

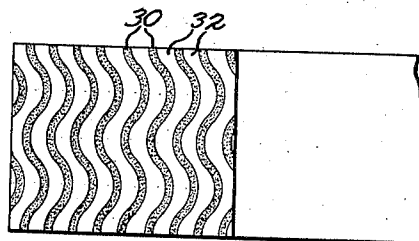
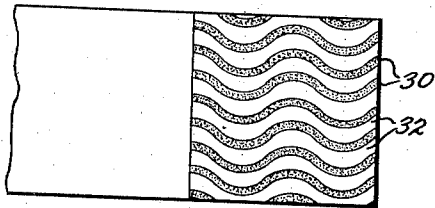
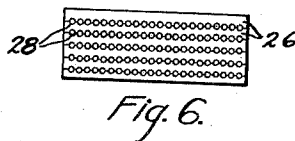
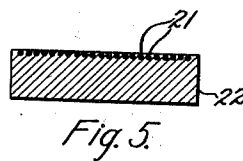
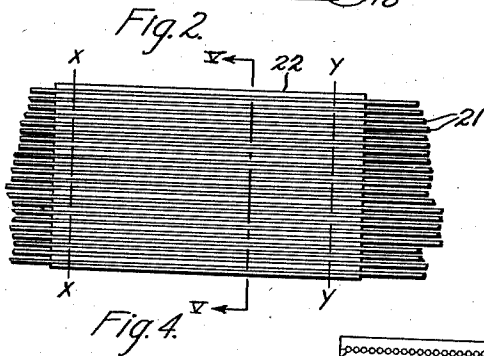
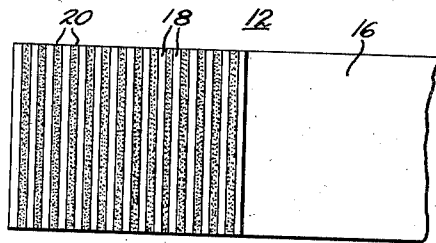
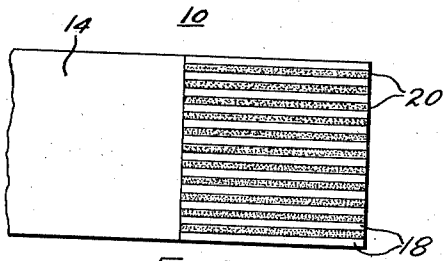
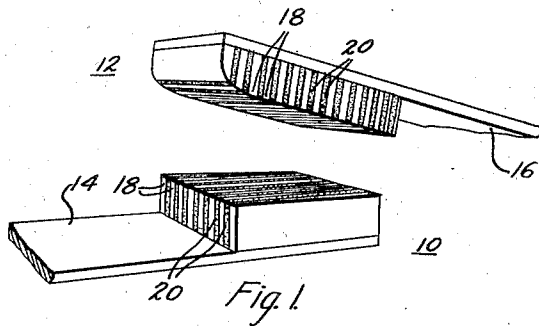
March 11, 1941.

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2,234,834

ELECTRICAL CONTACT

Filed Oct. 9, 1937



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ELECTRICAL CONTACT

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9 Claims. (Cl. 200—166)

This invention relates to electrical circuit making and breaking contact devices and particularly to the relatively movable contacts thereof.

In electrical circuit making and breaking devices, it is desired that the contacts have a low contact drop, low resistivity, together with the properties of having wear resistance and resistance to sticking. Metals which are good conductors having a low contact drop and a low resistivity, have relatively low melting points and poor wear resistance. Other metals which are known to have relatively high melting points and good wear resistance have the disadvantage that they have a high contact drop and high resistivity. It is not practicable to combine these known metals having the desirable properties by alloying them, since they do not form solid or liquid solutions or else the resulting alloy has too low a melting point to be employed as a contact.

Contacts have been formed of a mixture of powdered refractory material sintered together with approximately equal volumes of a good conducting metal, but such contacts have the disadvantage that the particles of the refractory metal break the continuity of the electrical path of the good conducting metal.

An object of this invention is to provide a contact having the properties of low contact drop, low resistivity, wear resistance and resistance to sticking.

Another object of this invention is to provide a composite contact having a contacting surface of a plurality of different metals so disposed as to provide a contact having relatively low resistance to the flow of an electrical current and resistance to wear and sticking.

Other objects of this invention will become apparent from the following description, when taken in conjunction with the accompanying drawing, in which

Figure 1 is a perspective view of a pair of relatively movable electrical contacts embodying the teachings of this invention;

Fig. 2 is a top plan view of the stationary contact illustrated in Fig. 1;

Fig. 3 is a bottom plan view of the movable contact of the contacts illustrated in Fig. 1;

Fig. 4 is a top plan view of a contact embodying a modification of this invention;

Fig. 5 is a sectional view of the contact taken along the line V—V of Fig. 4;

Fig. 6 is a plan view of the contact surface of a contact embodying this invention;

Fig. 7 is a top plan view of the stationary con-

tact embodying a further modification of this invention; and,

Fig. 8 is a bottom plan view of the movable contact for cooperating with the stationary contact of Fig. 7.

Referring to Figure 1 of the drawing, there is shown a pair of relatively movable contacts 10 and 12 constructed in accordance with this invention. The contacts 10 and 12 form the contact means of a circuit interrupter (not shown). The details of structure and operating mechanism of the circuit interrupter are not shown or described, since they do not form a part of this invention as the invention may be employed with any suitable circuit interrupter.

The stationary contact 10 is suitably mounted on a conductor support 14, while the movable contact 12 is carried by a movable switch arm 16. The contacts 10 and 12 are mounted on their respective supports either by some suitable mechanical means or by a suitable brazing.

As illustrated in Figs. 1, 2 and 3 of the drawing, in order to provide a wear resistant contact having a low resistivity, the contacts 10 and 12 comprise a plurality of substantially parallel solid sheets or strips of good conducting metal 18 and refractory metal 20 alternately disposed and spaced from each other. The good conducting metal strips are either copper or silver while the refractory metal may be selected from the group consisting of tungsten, molybdenum and tantalum. As illustrated the strips 20 of refractory metal extend through the body from the contact surface to the backing up plate or support 14 or 16 thereby imparting high strength to the assembled contact and preventing deformation of the good conducting metal strips 18 under impacts such as are encountered in the making and breaking of a circuit.

In preparing the contacts 10 and 12, the layers 18 and 20 are stacked alternately, compressed and then bonded into an integral structure by brazing the sheets together. The brazing may be either copper or silver brazing as desired, and is preferably accomplished in a protective atmosphere such as hydrogen. After the layers of material are bonded into an integral structure, the contact is so cut from the laminated composite mass that the contact face of the contact is perpendicular to the plane of the laminations.

Where the opposing and relatively movable contacts 10 and 12 are each of the laminated structure, it is desirable that the contacts be so mounted that the laminated plane in one contact is at right angles to the laminated plane of

the other contact. Such mounting of the contacts insures a good electrical contact between the contacts and prevents sticking of the contacts in case the conducting metal thereof ever becomes pitted. Further since in each contact member each portion of the good conducting metal is bordered or enclosed by the adjacent strips of refractory metal, the good conducting metal is retained in assembled position with respect to the refractory metal when fused under the action of arcs or the like, the refractory metal strips preventing the flow of molten conducting metal to another portion of good conducting metal of the same contact surface.

Where there is a sliding motion of one contact surface on the cooperating contact surface, the laminations need not be perpendicular to the contact surface but, instead, may extend at an angle of between 45° and 90° from the plane of the contacting surface.

In a modification of this invention illustrated in Figs. 4 and 5, the contact comprises a body of conducting material 22 such as copper or silver into which a plurality of rods or wires 21 of refractory material, such as tungsten, molybdenum or tantalum are bodily pressed in spaced and substantially parallel relation to each other. In order to secure the rods or wires 21 in the recesses pressed into the body of conducting metal, the composite mass is brazed, preferably with silver, in a protective atmosphere. The silver fills any spaces between the wires and the body of conducting material and effects a good current conducting body therewith.

After the rods or wires of refractory material are pressed and secured into the body of conducting metal, the composite mass is cut to a desired size as along the lines X—X and Y—Y illustrated in Fig. 4 by any suitable means. Thus, loose ends of the rods or wires are removed from the contact, giving a contact having smooth edges.

In another modification of this invention illustrated in Fig. 6, a plurality of layers 26 of the good conducting material, silver or copper, are stacked with rods or wires 28 of the refractory material disposed in spaced relation between the layers thereof. These wires are pressed bodily into the surface of the associated layers of good conducting material in spaced and parallel relation to each other. After the layers of the good conducting material having the rods or wires of refractory material therebetween are stacked and pressed as illustrated, they are bonded together into an integral composite structure by brazing them with a suitable material. The brazed integral mass is then cut in a plane perpendicular to the plane of the stacked layers to provide a contact surface, as illustrated in Fig. 6, in which the refractory metal gives point contacts in spaced relation between and in the same contacting plane of the strips of good conducting metal. The contact illustrated in Fig. 6 may also be fabricated by stacking a plurality of thin layers of the conducting material carrying the refractory wires in one face thereof as illustrated in Fig. 5 and then brazed together as by silver to give an integral structure, after which a contact surface is formed by cutting the mass in a plane perpendicular to the plane of the stacked layers as described hereinbefore.

Referring to Figs. 7 and 8 of the drawing, another embodiment of this invention is disclosed. In this particular embodiment, the sheets 30 and 32 of refractory metal and good conducting met-

al, respectively, are corrugated throughout their length and then assembled in alternate and substantially parallel relation with each other. The corrugated laminations are bonded into an integral mass by brazing them and then cut to the desired contact or contact button size. In this embodiment, it is noted that the edges of the corrugated and bonded laminations form a contact surface having wavy, alternate and substantially parallel surfaces of a good conducting metal and a refractory metal. The corrugations are of such a size that where the contacts are employed as sliding contacts, the contacting surface of the moving contact alternately slides over good conducting metal and then refractory metal. With contacts embodying the corrugated laminations, care need not be exercised for securing the right angle directional relation of the laminations, described hereinbefore and illustrated in Figs. 7 and 8, in the mating or opposing cooperative contacts, since the wavy corrugations insure a correct contacting relation between the contacts.

By providing contacts having the laminated contact surface described, continuity of the electrical conducting path through the good conducting metal is insured. These contacts further have the desirable properties of having a low contact drop, low resistivity, resistance to wear and wear resistance.

Although this invention has been described with reference to particular embodiments thereof, it is, of course, not to be limited thereto except insofar as is necessitated by the prior art and the scope of the appended claims.

I claim as my invention:

1. An electrical contact member comprising in combination, a composite metallic body consisting of a plurality of strips of metal having good conductivity and a plurality of strips of refractory metal, the strips of good conducting metal and refractory metal being arranged on edge and alternately in substantially parallel relation to give a contact surface of alternate parallel strips of the good conducting metal and refractory metal, the refractory metal strips extending through the body to impart strength thereto and prevent deformation of the good conducting metal under impact, and means for uniting the alternate strips into an integral structure having a good electrical connection between the strips.

2. An electrical contact comprising an integral composite metallic body having a contact surface composed of a plurality of alternate of parallel strips of good conducting metal and a refractory metal selected from the group consisting of tungsten, molybdenum and tantalum, the refractory metal strips preventing the flow of the good conducting metal between the strips of good conducting metal when arcing is encountered.

3. An electrical contact comprising an integral composite metallic body composed of a plurality of alternate parallel strips of a good conducting metal and a refractory metal selected from the group consisting of tungsten, molybdenum and tantalum, the refractory metal strips extending through the body to impart strength thereto and prevent deformation of the good conducting metal under impact.

4. An electrical contact comprising an integral composite metallic body composed of a plurality of alternate parallel strips of good conducting metal and a refractory metal selected from the group consisting of tungsten, molybdenum and tantalum, the parallel strips being at an angle of not less than 45° to the contact surface of the contact, the refractory metal strips preventing

the flow of the good conducting metal between the strips of good conducting metal when arcing is encountered.

5 An electrical contact comprising a composite metallic body composed of a plurality of alternate and substantially parallel strips of good conducting metal and a refractory metal selected from the group consisting of tungsten, molybdenum and tantalum, the parallel strips being so
10 corrugated that when assembled the edges of the strips form a contact surface having wavy parallel alternate surfaces of the good conducting metal and the refractory metal.

6. An electrical contact comprising a body of
15 metallic conducting material having its contact surface provided with a plurality of closely spaced parallel recesses filled with strands of refractory metal, the strands of the refractory metal being pressed into the body of the conducting metal,
20 and preventing the flow of the good conducting metal between the portions separated from the refractory metal when arcing is encountered.

7. An electrical contact comprising a body of metallic conducting material having its contact
25 surface provided with a plurality of closely spaced and substantially parallel recesses filled with refractory metal, the refractory metal being pressed into the body of the conducting metal, and pre-

venting the flow of the good conducting metal between the portions separated from the refractory metal when arcing is encountered, the refractory metal and the conducting metal being brazed to form an integral mass.

8. An electrical contact comprising a composite metallic body composed of alternate and substantially parallel strips of good conducting metal and refractory metal selected from the group consisting of tungsten, molybdenum and tantalum, the substantially parallel strips of metal being united into an integral structure by brazing them with a good conducting metal, the refractory metal strips extending through the body to impart strength thereto and prevent deformation
15 of the good conducting metal under impact.

9. An electrical contact comprising a laminated body of alternate layers of good conducting metal and layers of refractory metal selected from the group consisting of tungsten, molybdenum and tantalum, the layers being disposed substantially
20 perpendicular to the contact surface of the contact, the alternate layers of refractory metal preventing the flow of good conducting metal between the layers of good conducting metal separated by the refractory metal when arcing is
25 encountered.

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