

June 4, 1940.

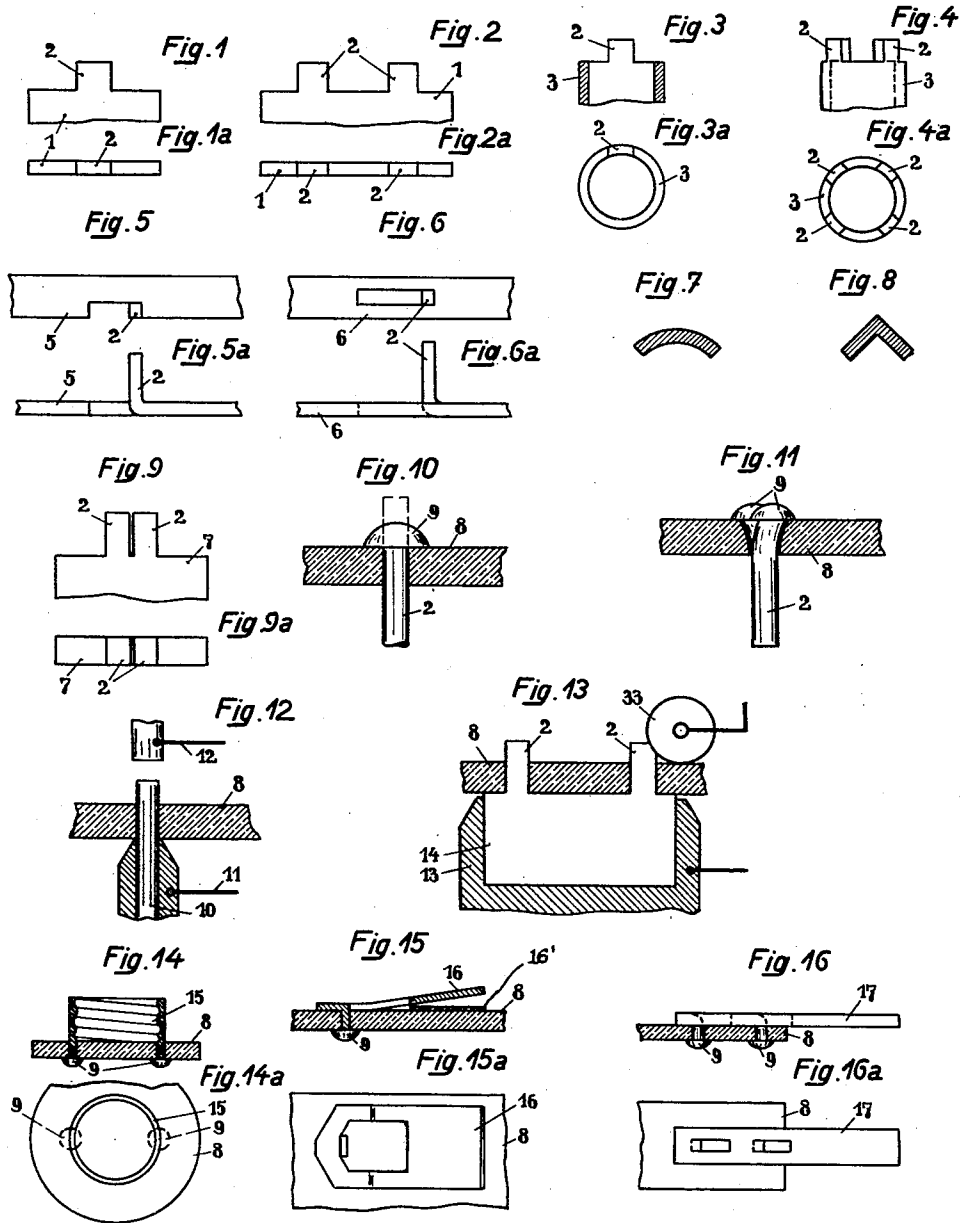
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2,203,099

ART OF BONDING METAL TO INSULATION

Filed Nov. 11, 1937

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 17

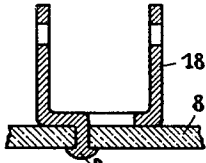


Fig. 17a

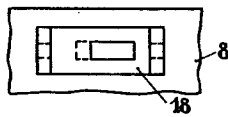


Fig. 19

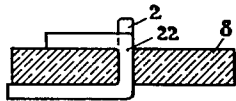


Fig. 19a

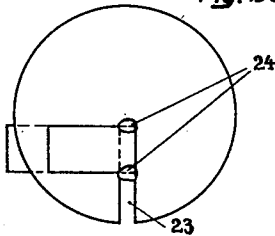


Fig. 22

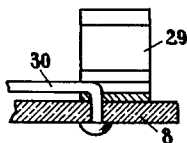


Fig. 22a

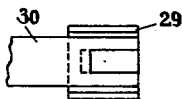


Fig. 20

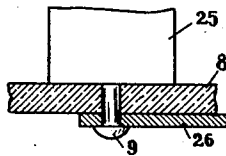


Fig. 21

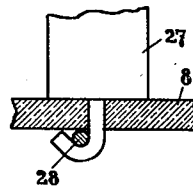


Fig. 23

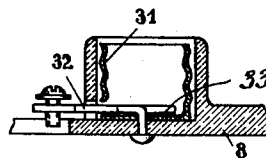


Fig. 23a

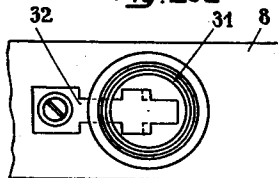
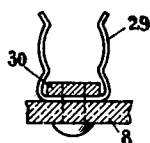


Fig. 22b



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ART OF BONDING METAL TO INSULATION

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Application November 11, 1937, Serial No. 174,037

5 Claims. (Cl. 219-2)

Difficulties are encountered in the attachment of the conductors of electrical outlets of various types upon their respective carriers, usually of ceramic material or the like. On the one hand is the requirement that the conducting part of metal shall have a secure mount upon the carrier, while on the other the material of which the carrier is constructed will not stand any considerable pressure or the like such for instance as is encountered in screwing two parts together. The cementing of the conducting parts provided with suitable projections or the like lodged in corresponding cavities or depressions in the carrier is also not especially effective since a secure and permanent mount cannot be depended on.

In the case of conducting bodies which consist of relatively massive metal pieces, as for instance in the case of prongs of electric contact plugs, a projection upon the conducting relatively massive body may be softened by electrical heating with the aid of electrodes and the softened part may be introduced into openings in the ceramic carrier in order thereby to obtain a secure connection between the two parts without the application of appreciable pressure.

This method is not applicable where the conducting parts are of sheet metal especially of thin sheet metal as is frequently the case in electrical outlets. In order to attain a satisfactory and secure connection in this case, without the application of appreciable pressure, it is a feature of the invention that the conducting parts which are of sheet metal, be equipped with special tongues which protrude through openings in the non-conducting carrier, whereby the attachment is effected by subjecting the protruding end to bending, upsetting, riveting or the like.

In this manner the fastening means may be produced as a part of the otherwise finished conducting element, in that the tongues are stamped out of the sheet metal or are cut out as projections thereof, whereby without the application of appreciable pressure the ends protruding through the openings in the ceramic carrier may then be bent over or riveted together without the application of appreciable pressure, since we are here concerned with sheet metal.

In particular all pressure may be avoided with the use of carriers of ceramic material or the like, where the projecting ends of the sheet metal tongues are formed into rivet heads by electrically heating by means of electrodes.

The invention may be carried out in any of numerous embodiments. In the accompanying

drawings in which are shown a number of the various possible embodiments of the invention,

Fig. 1 shows a front elevation of a simple embodiment of metal element in sheet form,

Fig. 1a is a plan view thereof,

Fig. 2 is a front elevation of a modification thereof,

Fig. 2a is a plan view thereof,

Fig. 3 is a modification in cylindrical form,

Fig. 3a is a plan view thereof,

Fig. 4 is a modification of the cylindrical form,

Fig. 4a is a plan view of the latter,

Fig. 5 is a plan view of the modification applied to a strip of material,

Fig. 5a is a side elevation thereof,

Figs. 6 and 6a respectively are modifications of embodiments of Figs. 5 and 5a,

Fig. 7 is a plan view of one embodiment of the tongues shown in Figs. 3 and 4,

Fig. 8 is a modification thereof,

Fig. 9 is a side view of a modification of the embodiment of Fig. 1,

Fig. 9a is a top view thereof,

Fig. 10 is a side elevation showing the attachment of the embodiment of Fig. 9 to an insulating carrier,

Fig. 11 is a modification of the embodiment of Fig. 10,

Fig. 12 is a side elevation indicating the mode of assembly of parts of Figs. 10 and 11,

Fig. 13 shows a further modification with two projections on the conducting body,

Fig. 14 is a view in longitudinal cross-section showing the application of the invention to a lamp socket,

Fig. 14a is a plan view thereof partly broken away,

Fig. 15 shows the illustrative application of the metallic tongue to a carrier with a metal coating,

Fig. 15a is a plan view thereof,

Figs. 16 and 16a show modifications of Figs. 15 and 15a respectively,

Fig. 17 shows a view in longitudinal cross-section illustrating the application of a U-shaped carrier to an insulating body,

Fig. 17a is a plan view thereof,

Fig. 18 illustrates the method of applying a reversely bent thin sheet metal part to an insulating carrier,

Fig. 19 illustrates the application of the invention to a U-shaped metal part which does not admit of being inserted through an aperture,

Fig. 19a is a plan view thereof,

Fig. 20 illustrates the application of the in-

vention for connection of a metal part to both an insulating and another metal part.

Fig. 21 illustrates the assembly of the metal part to the carrier by means of a hook conformation on the former.

Fig. 22 is a view in longitudinal cross-section showing another mode of attachment of a U-shaped metal body to a carrier.

Fig. 22a is a plan view thereof.

Fig. 22b is an end view thereof.

Fig. 23 is a view in longitudinal cross-section illustrating another application of the invention to a lamp socket.

Fig. 23a is a plan view thereof.

Referring now to the drawings there is shown in Fig. 1 a metal body 1 in the form of a sheet or plate which is formed with a lug 2. This lug 2 is inserted through a corresponding opening in a supporting body to which part 1 is to be attached and in such manner that it projects through the supporting body.

Electrodes serve to convey current through the part 1 and lug 2. Since lug 2 has a cross-section materially less than that of part 1 it will be heated greatly, so that it may be shaped under small pressure exerted by the electrodes. In this shaping the projecting part of the lug 2 is desirably formed into a rivet head. Where we are concerned with the attachment of the metal parts to insulating bodies, a secure attachment of the metal parts to the insulating body may be attained in this manner. The rectangular form of the lug 2 affords assurance against turning of such lug within the opening. Since the shape is attained without the exercise of appreciable pressure, injury to the insulating body is avoided. This is especially of value where the insulating body consists of ceramic or correspondingly brittle material.

In Fig. 2 is shown a metal part provided with two lugs 2 which may be introduced through corresponding openings in the insulating body for purposes of attachment.

In Fig. 3 a cylindrical metal part is shown, which likewise has a lug 2 and which protrudes through the insulating body and is shaped thereagainst.

Fig. 4 shows a cylindrical metal part which has four such lugs 2. A structure such as shown in Figs. 3 and 4 is especially advantageous where the attachment of cylindrical lamp sockets is involved. The projections shown in Figs. 1 to 4 may be formed round for enhanced stability, as shown for instance in Fig. 7 or they may be pressed angularly as shown in Fig. 8. In this case the opening in the insulating body must have corresponding cross-sectional form.

In Fig. 5 the tongue 2 is formed by stamping out and bending over at the side of the strip of material.

In Fig. 6 the securing tongue 2 is formed by stamping out of the middle of the metal strip 6.

Fig. 9 shows a metal part 7 on the face of which two contiguous fastening tongues 2 are disposed.

In Fig. 10 is shown in dash lines how the fastening tongue 2 is secured and may be shaped into a rivet head 9.

In Fig. 11 is shown the attachment of a metal part like that of Fig. 9 to an insulating body 8. In this case the contiguous securing tongues 2 are bent over in opposite directions and the protruding parts of each of said lugs is formed into an independent rivet head 9.

The electrode 11 which holds the work must be formed as shown in Fig. 12. That is it must en-

gage the metal part 10 from opposite sides in the manner of a pair of tongs. The electrode for forming the rivet head is suitably formed of concave shape.

Fig. 13 shows an electrode 13 which embraces a metal part 14 which is caused to protrude by means of its lugs 2 through corresponding apertures in an insulating body 8. The shaping of the lugs 2 is effected in this case by the aid of a roller form of electrode 33 which in itself is known.

Attachment of a socket 15 to an insulating body 8 is indicated in Fig. 14. The cylindrical part of the socket is in this case equipped with lugs protruding through openings in the insulating body, which lugs are transformed into rivet heads 9 and thereby effect a secure mounting of the part 15 to the insulating body 8.

In Fig. 15 the attachment of a sheet metal contact 16 to an insulating body 8 is shown. This embodiment is particularly useful for a trimmer condenser to effect final tuning adjustment in a radio receiver, in which the insulating body 8 will be covered with a thin covering 16' of metal and the capacitance would depend upon the position of sheet metal contact 16 with respect to said thin covering. An attachment tongue is bent out of the metal piece and is inserted through the opening in the insulating body and conformed as a rivet head.

In Fig. 16 there is shown in similar manner the attachment of a metal part 17 to an insulating body 8 with the use of two attachment tongues bent out of the metal part 17. The metal part to be secured may be of any suitable form. In Fig. 17 for instance, a U-shaped mounting piece 18 is shown from the metal part of which an attachment tongue may be bent out which projects through an opening in an insulating body 8 and is shaped at its protruding end into a rivet head 9.

Where we are concerned with an attachment of very thin metal parts 19, the material is bent over into one or more layers to afford sufficient thickness for the rivet head and the shank of the rivet as shown in Fig. 18. By bending over into layers enough material to form the rivet shank and rivet head, even thin metal parts may be secured in satisfactory manner. The electrodes 20, 21 are applied in the manner shown in Fig. 18. By virtue of the temperatures attained due to the heating of the electrodes, the bent over layers or parts become welded together.

Fig. 19 shows the attachment of a metal part 22 bent into a U-form and which by virtue of its U-form cannot be introduced through a hole or aperture. In this case the aperture 23 is formed in the manner of a slot through the side of the insulating body and the part 22 is laterally slid into said slot until it abuts at the end thereof. The material for shaping and securing of the metal part to the insulating body is afforded by lugs 2 which by shaping are pressed into flat heads 24.

Within the scope of the invention it is also possible to attach with respect to the insulating body a piece in addition to the metal body in the shaping of the lugs. Fig. 20 for instance shows the projection of a lug of metal part 25 through a slot in the insulating body 8 and also shows a distinct metal part 26 through which said lug extends, the protruding end of the latter being formed as a rivet head 9. In this manner three distinct bodies are simultaneously securely connected together.

In Fig. 21 the lug on the metal part 27 is not shaped as a rivet head but bent over in the form of a hook. It thereby embraces a wire 28 and presses the latter tightly against the insulating body 8 and thus effects attachment of the wire with respect to the insulating body 8 and simultaneously with the metal part 27.

In Fig. 22 the essentially U-shaped metal part or clip 29 is attached by means of the metal piece 30 which has an attachment tongue that protrudes through a slot through the insulating body 8 and the metal body 29 and is secured to the insulating body 8 illustratively by riveting over.

In similar manner Fig. 23 shows an attachment of metal parts 31 and 32 to the insulating body 8 and insulating washer 33 being interposed between the two metal parts 31 and 32.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The method of fastening a flexible sheet metal piece to a ceramic carrier, which consists in inserting snugly into and through a corresponding slot in the carrier, a tongue of reduced width stamped from the body of said metal piece and extending at an angle thereto, and applying electrodes to the end of the protruding length of the tongue and to another part of the sheet metal piece respectively, and thereby heating and softening the said tongue and bending, upsetting or converting into a rivet head the protruding length of said tongue.

2. The method of attaching a piece of flexible sheet metal to a brittle carrier therefor which consists in cutting a tongue out of said material, extending the latter at right angles to said material, snugly through a corresponding hole in the carrier to protrude therebeyond and causing said tongue to be softened and shaped by compression thereof to conform the end thereof into a rivet head by the application of shaped

electrodes respectively to the end of said tongue and to the face of said material.

3. The method of mounting electric lamp terminals in a ceramic holder therefor which consists in superposing an insulating washer upon the cylindrical screw shell socket within the ceramic holder, superposing the central contact bar over the washer, bending the end thereof to extend through said washer and snugly through a corresponding aperture in the ceramic holder and applying electrodes to the extremity of said end and to the face of said contact bar to cause said end to heat and soften and to cause the protruding extremity thereof to be shaped into a rivet head under the pressure exerted by said electrodes.

4. The method of fastening the base of a U-shaped metal mounting piece to the face of a ceramic carrier, which consists in superposing a sheet metal piece over said base, bending the end thereof to extend snugly through corresponding slots in the carrier and in said base of the mounting piece and applying electrodes to the protruding extremity of said end and to another part of the sheet metal piece respectively, to cause said protruding extremity of said metal piece to be shaped into a rivet head under the pressure exerted by said electrodes.

5. The method of fastening the base of a U-shaped metal mounting piece to the face of a ceramic carrier, which consists in stamping out of said base a tongue extending at right angles thereto, inserting the tongue through a corresponding slot in the carrier and applying electrodes to the end of the protruding length of the tongue and to another part of said carrier piece respectively and thereby heating and softening the said tongue and bending, upsetting or converting into a rivet head the protruding length of said tongue.

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