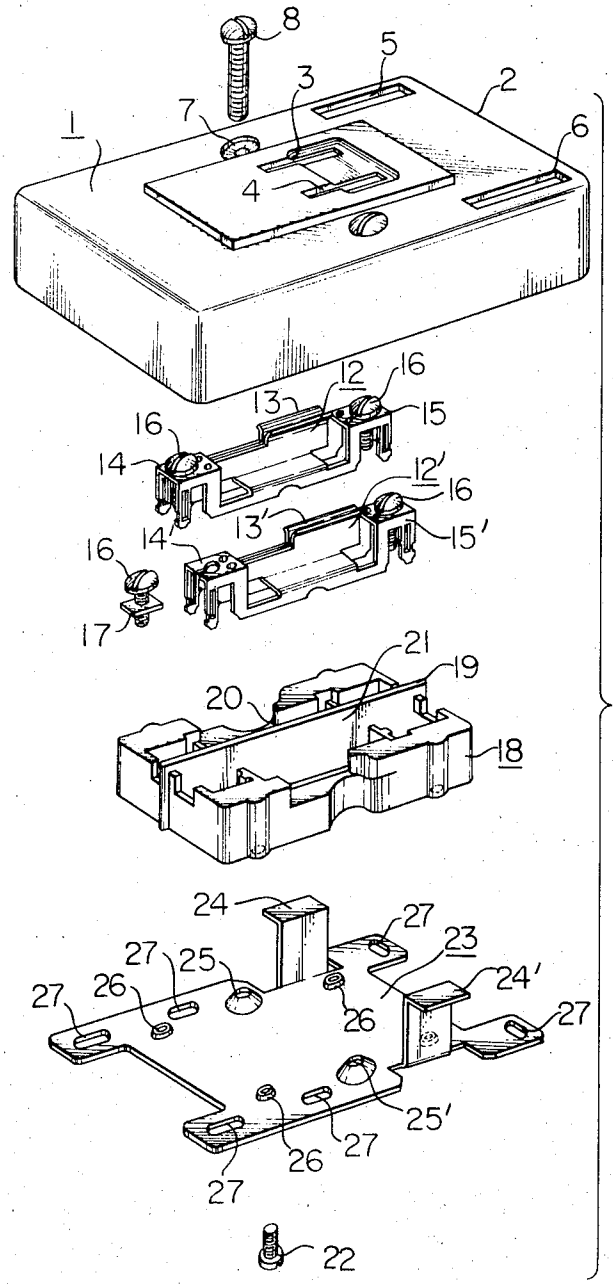


Fig. 1A

PRIOR ART

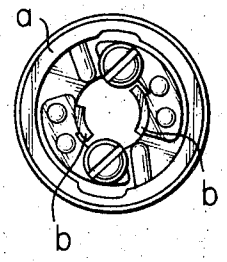
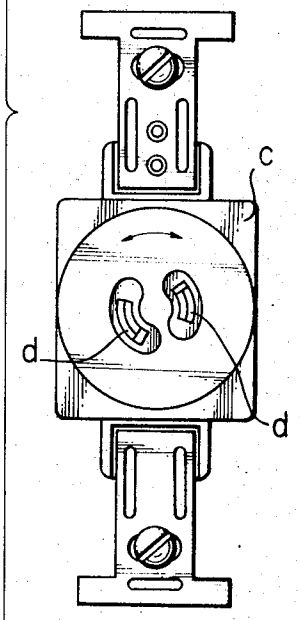


Fig. 1B

PRIOR ART



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Fig. 3A

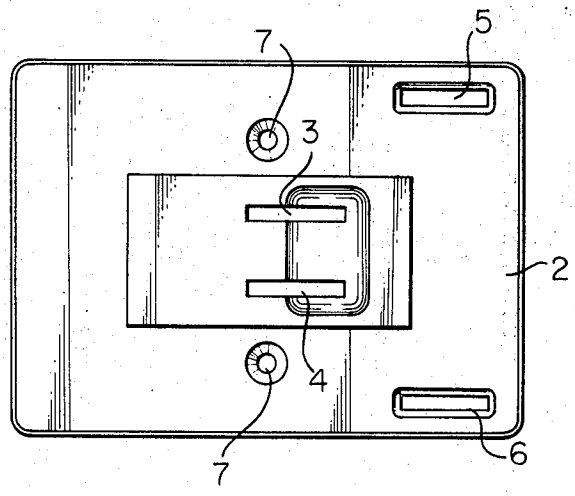


Fig. 3B

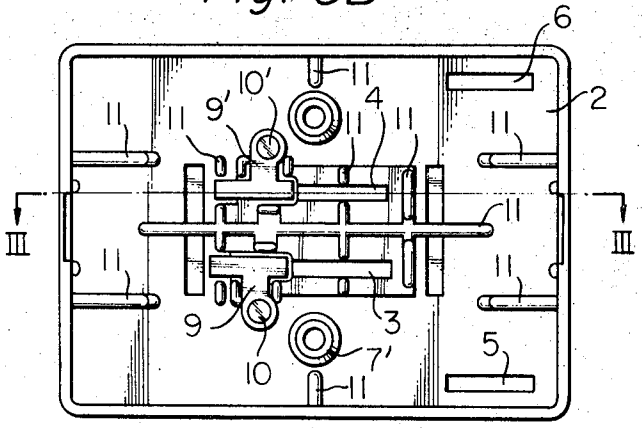
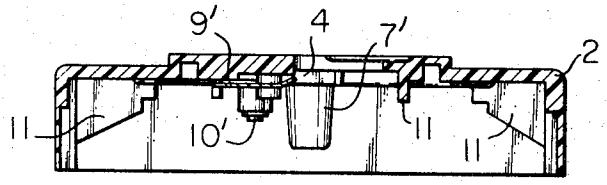


Fig. 3C



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HOOK TYPE SURFACE MOUNTED CONNECTOR

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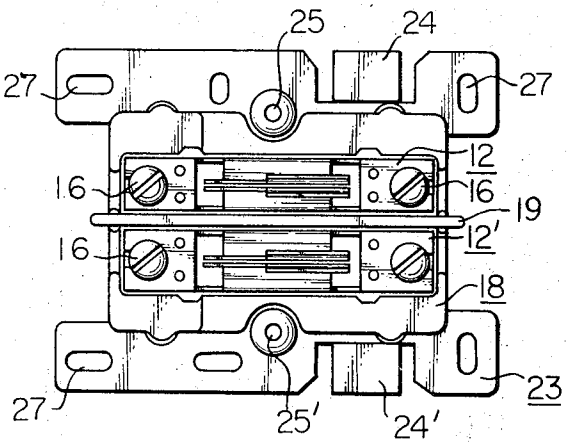


Fig. 4A

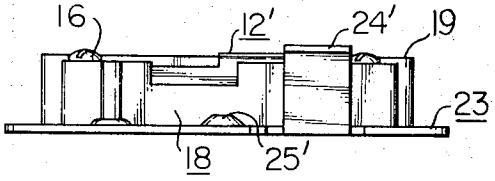


Fig. 4B

Fig. 5A

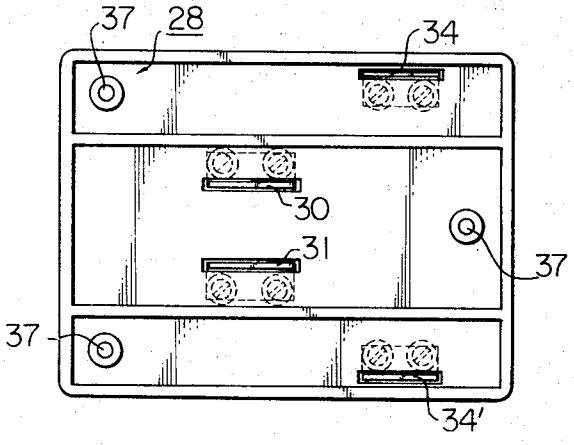
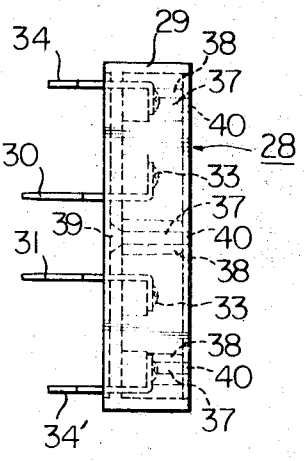


Fig. 5C



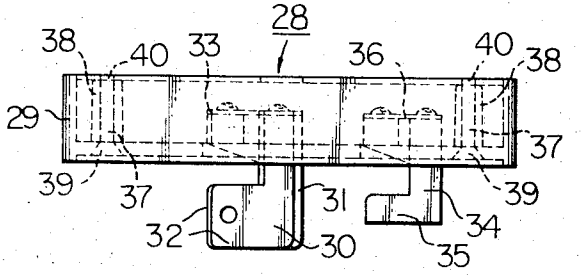


Fig. 5B

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HOOK TYPE SURFACE MOUNTED CONNECTOR

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Fig. 6

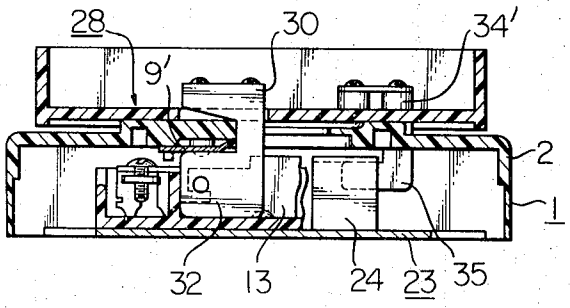


Fig. 7A

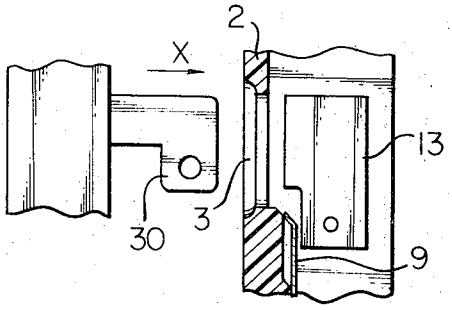


Fig. 7B

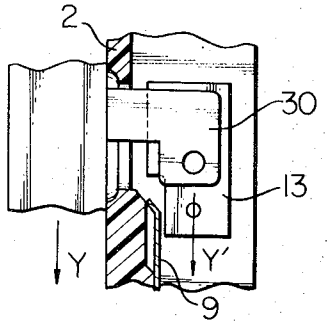
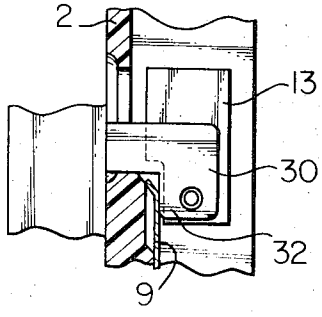


Fig. 7C



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HOOK TYPE SURFACE MOUNTED CONNECTOR

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Fig. 8A

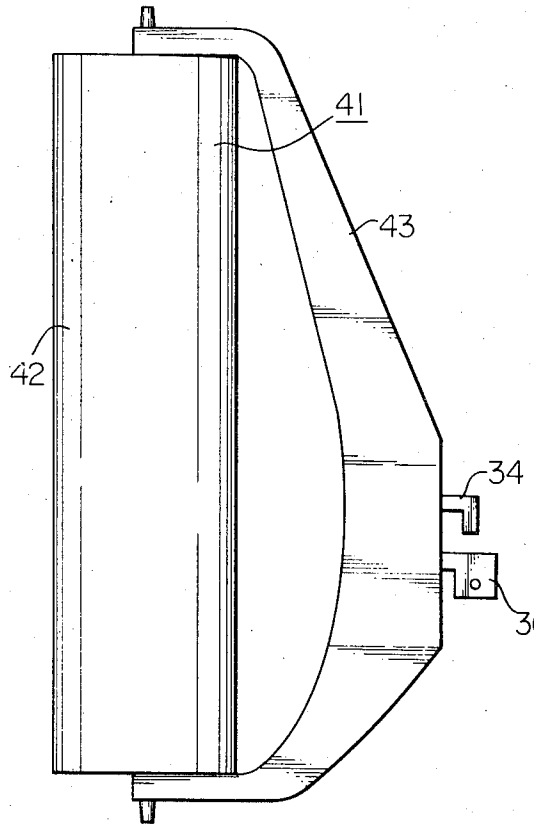
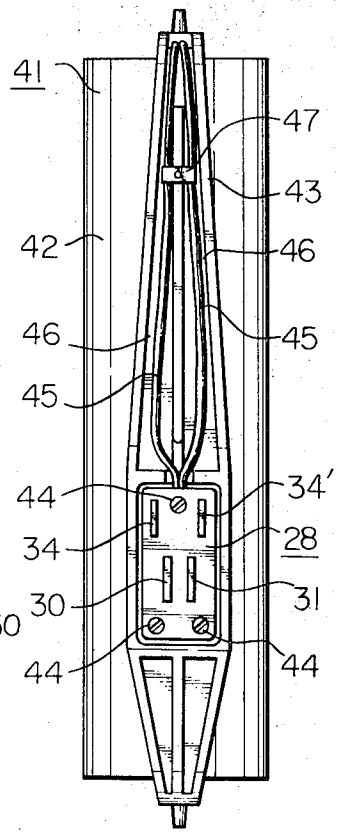


Fig. 8B



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United States Patent Office 3,564,482 Patented Feb. 16, 1971

3,564,482

HOOK TYPE SURFACE MOUNTED CONNECTOR

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Claims priority, application Japan, July 7, 1967, 42/43,809, 42/58,845; Sept. 26, 1967, 42/81,965; Mar. 19, 1968, 43/21,760
Int. Cl. H01r 13/54
U.S. Cl. 339—91 3 Claims

ABSTRACT OF THE DISCLOSURE

An electrical connector of a hook type to be mounted on wall surfaces, which consists of a receptacle substantially in a box shape including electric terminals for connection with an electric source, and a plug body substantially in a box shape including plug blades for connection with said terminals to plug in electric devices. Each plug blade is provided with a hooking means for engagement with an inside surface of the receptacle box adjacent to an inserting hole for the blade when the latter is inserted into contact relation with one of said terminals, and then pulled substantially downward along the terminal. The inserting and pulling operations provide both the electrical connection and a stable fixing of the plug body to the receptacle. The stable fixing may be improved by the provision of a hook receiving means in the plug body and a corresponding receiver means in the receptacle.

This invention relates to a hook type surface mounted connector, to and from which not only an attachment plug cap but also a bracket can be freely attached and detached.

In fixing a bracket to a wall surface, it has been general practice to screw it directly to the wall surface by using mounting holes made on the attaching surface of the body or to mount it on a standard box. Further, as a special device, there has been used a mounting device consisting of a mounting plate having a connector and a hook receiver.

However, in the system of screwing a bracket directly to a wall surface or to a standard box, the connection of the inner conductor of the bracket with the internal wiring is a problem in view of safety and is difficult to do. On the other hand, it is desirable that the bracket may be often replaced in conformity with the taste of any dweller. For this purpose, there is required a surface mounted connector which is easy to attach to and detach from the wall surface, and yet will not be detached by any accidental vibrations or shocks. Further, in the latter case of using a special mounting device, the component parts will be of a large number, the cost will be high and a heavy load will be applied to the conductor connecting part.

When a connector of a reciprocal locking type having arcuate inserting holes *d* as is shown in FIG. 1 is used so that plug blades *b* of a plug *a* may be fitted to the bracket body and a plug socket *c* may be fitted to a wall surface, the bracket will be easy to detach, so that a surface mounted connector with a stable electric connection will be obtained, and a hook type standard plug *a* may be used. But, as it is a reciprocal type connector, it will be difficult to determine the angle of the bracket in a fixed position, where the connector will be vertical after being reciprocated. Further, since the bracket has to be set in with a certain inclination and then fitted into the fixed position by rotating the same, the operation will be troublesome to general users. Thus, there

are problems in using such reciprocally locked connector to attach a bracket, together with the fact that this connector has no universality. The present invention has been suggested to eliminate the above mentioned disadvantages of conventional connectors.

A main object of the present invention is to provide a surface mounted connector which can be used together with an attachment plug cap and a bracket, is easy to attach and detach, can easily have a bracket attached in a fixed position, will not be accidentally detached by vibrations or shocks and is stable in the electric contact.

Other objects and advantages of the invention will become apparent upon reading the following descriptions, taken in conjunction with the accompanying drawings, in which:

FIGS. 1A and 1B illustrate a conventional connector, showing a plug and a receptacle, respectively.

FIG. 2 is a perspective view of an exemplary receptacle in the surface mounted connector of the present invention, respective parts being shown as disassembled.

FIGS. 3A and 3B illustrate respectively a plan view and a rear view of a case of the receptacle, and FIG. 3C illustrates a cross-sectional view on line III—III in FIG. 3B.

FIGS. 4A and 4B illustrate a combination of a mounting frame, insulating block and female contact plates in the receptacle, as assembled, FIG. 4A being a plan view and FIG. 4B being a side view.

FIGS. 5A, 5B and 5C illustrate a plug body of the connector, showing a plan view, an elevation and a side view of the body, respectively.

FIG. 6 illustrates the plug body as inserted into the receptacle.

FIGS. 7A, 7B and 7C show the order of inserting the plug body into the receptacle.

FIGS. 8A and 8B illustrate an illuminating device incorporating a plug body of the present invention, showing a side view and a rear view of the device, respectively.

While the invention is susceptible of various modifications and alternative forms, specific embodiments thereof have been shown by way of example in the drawings and will be herein described in detail. It should be understood, however, that it is not intended to limit the invention to the particular forms disclosed, but, on the contrary, it is intended to cover all modifications, equivalents and alternatives falling within the spirit and scope of the invention.

In FIG. 2, **1** is a receptacle and **2** is a case for the receptacle. Plug inserting holes **3** and **4** parallel with each other are made substantially in the middle of the upper surface of the case **2** and, further, slots **5** and **6** parallel with the inserting holes **3** and **4** are made near both sides of the case **2**. **7** is a tapped hole. A screw **8** is inserted into the screw hole **7** and is rotated to be screwed into a tapped hole **25** or **25'** in the later described mounting frame **23** so that the mounting frame **23** may be fixed to the case **2**. The details of the case **2** are shown in FIGS. 3A, 3B and 3C, which being a plan view, a view as seen from the back and a sectioned view on line III—III in FIG. 3B, respectively. **7'** is a boss around the tapped hole **7**. **9** and **9'** are angle plate springs having an inclined surface and riveted to the case **2** respectively in projected parts **10** and **10'** provided on the inside surface of the case **2**. **11** is a rib to improve the mechanical strength of the case and to guide the receptacle **1**.

Again in FIG. 2, **12** and **12'** are metallic female contact plates made by bending a metal plate. **13** and **13'** are contact areas of said female contact plates **12** and **12'** being made by overlapping two edges of said bent metal plate. **14**, **15**, **14'** and **15'** are terminal parts at each end of the contact parts. **16** is a terminal screw and **17** is a nut,

both being fitted in the terminal part 14, 15, 14' or 15'. 18 is an insulating block made of a synthetic resin and provided with small chambers 20 and 21 containing the female contact plates 12 and 12' on each side of a partition wall 19 separating the chambers in the longitudinal direction. 22 is a rivet or a screw embedded or screwed in the bottom of the insulating block 18. 23 is a mounting frame made of a metal plate and provided with engaging piece receivers 24 and 24' bent upwardly in the form of L on each side. 25 and 25' are tapped holes. 26 is a hole in which the rivet 22 embedded in the bottom of the insulating block is to be inserted and calked to fix the mounting frame 23 to the insulating block 18. 27 is a hole to be used to fix the mounting frame to a wall surface. FIGS. 4A and 4B show the female contact plates 12 and 12', insulating block 18 and mounting frame 23 as assembled all together.

In FIGS. 5A to 5C, 28 is a plug body. 29 is a main body of the plug body made in the form of a box of a synthetic resin. Each of 30 and 31 is a plug blade provided with a hook 32 at the tip and, at the other end, with a base part 33 bent in the form of L. The blades 30 and 31 are to be riveted or screwed to the inner surface of the main body 29. The plug blades 30 and 31 are arranged parallelly with each other in the middle of the main body. 34 and 34' are hook receivers having a hook 35 at the tip, respectively, and riveted or screwed in the base part 36 to the inner surface of the main body 29. The hook receivers 34 and 34' are arranged parallelly and as spaced from each other so as to be near both sides of the main body, respectively. 37 is a hole made in a boss 38 provided in the plug body 28, aligned with holes 39 and 40 made respectively on the front and back surfaces of the plug body 28 and forming a through hole to attach and fix the plug body 28 to a bracket of an electric device.

FIG. 6 shows the plug body 28 as inserted into the receptacle 1 and shown partially in a special section fragmental, so that the relation between the blades and hook receivers as fitted may be understood. It will be seen here that the plug blade 30 is inserted and held in the contact part 13 of the female contact plate 12 and is in contact at the upper side with the plate spring 9. Further, the hook receiver 34 is shown as engaged with the engaging piece receiver 24 of the mounting frame 23, at its hook 35.

FIGS. 8A and 8B show, as an application of the present invention, an illuminating device incorporating the plug body 28 of the present invention. The plug body 28 is housed and fixed on the back surface of an arm 43 holding a shade 42 and a lamp therein (not illustrated). The plug body 28 is housed in recesses made in the rear side surface of the arm 43 of the above mentioned illuminating device, and fixed to the arm by means of screws 44 inserted through aligned through holes 37, 39 and 40 made in the main body 29. 45 is an electric wire passed through a groove 46 provided in the rear side surface of the arm 43 so as to form an electrical connection between the plug body 28 and the lamp in the shade 42. 47 is an electric wire pressing plate to prevent the electric wire 45 from being removed out of the groove 46.

Turning now to FIGS. 7A, 7B, 7C, the order of combining the plug body 28 with the receptacle 1, specifically with reference to the plug blade 30 and contact area 13, is shown here. As shown in FIG. 7A, the plug body 28 will be first moved in the direction X so that the plug blade 30 is inserted into the contact area 13 of the female contact plates 12, through the plug inserting hole 3. The plug body 28 is then pulled downward (in the direction Y), as shown in FIG. 7B, so that the plug blade 30 will move downward (in the direction Y') in the female contact plates 12 made in a long shape. Finally as shown in FIG. 7C, the hook 32 of the plug blade 30 will come into contact with the plate springs 9 so that the plug body 28 may be secured to the receptacle 1, and an electrical contact may be simultaneously made.

It will be apparent that, while the above description has been made with reference only to the plug blade 30, the other plug blade 31 will be brought into contact with the female contact plates 12' simultaneously during the above operation.

Further, while only the order of combining the plug blade 30 or 31 of the plug body 28 with the receptacle 1 has been described with reference to FIGS. 7A to 7C, it will be understood that the combination of the hook receivers 34 and 34' of the plug body 28 with the receptacle will be also made at the same time. That is to say, when the hook receivers 34 and 34' are inserted respectively into the slots 5 and 6 in the receptacle 1, and then the plug body 28 is pulled down, the hooks 35 of the hook receivers 34 and 34' will be engaged respectively with the engaging piece receivers 24 and 24' of the mounting frame 23 so that the mechanical strength for fixing the plug blades 30 and 31 will be increased. As the plug body 28 is secured directly to the mounting frame 23 which is to be fixed to a wall surface, the increased strength at this part will be so high as to be sufficient even when a heavy illuminating device is connected to the plug body 28. It should be noted that this latter combining part contributes nothing to the electric connection.

When the plug blade 30 and hook receiver 34 are to be separated from the receptacle 1, the plug body 28 may be operated reversely to the above described combining operation.

Further, the plug blade 30 may be made longer than the plug blade 31 in the parallel direction to the latter blade, and the plug inserting hole 3 may be made longer than the plug inserting hole 4 in accordance with the length of the plug blade 30, so that the plug blades 30 and 31 may be prevented from being reversely inserted into the holes by mistake.

Thus, the surface mounted connector according to the present invention consists of the receptacle 1 and the plug body 28, the former of which having the case 2 containing the mounting frame 23 fixed to the case 2 and the insulating block 18 fixed to said frame and provided with the female contact plates 12 and 12' including the contact areas 13 and 13' formed therein, the latter of which having the main body 29 provided with the plug blades 30 and 31 fixed to the body and including the hooks 32 formed therein and with the hook receivers 34 and 34' likely fixed to the body and including the hooks 35. The electrical connection of the receptacle 1 with the plug body 28 may be easily performed at the same time when the plug body 28 is secured to the receptacle in a ready and simple manner, as the plug blades 30 and 31 and the hook receivers 34 are inserted respectively into the plug inserting holes 3 and 4 formed to be longer than the standard inserting hole and into the slots 5 and 6 and are engaged respectively with the plate springs 9 and the engaging piece receivers 24 and 24'. Therefore, when the mounting part of the bracket body (FIGS. 8A and 8B) 41 is fixed to the surface of the main body 29 of the plug body 28 or the plug body 28 is integrally formed on the back surface of the bracket body 41, a bracket mounting device which can be easily attached and detached may be obtained. Further, there can be obtained a surface mounted connector which can be used toegther with an ordinary attachment plug cap and may be set anywhere on a wall surface.

An important feature of the present invention is that, whereas it has been difficult to regulate the position in conventional hook type connectors to be reciprocally locked, according to the present invention, when the plug body 28 is inserted into the receptacle 1 and is then moved downward (in the direction indicated by the arrow Y in the case as illustrated in FIGS. 7A to 7C), the female contact plates 12 and 12' will respectively contact with and hold the plug blades 30 and 31, the respective hooks 32 will engage with the plate springs 9 and 9' on the back surface of the case 2 of the receptatcle 1 and, at the same

time, the respective hook receivers **34** and **34'** will engage with the engaging piece receivers **24** and **24'** of the mounting frame **23**, and, therefore, there can be obtained a surface mounted connector in which the bracket can be correctly mounted on a wall surface by a simple operation and will not be accidentally detached by any undesirable vibrations or shocks and hence the stable electrical connection is performed.

What is claimed is:

1. A surface mounted connector comprising in combination a receptacle and a plug body, said receptacle comprising a case made of an insulating material and forming plug inserting holes parallel with each other substantially in the middle of the case and a pair of slots parallel with said plug inserting holes, a mounting frame made of a metal and attached to the back surface of said case, an insulating block fixed to said mounting frame and containing female contact plates having contact areas, and an engaging piece receiver having a bent part at the tip on each side of the mounting frame, and said plug body comprising plug blades each having a hook at the tip, an insulating main body to which said plug blades are fixed parallelly with each other and a pair of engaging pieces each having a hook at the tip parallelly with the plug blades.

2. The surface mounted connector according to claim **1**, in which said receptacle is provided on the inside wall surface below the plug inserting holes of the receptacle with angle plate springs each having an inclined surface.

3. A surface mounted connector comprising the combination of a receptacle and a plug body, said receptacle comprising front and back sections, the front section being made of an insulating material and forming plug inserting holes parallel with each other substantially in the middle of the front section, and an insulating block fixed to said back section and containing a pair of substantially parallel female contact plates aligned with each of said plug inserting holes with the opposed surfaces of each of said pairs of contact plates forming a receptatcle extending across the respective plug inserting hole for engaging opposite sides of a plug blade immediately upon insertion of said blade into said hole, said plug body comprising plug blades each having a hook at the tip and adapted to fit between and engage said opposed surfaces of said female contact plates when inserted into said plug inserting holes, and an insulating main body to which said plug blades are fixed parallelly with each other, the front section and said plug body having opposed surfaces adapted to engage each other upon insertion of said plug blades into said receptacles, and spring means mounted independently of said contact plates on the inside of the front section for engaging said hooks on said plug blades when inserted into said plug inserting holes and moved parallel to said contact plates, said spring plates being mounted to bias said plug blades away from the front section and toward said back section whereby said opposed surfaces of said front section and said plug body are biased against each other.

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U.S. Cl. X.R.

339—120, 191