Feb. 10, 1959 V. R. DESPARD 2,873,433

CONVENIENCE OUTLET WITH IMPROVED WIRE AND PLUG BLADE GRIPPING MEANS

Filed Sept. 26, 1957

2 Sheets-Sheet 1

Fig. 1.

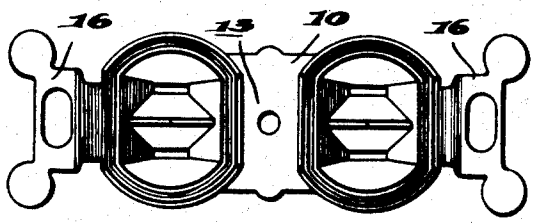


Fig. 2.

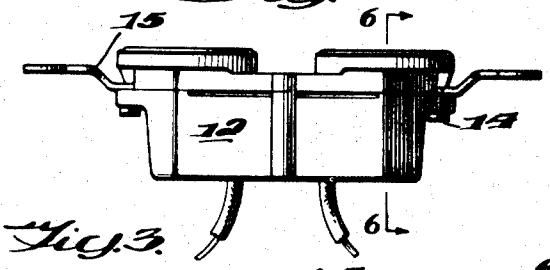


Fig. 3.

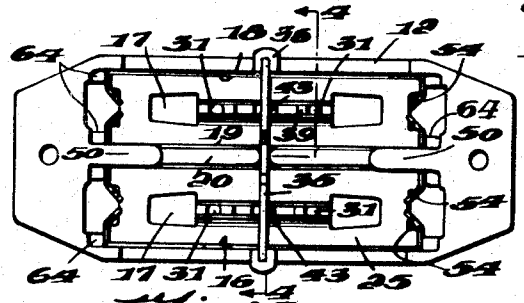


Fig. 7.

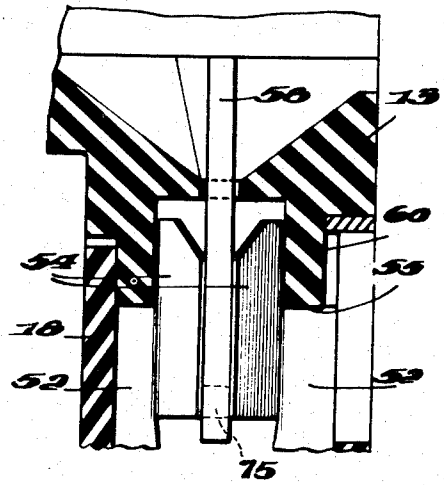


Fig. 4.

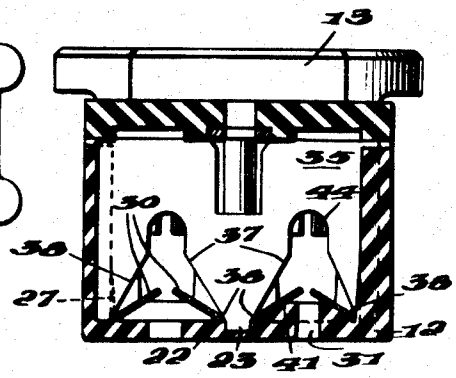


Fig. 6.

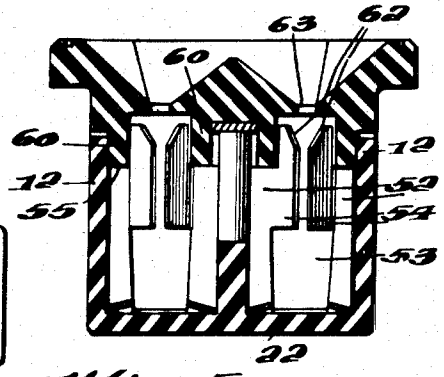
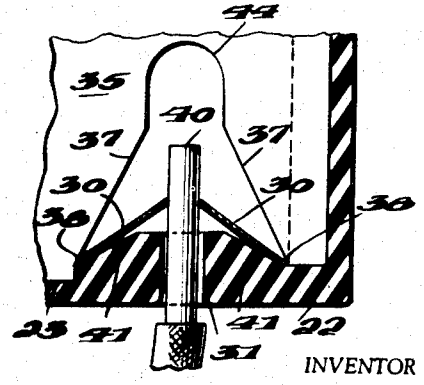


Fig. 5.



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2 Sheets-Sheet 2

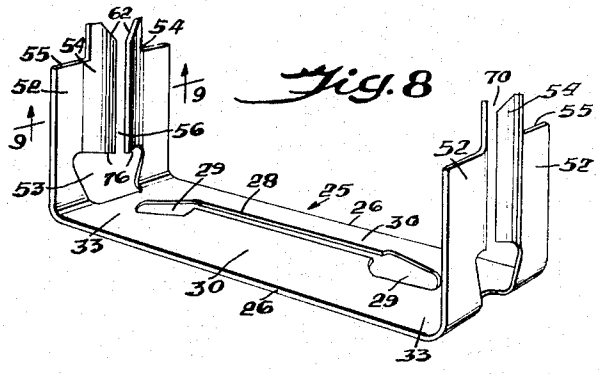


Fig. 8

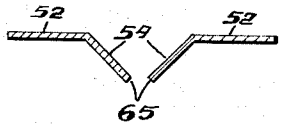


Fig. 9

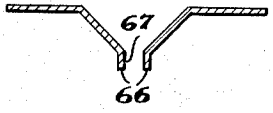


Fig. 11

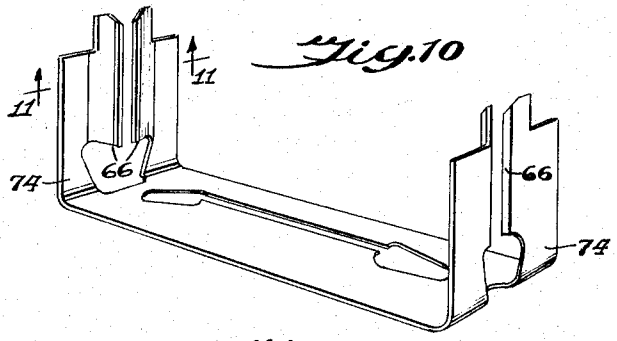


Fig. 10

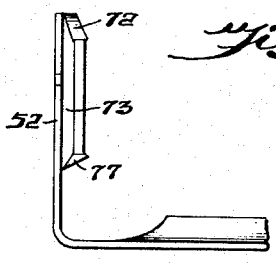


Fig. 12

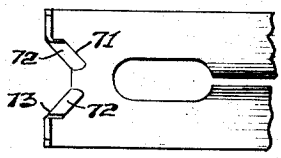


Fig. 13

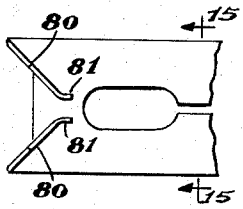


Fig. 14

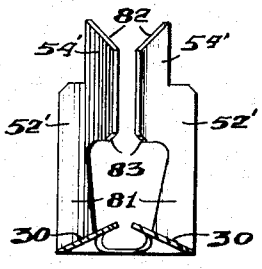


Fig. 15

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United States Patent Office 2,873,433 Patented Feb. 10, 1959

2,873,433

CONVENIENCE OUTLET WITH IMPROVED WIRE AND PLUG BLADE GRIPPING MEANS

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Application September 26, 1957, Serial No. 686,459

14 Claims. (Cl. 339—95)

This invention relates to electric wiring devices and more particularly to connecting apparatus for circuit continuation.

It is a general object of the present invention to provide novel and improved wiring devices having unique circuit continuing and connecting means associated therewith.

More particularly it is an object of the present invention to provide a novel and improved duplex convenience outlet having wire gripping terminals each acting automatically on insertion of the bared conductor end through an aperture in the wall of the outlet to grip the same in an effective electrical and mechanical connection.

An important object of the present invention resides in the arrangement of double spring tongue wire gripping devices together with stationary tongue stops whereby the wire is saved from being cut off by the tongues on the application of excessive pull thereto.

Another important object of this invention resides in the cooperating arrangement and mounting of the wire gripping elements whereby they are reinforced by the material of the housing and restrained against movement occassioned by the thrusting of wire ends therein.

Still another important feature of the invention resides in the arrangement of the wire gripping devices in a dual convenience outlet in such a manner that the wires leading thereto enter through the back of the outlet housing.

A further important feature of the invention resides in the unitary construction of wire gripping means and two plug blade gripping contacts whereby the unit may be mounted in a channel of uniform width whose side walls restrain both the wire gripping means and the blade gripping contacts to result in the proper performance of their functions.

A still further important feature of the invention resides in the construction of the plug blade gripping contacts whereby they are flexed in torsion to exert two line contacts on each blade to improve the conductivity.

An additional feature of the invention consists in so forming the plug blade gripping contacts that they present widened areas of contact engagement to the plug blade to reduce the frictional drag on the blade during insertion and withdrawal.

A further additional feature resides in the provision of turned edges at the entrance corners of the plug blade contacts to additionally facilitate blade entrance and the provision of inclined or folded lower corners to eliminate any tendency to catch in the plug blade aperture and resist withdrawal thereof.

Other and further objects and features of the invention will be more apparent to those skilled in the art upon a consideration of the attached specification and accompanying drawing wherein is disclosed a single exemplary embodiment of the invention with the understanding that such changes, additions, modifications and eliminations may be made without departing from the spirit of the invention as expressed in the appended claims.

In said drawing:

Fig. 1 is a front elevation of a duplex convenience outlet constructed in accordance with the present invention and shown full size;

Fig. 2 is a side elevation thereof;

Fig. 3 is a plan view of the lower half of the housing showing the unitary wire gripping and plug blade holding contacts in position therein and illustrated on an enlarged scale;

Fig. 4 is a transverse section taken on broken line 4—4 of Fig. 3 showing on the right the wire entrance and gripping means and on the left the entrance for wire release means;

Fig. 5 is a view similar to the right side of Fig. 4 on a still larger scale and showing a wire held by the gripping means;

Fig. 6 is a transverse sectional view taken on line 6—6 of Fig. 2 and showing the cooperation of the plug blade gripping contact parts with the restraining parts of the housing and cover;

Fig. 7 is a much enlarged view of a portion of the left side of Fig. 6 showing a plug blade in position and engaged by the contact therefor;

Fig. 8 is a perspective view of one embodiment of a wire gripping device shown removed from the outlet housing and incorporating integral plug blade gripping contacts, one set on each end thereof;

Fig. 9 is a horizontal section through one of the plug blade gripping contact sets taken on line 9—9 of Fig. 8;

Fig. 10 is a view similar to Fig. 8 but showing an improved blade gripping arrangement;

Fig. 11 is a horizontal section on line 11—11 of Fig. 10;

Fig. 12 is a fragmentary side elevation showing one blade gripping end of a contact assembly showing further improvements;

Fig. 13 is a plan view thereof;

Fig. 14 is a plan view of one end of a further embodiment of a blade engaging contact; and

Fig. 15 is a sectional view thereof taken on line 15—15 of Fig. 14 looking in the direction of the arrows.

In the wiring of homes, office buildings, factories, and the like, many wiring devices providing outlets and controls of various forms must be connected to the conductor system. Especially in flush wiring of the type used in homes and offices the equipment is beneath the surface of the wall and covered by a suitable wall plate while housed in a switch or outlet box. The installation of the wiring presents many problems augmented by the connections between the conductors and the terminals on the various types of wiring devices which have heretofore been of the screw type requiring the wireman to form a small loop on the end of each wire, fit it around the shank of a screw and turn down the screw head onto the loop to make the connection. The time required beyond that necessary for stripping the insulation from the end of each conductor is considerable and in large or multiple installations the cost of such time runs up into relatively large figures. It has long been the desire of the trade to reduce the time required for wiring the various outlet devices and to promote this the present invention provides a simple means for attaching the conductors by merely pushing the bared ends thereof into openings in one of the walls of the wiring device. There the wire is held by spring gripping means instantly providing both for mechanical and electrical connection between the conductor and the electrical parts of the apparatus to which it is to be connected. A few such devices have heretofore been proposed but have not in general been satisfactory for regular use and it is the purpose of the present invention to so improve these earlier forms of devices that all of their faults are overcome and they can be used with high efficiency in the rapid wiring of elec-

trical equipment of many types providing just as efficient and effective connection as the more mechanical types requiring the use of tools and the expenditure of considerable time.

Refer now to the drawings for a better understanding of the invention which has been displayed in connection with the more or less conventional type of duplex convenience outlet **10** such as shown in Figs. 1 and 2. This is formed of a two part molded insulation housing including base **12** and cover **13** secured together in any convenient and conventional manner as for instance by the screws **14** passing up through lugs on the ends of the base and engaging in the cover. As is customary the usual mounting strap **15** is interposed between the two housing parts and presents the mounting and plaster ears **16** at each end for attaching the same to the usual wall box.

While the wire gripping mechanism now about to be described has been shown in combination with a duplex convenience outlet or wall receptacle it nevertheless is adaptable for use with any type of wiring apparatus of the character used in home, office, and apartment wiring where the loads are not too heavy and the illustration with a particular type of apparatus is considered as representative only. It should be remembered that because of the character of a duplex convenience outlet the shape and arrangement of the wire gripping parts may be slightly different from those required in other apparatus such for instance as switches, lamp sockets, and the like.

It will be seen from Figs. 3 and 6 that the hollow base **12** of the housing is divided into two elongated parallel compartments arranged side by side across the width thereof. These compartments **17** have parallel side walls, the outer wall **18** of each being defined by the side of the housing. The inner walls **19** are defined by the partition **20** extending longitudinally through the center of the housing and being of varying heights at different portions of its length as clearly seen in the figures. In its center it is slotted down to the level of the bottom wall **22** of the housing which is recessed at **23** for a purpose later to be described.

Fitted closely into each compartment **17** and having areas resting on the bottom wall thereof is one of the combination wire and contact gripping units **25** best seen in Figs. 8 and 9 formed from a single relatively thin sheet of Phosphor bronze or similar good conducting and yet springy metal. This sheet has parallel edges **26** spaced apart a distance equivalent to that between the side walls of the compartment **17** whereby these side walls resist any lateral thrust resulting from the use of the part **25** in carrying out its regular functions. To assist in this and to insure a tight fit against these side walls they may be slightly tapered both for convenience in molding and to provide snugness, but a simpler way to facilitate it is by the use of slightly inclined ramps such as shown at **27** in Fig. 4. The intermediate portion of the part **25** forms the wire gripping section and for this purpose it is longitudinally split as seen at **28** between two punched openings **29** near the ends of the bottom. The two opposing wings **30** thus formed are bent upwardly out of the plane of the metal so as to provide upward inclinations from the lower surface forming a funnel-like entrance for the circuit wires which are introduced into the slot **28** through appropriate holes in the bottom wall of the housing as seen for instance at **31** in Figs. 3, 4, and 5. For each of the wire gripping strips as shown in Fig. 8 two openings are preferably provided, one for the wire normally conducting current to the unit and the second for any extension of the circuit found desirable.

As before mentioned, the contact and wire gripping strips **25** fit snugly into the compartments provided for them in the lower portion of the housing and the end sections **33** rest against the bottoms of the compartments with the edges **26** of the strips supported against lateral extension by means of the side walls of these compartments or the ramp structures previously referred to. To resist the upward thrust of wires being inserted in the slots **28** in the wire gripping devices as well as to hold these structures in position in the bottoms of their respective compartments a single transverse thrust plate of insulating material may be provided as seen at **35** in Figs. 3, 4, and 5. The edges of this sheet of insulating material fit in slots **36** in the side walls of the housing and its upper edge is shaped to be engaged by the housing cover to hold it in position with its lower tip portion at the center resting in the notch **23** in the bottom of the housing wall as previously mentioned. Over the transverse centers of the respective wire gripping devices the plate is cut away as seen at **37**, but at the points **38** adjacent the outer edges of each of the wings **30** there is contact along a narow line with the strip **25** so that when wires are thrust in through the bottom of the housing they cannot lift the wire gripping devices in their compartments.

Having recourse to Fig. 5 it will be seen how the stripped end **40** of a wire is introduced through the opening **31** in the bottom wall of the housing, pushes the wings **30** apart, and passes between them. They are tightly held against the wire by reason of their inherent resilience and grip it at such an angle that any tendency to withdraw the wire causes further gripping thereof insuring both a tight mechanical and an effective electrical engagement. To prevent excess pull on the wire causing the edges of the wings **30** to approach sufficiently to completely cut off the wire, limiting abutments are provided surrounding each wire entrance hole and having inclined sides **41** adapted, when the wings **30** are unflexed, to loosely engage their under surfaces as seen at the right in Fig. 4. When a wire of suitable size is inserted through the slot **28**, the wings are lifted from these surfaces **41** so as to become effective in holding the wire as seen in Fig. 5. Any excessive pull on the wire, however, will draw the wings down against the barrier surfaces **41** which prevent their edges from coming closer together than $\frac{1}{32}$ of an inch so that the wire cannot be cut off. At this point it might be well to note that the holes **31** and the slot **28** in the wire grips are sized to receive the standard No. 12 and 14 wires used in most all household wiring. The wires are respectively 81 and 64 mils in diameter. No selection is necessary, either size being received in each of the holes provided for the purpose.

In the event that for any reason a wire that has been inserted must be removed it is not necessary to separate the two parts of the receptacle for the purpose. Rather a single central opening **43** is provided in the housing floor for each of the wire gripping units. This is sized to receive a conventional 8-penny nail which is readily available on all construction jobs. When one is thrust in its tapered point passes into the slot **28** and springs the wings **30** sufficiently far apart to release the wire which may then be readily withdrawn if it does not fall out. The deep notches **44** in the hold down plate **35** are provided to limit the insertion of the end of this nail which enters at the center directly in line therewith. Thus only the tapered point enters between the wings **30** and the nail can easily be withdrawn since the wing edges cannot get a grip on it because of the slight included angle between them and the point sides.

By arranging the dual outlet as shown the two wire gripping devices are made of adequate length so that each may receive two wires and also provide space for the releasing nail. At the same time the arrangement is such that both wire gripping devices are in the bottom of one single piece of the housing for the whole unit and thus their side walls are rigidly restrained by a non-resilient one piece construction. This insures against any spreading of the side walls of the spring wings **30** when tension is applied to a wire which has been inserted between them. Thus no unwarranted release is

ever effected. For the sake of lightness the barrier wall **20** between the two compartments **17** is cut down as low as possible consistent with safety between the two wire gripping devices of different potential but at the ends as shown at **50** it is of full height for a reason now about to be explained.

The arrangement and material of the wire gripping strips **26** make it extremely convenient to apply to them any of the improved forms of attachment plug blade gripping contact shown in the drawings and forming a portion of the present invention. These contacts are integral, one with each end of each wire gripping strip and are constituted by turned up portions at the ends thereof. These turned up portions each comprise two spaced coplanar furcations **52** of complementary form. Where they leave the flat bottom portion of the strip **26** they are relatively wide but taper to form the cutout **53** of increasing width. The top of the opening is defined by the widened portions consisting of wings **54** extending generally toward each other from the furcations. The upper portions of the wings extend above the furcations which stop midway of the length of the wings as at **55**. The facing edges of the wings are separated by a narrow parallel walled slot **56** and like the wings **30** are bent, both in the same direction, away from the plane of the material of the strip where it is turned up at the end.

As seen in plan in Fig. 3, the narrow space **56** between the wings is slightly less than the thickness of a plug blade such as shown at **58** in Fig. 7 engaged between the wings **54** whereby the edges of the latter engage the sides of the plug blade in line contacts thus giving an extensive contact area not usually available in the conventional form of plug blade engagement which has only point contact.

As also seen in Fig. 3 as well as in Fig. 6, the outer edges of the furcations **52** closely abut against the side walls of the lower portion of the housing as well as against the high portions **50** of the separating partition between the compartments **17** and thus the wings are constrained against lateral displacement by the insertion of a plug blade.

It will be remembered that the upper ends of the furcations **52** are cut off sharply at **55** and this is to provide surfaces for engagement by the lugs **60** depending from the cover. These lugs rest on surfaces **55** to insure the restraining of the ends of the contact strips **26** in their compartments even though plug blades are being withdrawn. The action of these lugs **60** may be all that is necessary to restrain the whole gripping strip **25** so that the septum **35** may be eliminated. These lugs **60** of which there are four across each end of the receptacle, as seen in Fig. 6, also engage the edges of wings **54** where they extend above surfaces **55** and insure against this portion of them spreading. The upper corners of the wings are clipped or chamfered as at **62** to facilitate the insertion of a plug blade, the position of which is determined and guided by appropriate slots **63** in the cover plate in the normal manner.

When the plug blades are inserted the wings are prevented from spreading laterally and are prevented from moving toward the ends of the compartments by the column-like struts **64** best seen in Fig. 3. The space necessary to receive the plug blade, which is thicker than the width of slot **56** between the wings is effected by inserting the blade between the chamfered corners which twists the wings oppositely in a manner to place a torsional stress on the furcations **52** in the areas between the wings and the bottoms or flat portions of the strips **26**. This pure torsional stress insures that the wings will give the edgewise line contact desired. It furthermore provides a great deail more force than can be achieved by any other manner of stressing the spring within the areas available and provides therefore one of the most effective contacting arrangements known both

for insuring good electrical contact and providing tight mechanical holding so that the plug does not pull out when reasonable tension is applied to the cord attached thereto. It will be obvious that the type of plug blade gripping mechanism just defined is not restricted to use with the specific wire gripping mechanism defined earlier in this specification but the unit illustrated in Figs. 8 and 9 does combine these two devices into a single one-piece structure which makes use of the resilience of a single flat strip of sheet metal to provide both wire gripping and plug blade gripping in the manner already defined.

Under some circumstances and with certain types of plug blades, such as those recently becoming popular and formed by folding a thin sheet of metal to double its thickness, the pressure exerted on the blade by the raw cut edges of the wings **54** of the embodiment shown in Figs. 8 and 9, produces more than the desired amount of frictional engagement, making the insertion of the plug blade or its withdrawal too difficult in many instances. To eliminate this fault without disturbing the principal advantages of the plug blade gripping contact arrangements shown in Figs. 8 and 9, a modification as illustrated in Figs. 10 and 11 may be resorted to. Here the principal difference is best illustrated in the section view, Fig. 11, where the sharp corners or edges bearing the reference character **65** in Fig. 9, and which are somewhat rough as a result of the cutting operation for separating the wings, are bent over to form small flanges or ribs **66** which present relatively flat, smooth faces **67** to the sides of the gripped plug blade. This lifts the raw cut edges from engagement with the blade faces and also increases the area of contact, whereby the unit contact pressure is reduced and the amount of friction substantially decreased so that less effort is required to insert the plug or to remove it, although sufficient friction remains to insure it being retained in the receptacle against any normal withdrawal strains.

In the embodiment illustrated in Figs. 12 and 13, which is cumulative with that of Figs. 10 and 11, the smoothness of insertion of the tip of the blade is improved by forming the V-notch, such as is designated **70** in Fig. 8, by folding over the upper corners of the wings after first clipping them slightly as at **71** in Fig. 13. The folded over portion is designated **72** and actually extends substantially at right angles to the plane of the wing **73** which itself has substantially the same angle to the main portion **52** as seen in Fig. 8. This then eliminates any raw cut edges over which the tip of the plug blade must slide during insertion. Moreover, the flanges **72** on the wings are in effect somewhat transverse thereof and provide additional rigidity against bending, insuring that the action which accounts for the excellent contact engagement of the wings with the faces of the plug blade comes from twisting of the reduced section portions such as designated **74** in Fig. 10.

It will be remembered that the contact blades of many attachment plugs are transversely drilled closely adjacent their tips, as indicated at **75** in Fig. 7, in order to cooperate with a slight projection on some of the flat type contacts which are so lacking in friction as to need this engagement to insure holding the plug in position against accidental withdrawal. This rather large diameter straight through hole is very close to the tip and in constructions such as illustrated in Fig. 7, as well as in Figs. 8 and 9, the sharp lower corners **76** of the wings **54** may spring sufficiently into such a hole as to make the withdrawal of the plug exceedingly difficult, if not impossible under certain circumstances, and to obviate this difficulty these lower corners in the embodiment of Figs. 12 and 13 are diagonally bent inwardly and upwardly as seen at **77** in Fig. 12, to provide a smooth incline over which the edges of the hole **75** in the blade can slip without difficulty so that no resistance beyond that exerted by the frictional contact on the blade resists its withdrawal.

In yet another form of blade engaging arrangement, as seen in Figs. 14 and 15, each of the wings 54^1 is maintained in the same plane as its corresponding furcation 52^1 to present one long continuous transverse plane as seen at **80** in Fig. 14, and this may be edged by flanges **81** whose inner faces are substantially parallel to each other where they are intended to engage the faces of the plug blade. To achieve the condition illustrated in Fig. 14 the portions of the furcations below the lower ends of the wings are twisted in the areas designated **81** which areas also take the torsional twist when the plug blade is inserted. As in the other embodiments the top edges **82** of the wings may be either chamfered or turned over as in Fig. 12 and a similar treatment given to the lower corners as illustrated at **83**.

The plug blade receiving contacts of all of the embodiments can be readily incorporated in single outlets as will be obvious, the type of wire terminal being inconsequential.

This application is a continuation-in-part of my application Serial No. 378,380 filed September 3, 1953 now abandoned and entitled "Convenience Outlet With Improved Wire and Plug Blade Gripping Means."

Having thus described my invention, what I claim as novel and desire to secure by Letters Patent of the United States is:

1. A duplex convenience outlet having in combination, an insulating housing formed of a plug blade guiding cover and a body part providing two longitudinal, side-by-side compartments having bottom walls common with that of the body, a strip of resilient conductive metal mounted against the bottom of each compartment and having the ends thereof turned up normal to the bottom, each such end being longitudinally split providing wings deflected in the same direction through a small angle out of the plane of their end to receive tightly between them a plug blade entering through said cover whereby the wings are stressed in torsion, each said strip between the said ends having a pair of wings deflected up from the bottom wall to guide the bared end of a conductor wire between their edges and to there hold the wire against withdrawal, said bottom wall having a wire guiding opening therein for and in alignment with the space between said last mentioned wing edges.

2. Electric wiring apparatus as defined in claim 1 wherein the side walls of said compartments engage the outer edges of the upturned ends of said strips to prevent spreading thereof.

3. A receptacle for an attachment plug having a generally flat blade comprising in combination, a housing having a compartment, a cover for said compartment having a blade entrance opening, a contact in said compartment formed integrally of a resilient sheet metal strip and having a base, upturned, spaced furcations and an elongated wing on the inner edge of each furcation and extending above the latter, said wings including between them an angle of less than 180 degrees, the inner edges of the wings being spaced to receive between them and tightly contact a plug blade projecting through said entrance opening and means to attach a conductor to said contact.

4. The receptacle defined in claim 3 in which the walls of said compartment substantially engage the outer edges of said furcations to prevent their spreading under the stress of an inserted plug blade.

5. The receptacle as defined in claim 4 in which the said cover is provided with lugs engaging the tops of said furcations to hold the contact in position in its compartment.

6. The receptacle as defined in claim 4 in which the housing has an end wall for said compartment intersecting those engaging the furcation edges so as to provide corner fulcra for the furcation edges.

7. In a duplex convenience outlet, in combination, an insulating housing having entrance slots for the two blades of each of two attachment plugs and having therein two laterally spaced, longitudinally extending chambers each entered by one of said slots for each plug, a one piece, sheet metal, conducting fitting in each chamber including spaced plug blade engaging and holding furcations at each end thereof and automatic wire engaging and holding means intermediate the ends, the portions of each fitting connecting the furcations thereto being reduced in width providing narrow parts whereby each furcation performs its plug blade engaging function under the action of torsional stresses in its adjacent narrow part.

8. The outlet defined in claim 7, wherein the plug blade engaging and holding furcations include the adjacent parallel edges of relatively inclined wings, the outer edges of said furcations being parallel to and spaced from the adjacent edges, and means forming walls of said chambers substantially engaging said outer edges to resist spreading and insuring said torsional stressing.

9. Electric wiring apparatus including in combination, an insulating housing, a contact in said housing and means for connecting a conductor to said contact comprising a flat strip of resilient metal connected to the contact, resting against a rigid wall of the housing and provided with integral facing wings bordering a slit in the strip, said wings being bent outwardly from said wall to be spread by a conductor wire introduced between them through an entrance hole in said wall to thereby grip the conductor and resist its withdrawal, and means integral with said wall adjacent the entrance hole positioned beneath the wings and shaped to be engaged by said wings on excess conductor wire withdrawal effort to hold the slit edges apart sufficiently to prevent conductor cutoff thereby.

10. A receptacle for an attachment plug having a generally flat blade comprising in combination, a housing having a compartment, a cover for said compartment having a blade entrance opening, a contact in said compartment formed integrally of a resilient sheet metal strip and having a base, and an upturned portion substantially normal to said base, a central aperture in said portion adjacent its junction with the base, a slit connecting the aperture to the free end of the said portion and forming contiguous wings, said wings being deflected to overhang the base and separate the edges of the slit to accept a plug blade extended through said opening by engaging its opposite faces longitudinally, the insertion of the blade stressing the narrowed areas beside said aperture torsionally.

11. The receptacle as defined in claim 10 in which the edges of said slit are formed with narrow flanges each turned in the same direction as its wing deflection.

12. The receptacle as defined in claim 10 in which the corners at the junction of the slit edges and the strip end are folded over to provide a smooth converging entrance to the space between the slit edges.

13. The receptacle as defined in claim 10 in which the corners at the junction of the slit edges and the central aperture are relieved sufficiently to avoid catching in a hole in the lower end of a plug blade.

14. Electric wiring apparatus having in combination, an insulating housing, an electrical contact in said housing and means to connect a conductor to said contact comprising a strip of resilient metal connected to the contact and having a slit therein, the metal of the strip adjacent said slit being formed into converging wings to guide and receive a bared conductor between the facing free edges of said slit to grip the same and resist withdrawal, said strip of metal bearing on a wall of said housing, a conductor entrance hole in said wall having an axis intersecting a portion of said slit, and said wall surrounding said hole being elevated and shaped to be engaged by said wings when deflected on excess conductor withdrawal effort to hold the slit edges apart sufficiently so that conductor cutoff is prevented.

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