

May 21, 1935.

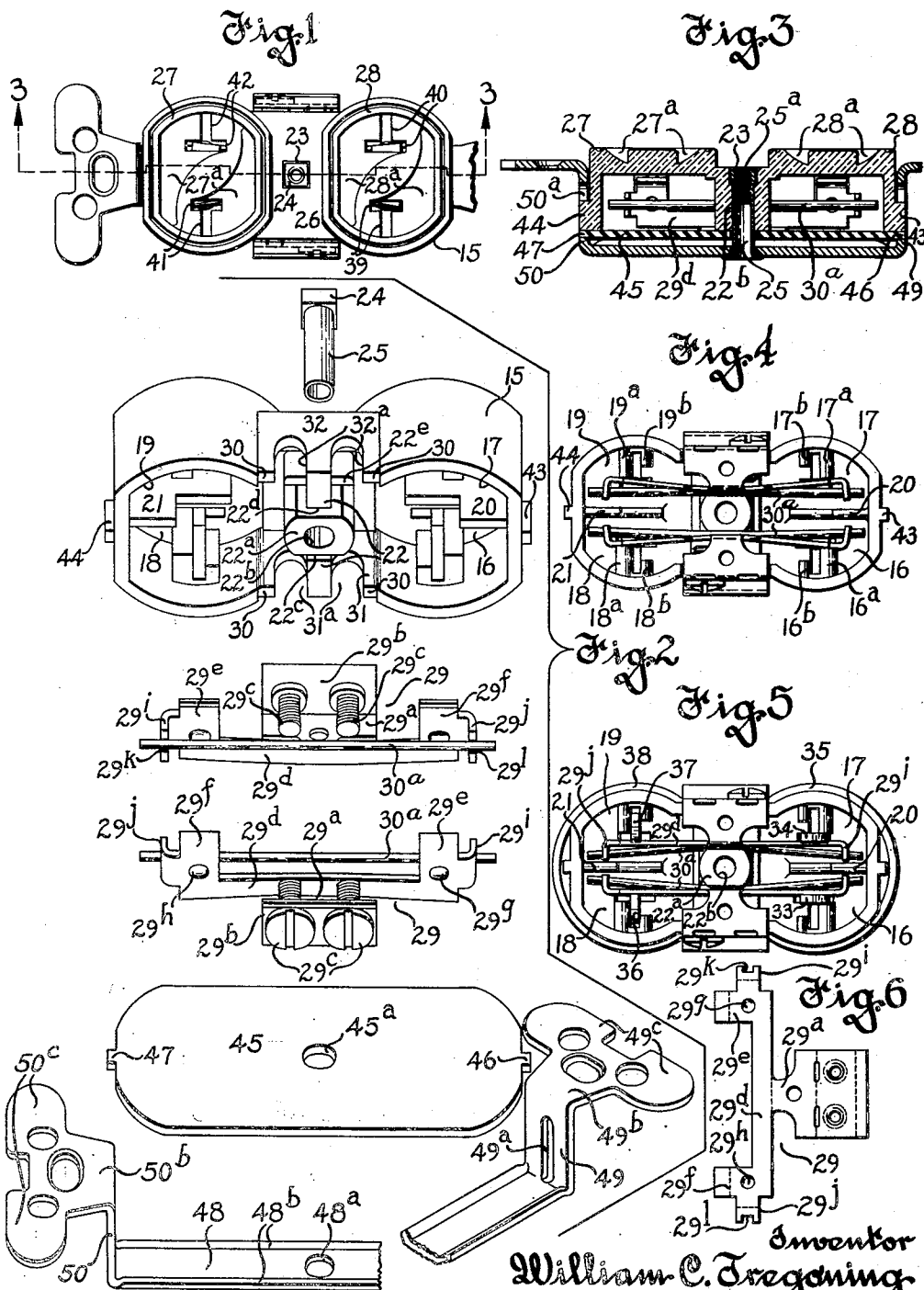
W. C. TREGONING

2,001,990

ATTACHMENT PLUG RECEPTACLE

Filed Sept. 28, 1931

3 Sheets-Sheet 1



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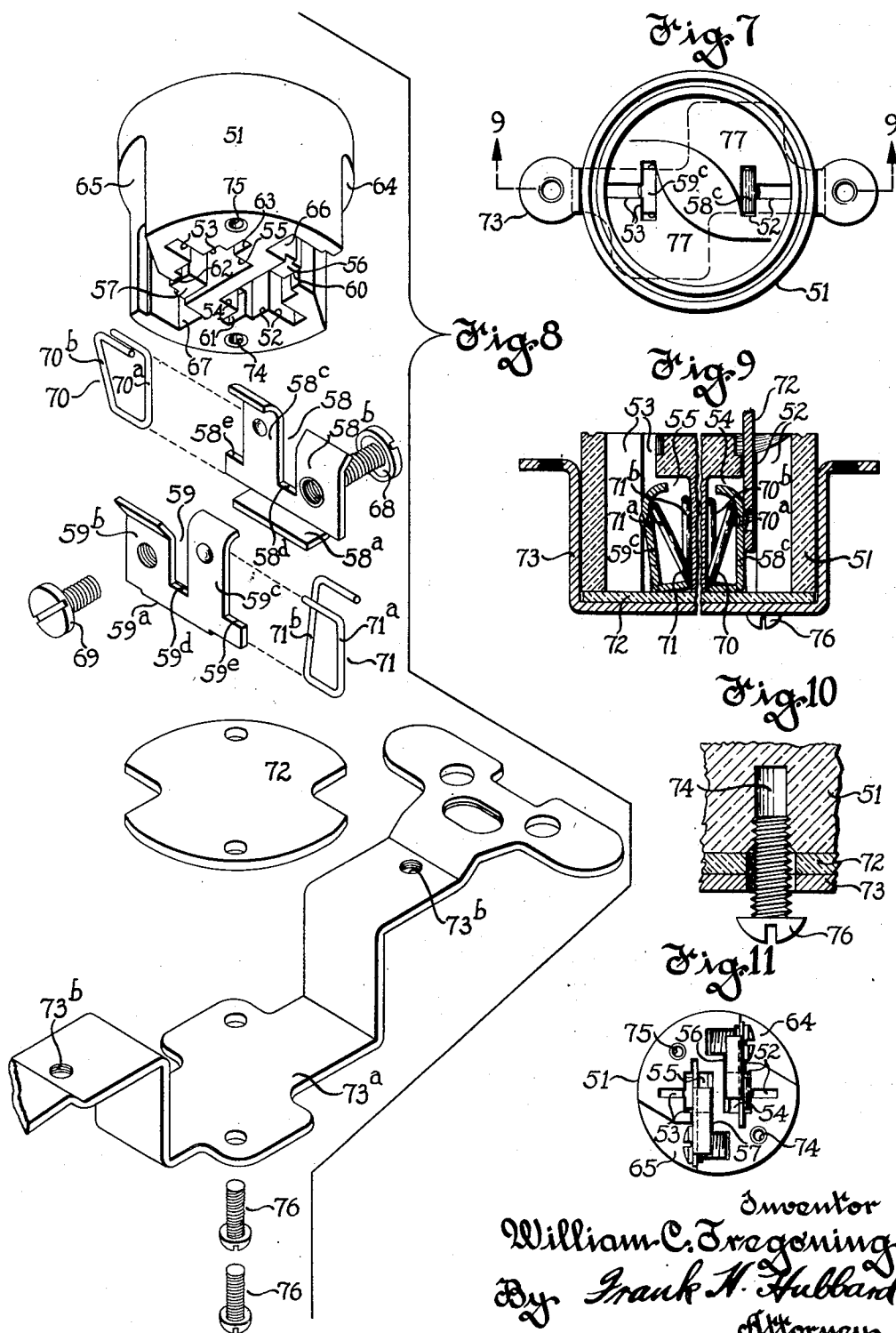
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Fig. 12

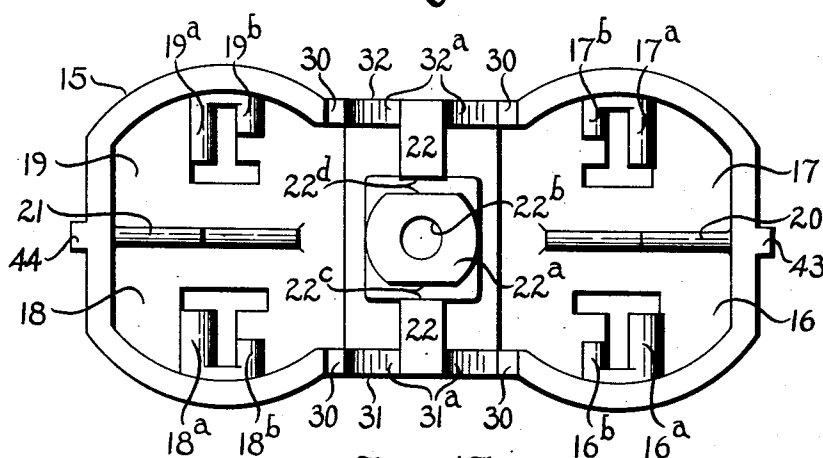
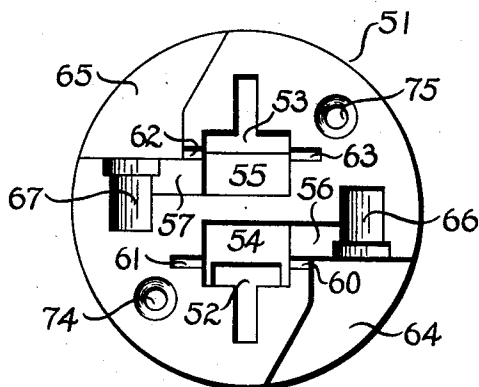
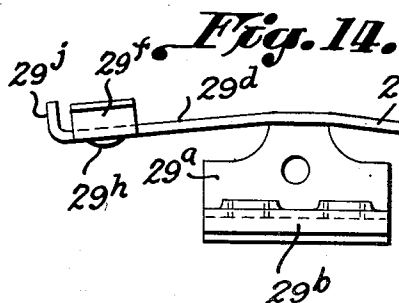
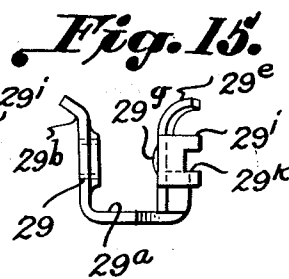


Fig. 13



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UNITED STATES PATENT OFFICE

2,001,990

ATTACHMENT PLUG RECEPTACLE

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Application September 28, 1931, Serial No. 565,538

12 Claims. (Cl. 173—330)

This invention relates to improvements in attachment plug receptacles.

An object of the invention is to improve and simplify the construction, arrangement, and manner of assembling the parts of such a device, and to improve the operative characteristics of the finished article.

Another object is to minimize the size and weight of the metal and insulation parts required in the production of such devices, while at the same time providing a structure of improved mechanical and electrical strength and durability.

Another and more specific object is to provide a device enabling use of a molded insulating base of extremely shallow depth.

Another object is to provide novel means for insuring the proper degree of pressure of the receptacle contacts against inserted jack blades, which means provides for use of contacts which are substantially non-resilient in character.

Another object is to provide a novel form of interlocking connection between the bottom cover member of the receptacle and the metal supporting strap or plate.

Other objects and advantages of the invention will hereinafter appear.

The accompanying drawings illustrate certain embodiments of the invention which will now be described, it being understood that the invention is susceptible of embodiment in other forms without departing from the scope of the appended claims.

In the drawings, Figure 1 is a top plan view of a duplex attachment plug receptacle constructed in accordance with my invention.

Fig. 2 is a perspective view of the device shown in Fig. 1, the parts thereof being shown in separated relation.

Fig. 3 is a longitudinal section, on the broken line 3—3 of Fig. 2.

Fig. 4 is a bottom plan view of the receptacle, with the supporting strap and the bottom cover member removed.

Fig. 5 is a view similar to Fig. 4, but showing the relative positions of the parts when the jack blades of plug caps of known forms are inserted.

Fig. 6 is a plan view of a metal blank from which each of the identical one-piece contact and terminal members may be formed.

Fig. 7 is a top plan view of a single attachment plug receptacle constructed in accordance with my invention.

Fig. 8 is a perspective view of a device like that shown in Fig. 7, but having a slightly modified

form of supporting strap,—the several parts being shown in separated relation.

Fig. 9 is a composite view, on the line 9—9 of Fig. 7,—the combined contact and terminal member at the left-hand side thereof being shown in its normal position, and the combined contact and terminal member at the right-hand side being shown in the position assumed thereby upon insertion of a jack blade.

Fig. 10 is an enlarged detail view illustrating the manner in which the securing screws are united to the insulating base.

Fig. 11 is a bottom plan view of the device with the supporting strap and the bottom cover plate removed.

Fig. 12 is a bottom plan view, on an enlarged scale, of the insulating base shown in Figs. 1 to 5, inclusive.

Fig. 13 is a bottom plan view, on an enlarged scale, of the insulating base shown in Figs. 7 to 11, inclusive.

Fig. 14 is an enlarged top plan view of one of the combined contact and terminal members employed in the device of Figs. 1 to 5, and

Fig. 15 is an end view of the member shown in Fig. 14.

Referring first to Figs. 1 to 6, inclusive, the numeral 15 designates a base which may be molded from any suitable insulating material. I prefer to employ, as a molding material, the phenol-formaldehyde condensation product sold commercially under the trade-name of "Bakelite". As shown (see Figs. 4 and 5) base 15 is recessed from its bottom face to provide a plurality of pairs of laterally opposed contact chambers 16, 17 and 18, 19,—the chambers 16, 17 preferably being only partially separated by a barrier 20 formed upon the inner surface of the top wall and one end wall of the base,—a similar barrier 21 being interposed between chambers 18, 19. By the use of an insulating material of the character aforementioned I am enabled to form the base with relatively thin top and side walls of substantially uniform thickness, without sacrificing any of the necessary or desired strength of the piece.

Interposed between the pairs of contact chambers is an insulating barrier 22 provided with an intermediate enlargement 22^a which is in turn provided with an opening or passage 22^b. The upper end of passage 22^b (Figs. 1 and 3) is provided with a countersink 23 of angular cross section to accommodate the angular head or enlargement 24 of an eyelet or ferrule 25 or other suitable securing element. The countersink 23

opens onto a ledge 26 located below the surface of the plug receiving portions 27, 28 of the base, whereby a flush or wall plate (not shown) may be attached to the base by means of a screw which takes into the tapped upper end 25^a of eyelet 25,—said plug receiving portions being adapted to project through correspondingly shaped openings in the flush plate, as is usual in devices of this character.

Barrier 22 is provided on opposite sides of enlargement 22^a with a pair of relatively narrow grooves 22^c, 22^d. Said grooves are of like depth,—the bottom wall of groove 22^d being shown at 22^e in Fig. 2 as extending outwardly to the full width of enlargement 22^a. As shown in Fig. 4, for instance, each of the contact chambers is provided with a pair of projections 16^a, 16^b; 17^a, 17^b; 18^a, 18^b and 19^a, 19^b arranged on opposite sides of the shank (or tandem-aligned) portions of the respective T-slots; the projections 16^a, 17^a, etc., preferably extending to points flush with the walls of the respective parallel blade-receiving portions of said T-slots; whereas the projections 16^b, 17^b, etc., may be made relatively shorter, as shown.

In each receptacle I employ a pair of identically formed one-piece combined contact and terminal members of relatively thick sheet metal, each designated in general by the numeral 29. Each member 29 comprises a flat base portion 29^a adapted to rest upon one of the end portions of barrier 22 and upon the offset portions 30 of one of the side walls of base 15 and in a relation substantially flush with the bottom surface of the latter. Members 29 are also provided with terminal portions 29^b bent upwardly at substantially right angles to the respective base portions 29^a,—said terminal portions being preferably provided with pairs of tapped openings to accommodate binding screws 29^c of usual form. Also extending upwardly from each base portion 29^a in substantially parallel relation to terminal portion 29^b is a bus member 29^d the intermediate portion of which is adapted to fit into one of the grooves 22^c or 22^d; and the opposite ends of which member are provided with upwardly extending contact portions 29^e, 29^f the upper ends of which are flared away from the respective terminal portion 29^b,—the usual bosses or projections 29^g, 29^h being provided for interlocking engagement with the openings or notches formed in plug jacks of well known form.

Extending laterally from contact portions 29^e and 29^f and bent rearwardly with respect thereto are lugs 29ⁱ and 29^j, respectively, the vertical edges of said lugs being provided with notches 29^k and 29^l,—a predetermined length 30^a of straight spring wire (preferably steel) being engaged with each pair of notches 29^k, 29^l prior to insertion of the bus members and said springs within the grooves 22^c and 22^d. As best illustrated in Fig. 4 the arrangement is such that springs 30^a are slightly distorted or bent upon assembling of the same and members 29 with respect to base 15, the strain so produced acting in turn to bend the opposite ends of bus members 29^d whereby the contact portions 29^e and 29^f of each member are definitely biased toward or into engagement with the projections 16^a, 17^a, 18^a and 19^a, respectively.

As shown the opposite side walls 31, 32 of base 15 are provided with pairs of notches 31^a, 32^a to provide clearance for the shanks of binding screws 29^c and to facilitate assembly of the parts aforedescribed. The assembled parts will normally as-

sume the positions thereof illustrated in Fig. 4; whereas upon insertion of the parallel-mounted jack blades 33 and 34 of a plug cap 35 of usual construction the laterally opposed contact portions are moved toward each other against the bias of springs 33^a and also against the normal or inherent bias of the respective bus members 29^d, as shown at the right hand side of Fig. 5. A similar movement of the contact portions will result upon insertion of tandem-mounted jack blades 36 and 37 of a plug cap 38, as shown at the left-hand side of Fig. 5. As will be understood the receptacles so constructed will accommodate plugs having jack-blades arranged at right angles to each other; that is, one parallel-mounted and one tandem-mounted. As best illustrated in Fig. 1 the parallel portions of each pair of T-slots are of different sizes for cooperation with known forms or arrangements of polarized jack blades.

The finding surfaces 27^a, 28^a formed upon the projections 27, 28 are of the character described and claimed in my Patent No. 1,677,256, dated July 17, 1928. That is to say, the pairs of finding surfaces on each projection are inclined downwardly and inwardly in opposite directions with respect to each other and toward the respective T-slots or contact recesses,—said T-slots having upstanding vertical walls 39, 40, 41 and 42 to prevent movement of the jack-blades past the same.

Base 15 is provided at the opposite outer ends thereof with centrally located relatively narrow projections 43 and 44 which extend from points flush with the lower surface of the base throughout a predetermined portion of the height of the latter. The bottom cover plate 45 of the receptacle is of a form to substantially cover the entire lower surface of base 15, said plate being preferably punched from a sheet of relatively thin but tough and sufficiently rigid insulating material, such as fiber board. Plate 45 is provided at opposite ends with projections 46 and 47 to underlie and register with the projections 43 and 44, respectively.

The supporting strap member 48 is of substantially U-shape in longitudinal cross section, the vertical arms 49 and 50 thereof being provided with slots 49^a and 50^a of predetermined length extending upwardly from the lower ends thereof. As will be apparent said strap may be pressed manually into assembled relation to base 15 whereby the projections 43, 46 and 44, 47 are interlocked with the walls of slots 49^a, 50^a to prevent relative lateral movement of the strap and cover plate with respect to base 15 when said parts are assembled, and to also releasably retain said parts in partially assembled relation. The lower end of eyelet or ferrule 25 is adapted to penetrate registering openings 45^a and 48^a in plate 45 and strap 48, said lower end being then upset or riveted, as shown in Fig. 3 to permanently secure the several parts in assembled relation. Strap 48 is provided with upwardly angled edges 48^b to strengthen the same and to insure proper clamping engagement thereof against plate 45. It will be understood that a sub-assembly may be effected by tilting plate 45 to permit insertion of one of the projections 46 or 47 into one of the slots 49^a or 50^a, the other projection being thereafter insertable into the other slot in strap 48 by depressing the plate, or by slightly spreading the arms 49, 50 of the strap.

Extending outwardly from arms 49, 50 are the usual attaching lugs 49^b, 50^b, and formed integrally with said lugs and separately removable by breakage therefrom are pairs of wall-engaging

or flush-aligning portions 49^c, 50^c, of a well known form.

It is to be particularly noted that in accordance with my invention only a single contact brush is associated with each T-slot, which arrangement, in conjunction with the spring-biasing means shown herein, simplifies the construction and assembly of the parts, while insuring a predetermined pressure of the contact brush against an inserted jack blade,—not only when the device is new, but throughout the life of the latter. Also my invention provides for use of relatively thick sheet metal stock in forming the one-piece contact and terminal members, with resultant increased strength and durability of these parts of the device. As best illustrated in Fig. 3, the opposite free ends of the bus members 29^d are supported in spaced relation to the bottom cover plate 45 to permit free or unobstructed movement of the contact brushes under or against the normal spring bias thereof. While the springs 30^a will normally be maintained against endwise movement by reason of the relatively snug fit thereof within grooves 22^c, 22^d, and by reason of the fact that the same are assembled under tension, it will be noted that the length of said springs is such that endwise disengagement thereof from either of the notches 29^k or 29^l would be prevented by the end walls of base 15.

The single receptacle illustrated in Figs. 7 to 11 is in many respects similar to that shown in Figs. 1 to 6. Thus I have shown the same as comprising a substantially cylindrical base 51 which is molded from "Bakelite" or equivalent insulating material. Said base is provided with T-slots 52, 53 extending longitudinally therethrough. The base is additionally recessed from the lower surface thereof to provide a pair of substantially rectangular chambers 54 and 55 which underlie the closed portions of the upper surface of the base and which communicate laterally with the respective T-slots or passages. Offset upwardly from the bottom surface of the base are a pair of ledges 56 and 57 (Figs. 8 and 11) upon which the flat base portions 58^a, 59^a of a pair of one-piece combined contact and terminal members 58 and 59 are adapted to bear. Members 58 and 59 are of identical form, and the same include terminal and contact brush portions 58^b, 58^c and 59^b, 59^c projecting upwardly at substantially right angles to the base portions 58^a and 59^a.

The portions 58^d, 58^e on opposite sides of contact portion 58^c are adapted to fit rather loosely within the groove 60 and notch 61 on opposite sides of chamber 54 whereby a slight tilting or bodily movement of member 58 is permitted. A groove 62 and a notch 63 are likewise provided to accommodate the portions 59^d, 59^e of member 59. Recesses 64 and 65 are provided to accommodate the terminal portions 58^b, 59^b, respectively,—relatively narrower recesses 66 and 67 communicating with recesses 64 and 65 to accommodate the shanks of the usual binding screws 68 and 69.

A pair of springs 70 and 71 is provided, said springs being bent as shown into substantially loop-shape, with the relatively short arms 70^a, 71^a thereof adapted to bear against the rear surfaces of contact portions 58^c, 59^c, and with the relatively longer rearwardly angled arms 70^b, 71^b adapted to bear against the walls of chambers 54 and 55, respectively, as best illustrated in Fig. 9.

Thus with the bottom cover plate 72 (of

punched sheet fiber or the like) in position as shown in Fig. 9 the springs 70 and 71 normally bias the contact portions 58^c, 59^c against the outer walls of the parallel portions of the respective T-slots with consequent bodily tilting of members 58 and 59 (Fig. 7 and the left-hand side of Fig. 9), the upper ends of said contact portions being curved inwardly toward each other to at all times underlie the shoulders formed by chambers 54 and 55. Upon insertion 10 of the jack-blades of a plug (one of such blades being shown at 72 in Fig. 9) the same engage the contact portions 58^c, 59^c to move the same against the bias of the respective springs 70, 71 whereby proper electrical contact is insured. 15 While I have illustrated a parallel-mounted jack-blade at the right hand side of Fig. 9, it will be apparent that a similar degree of movement of the contact portions will result upon insertion of the tandem-mounted jack-blades of a 20 plug.

As shown the bottom cover plate 72 substantially conforms in shape to the contour of the bottom surface of base 51, and underlying said plate is a supporting strap or yoke 73,—said 25 plate and said yoke being provided with openings adapted to register with a pair of substantially cylindrical recesses 74 and 75 formed in the bottom surface of the base by the molding operation. Said recesses preferably have smooth 30 surfaces and the diameter of each is slightly less than the diameter of the threaded shank portions of a pair of securing screws 76.

As shown in detail in Fig. 10 the securing screws 76 are applied by means of an ordinary 35 screw driver,—each screw acting automatically to cut a holding thread in the wall of its respective recess,—the aforescribed material of base 51 being particularly adapted to facilitate insertion of the screws within the respective recesses in this manner. As an alternative, however, the screws may be driven home by hammering or pressing the same into the respective recesses, or drive-screws of known form may be employed. In either case the screws will be 45 rigidly held in final position without danger of accidental loosening. The yoke 73 shown in Figs. 7 and 9 is of a form to adapt the same to securement to a panel or similar support (not shown) having an opening to accommodate the 50 projecting upper end of the base. The yoke 73^a shown in Fig. 8 is of a form corresponding in general with that shown in Figs. 1 to 3, whereby the same may be attached to an outlet box of standard size. A pair of tapped openings 73^b 55 is adapted to accommodate the securing screws of a flush or face plate of well known form. The finding surfaces 77 in this form of the invention are identical with those aforescribed.

What I claim as new and desire to secure by Letters Patent is:

1. The combination with a molded insulating body recessed from its lower face to provide contact chambers and having T-shaped slots penetrating the upper face of said body and communicating with said chambers, of a pair of one-piece sheet metal contact and wiring terminal members insertable within said chambers from the lower face of said body, with the terminal portions thereof exposed at opposite sides 70 of said body, the contact portions of said members each comprising a single lug, said lugs having flared upper ends adapted to underlie the upper surface of said body, and separately formed resilient wire elements interposed between the 75

interior walls of said body and the respective members to yieldably bias the contact lugs on the latter across the adjacent parallel head portions of said T-slots, whereby said single lugs are adapted for cooperation with plug caps having the jack blades thereof arranged in parallel or in tandem relation.

2. A duplex attachment plug receptacle comprising an insulating base recessed in its lower face to provide a plurality of pairs of contact chambers, said pairs of chambers having T-shaped guide-ways leading thereto through the opposite face of the base, a pair of one-piece sheet metal contact and terminal members insertable into said chambers from the lower face of the base, each of said members having single contact brush portions bent upwardly therefrom in substantially thereof, and a pair of spring wire elements, each wire element being engaged under tension with opposite ends of its respective member and with a shoulder formed on said base, whereby each of said single contact brushes is yieldably biased into cooperative relationship to both the head and shank portions of its associated T-shaped guide-way to insure a given degree of pressure thereof against inserted plug jacks.

3. As an article of manufacture, a one-piece combined contact and terminal member for duplex plug receptacles, said member comprising a flat base portion and wiring terminal and bus portions bent upwardly therefrom in substantially parallel relation to each other, single contact brush portions formed integrally with said bus portion and projecting upwardly from the latter at opposite ends thereof, said brush portions having flared upper ends, lugs formed integrally with the respective brush portions and extending laterally with respect thereto, said lugs having notches formed therein, and a normally straight spring wire having the opposite end portions thereof engaged with said notches, said spring being engageable at an intermediate point thereof to place the same under strain and to yieldably bias said brush portions in a given direction.

4. As an article of manufacture, a one-piece combined contact and terminal member for duplex attachment plug receptacles, said member comprising a flat base portion to be clamped in position against a suitable support, a wiring terminal portion bent upwardly at substantially a right angle to said base portion, said terminal portion having a plurality of tapped openings formed therein for the reception of suitable binding screws, said base portion having a bus portion bent upwardly therefrom at substantially a right angle thereto, the free ends of said bus portion each having a single contact brush extending upwardly in the plane thereof, said ends also having lugs extending parallel to the contact proper and then laterally thereto, the free edges of said lugs having notches formed therein, and a length of wire engageable at its opposite ends within said notches, the intermediate portion of said wire being engageable with a suitable support to distort the wire, whereby the opposite ends of said bus portion are yieldably biased in a given direction.

5. In an attachment plug receptacle, in combination, a molded insulating base having recesses formed in the lower surface thereof, said base also having guide passages penetrating the upper surface thereof and communicating with said recesses, a plurality of one-piece sheet metal contact and terminal members the contact portions of which are freely insertable within said

recesses and the terminal portions of which are exposed at opposite sides of said base, said members being substantially non-flexible and the same being retained in position in a relation to provide for bodily tilting thereof relatively to said base as an incident to insertion of the jack blades of a plug, and a pair of substantially loop-shaped springs each having divergent arms one of which arms is engageable with a recess wall and the other of which arms is engageable with its associated contact portion whereby the latter is yieldably biased into the path of an inserted jack blade.

6. An attachment plug receptacle comprising a molded insulating body having a recess in its lower face to provide a contact chamber, said body having a plug-jack-receiving opening extending from the upper face thereof and communicating with said recess, a metal member having a contact portion entering said chamber from said lower face of the body, said member having a wiring terminal portion formed integrally therewith and lying against a side of said body, the contact portion of said member being substantially non-flexible with respect to said terminal portion, a substantially loop-shaped spring having divergent arms respectively engaged with a wall of said recess and with said contact portion to yieldably bias the latter to a given operative position, and retaining means underlying said metal member, said retaining means being adapted to cooperate with said insulating body and said metal member to provide for bodily tilting of the contact and terminal portions of the latter as an incident to the insertion of a plug-jack within said recesses.

7. As an article of manufacture, a molded insulating base for duplex plug receptacles, said base being recessed from the lower face thereof to provide relatively thin top and side walls of substantially uniform thickness, a transverse barrier formed in said base to provide a pair of substantially identical recesses, said barrier having a pair of grooves formed therein to afford communication between said recesses, said base having a plurality of pairs of T-slots penetrating the upper face thereof and communicating with the respective recesses, each of said recesses having pairs of projections formed therein on opposite sides of the aligned shank portions of said pairs of T-slots, at least one projection of each pair extending flush with the parallel head portions of said pairs of T-slots, and additional projections formed in said recesses at longitudinally opposed ends of said base, for the purpose set forth.

8. In a duplex attachment plug receptacle, in combination, a molded insulating base recessed from its lower face to provide a plurality of pairs of contact chambers with a barrier interposed between said pairs, said barrier having a pair of grooves formed therein to afford communication between the longitudinally aligned chambers of the respective pairs, a pair of one-piece combined contact and terminal members each having a flat base portion seated in a substantially flush relation upon the lower face of said insulating base and a terminal portion extending upwardly from said base portion and exposed at one side of said insulating base, a bus portion also extending upwardly from said base portion and adapted to fit loosely into one of said grooves, a single brush contact portion formed adjacent to each end of the bus portion and extending upwardly therefrom, and a length of spring wire positioned

under tension within said groove and bearing against the respective free ends of said bus portion, whereby the contacts carried by the latter are yieldably biased to a given operative position.

5 9. In a duplex attachment plug receptacle, in combination, a molded insulating base recessed from its lower face to provide a plurality of pairs of contact chambers with a barrier interposed between said pairs, a pair of grooves formed in said barrier to afford communication between the
10 longitudinally aligned chambers of the respective pairs, a pair of one-piece combined contact and terminal members each having a flat base portion seated in a substantially flush relation upon
15 the lower face of said insulating base and a terminal portion extending upwardly from said base portion and exposed at one side of said insulating base, a bus portion also extending upwardly from said base portion and adapted to fit loosely
20 into one of said grooves, a single brush contact portion formed adjacent to each end of the bus portion and extending upwardly therefrom, a length of spring wire positioned under tension within said groove and bearing against the respec-
25 tive free ends of said bus portion, whereby the contacts carried by the latter are yieldably biased to a given operative position, and barriers located between the laterally aligned chambers of each pair to properly insulate the laterally adjacent
30 contacts and the spring ends respectively associated therewith.

10. In an attachment plug receptacle, in combination, a molded insulating base having a recess, said base having a T-shaped guide-way penetrating the upper surface thereof and commu-
35 nicating with said recess, a one-piece combined contact and terminal member secured to said base with the terminal portion exposed at one side thereof and the contact portion extending
40 upwardly into said recess, said contact portion comprising a single lug having a flared upper end, and a separate spring wire member interposed under strain between said lug and a shoul-

der formed in said recess, whereby said lug is biased to a position to cooperatively engage the flat side of a parallel mounted jack blade of a plug cap or to cooperatively engage the edge of a tandem mounted jack blade of a plug cap.

11. In an attachment plug receptacle adapted for flush mounting, in combination, a molded insulating base recessed to provide a pair of contact chambers, said base having a pair of T-shaped guide-ways penetrating the upper surface thereof and communicating with said chambers respectively, a pair of one-piece combined contact and terminal members secured to said base with the terminal portions thereof exposed on opposite sides of said base and the contact portions extending upwardly into said chambers, said
10 contact portions each comprising a single substantially non-resilient lug having a flared upper end, and a pair of separate spring members each interposed under strain between its respectively
20 associated lug and a shoulder formed in its respective chamber, whereby said lugs are biased bodily into positions to cooperatively engage either parallel or tandem mounted plug cap blades when inserted through said guide-ways.

12. In combination, a one-piece contact member for duplex plug receptacles, said member comprising a flat base portion and a bus portion bent upwardly therefrom at substantially a right angle thereto, single contact brush portions
30 formed integrally with said bus portion and projecting upwardly from the latter at opposite ends thereof, said brush portions having flared upper ends, lugs formed integrally with the respective brush portions and extending laterally with respect thereto, said lugs having notches formed therein, and a normally straight spring wire having the opposite end portions thereof engaged with said notches, said spring being engageable at an intermediate point thereof to place the same
40 under strain and to yieldably bias said brush portions in a given direction.

WILLIAM C. TREGONING.

CERTIFICATE OF CORRECTION.

Patent No. 2,001,990.

May 21, 1935.

WILLIAM C. TREGONING.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 40, for "Fig. 2" read Fig. 1; and line 49, after "one-piece" insert the word combined; page 4, first column, line 17, claim 2, for the words "bent upwardly therefrom in substantially" read formed adjacent to the respective ends; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of October, A. D. 1935.

Leslie Frazer

Acting Commissioner of Patents.

(Seal)