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ELECTRICAL CONTACT

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This invention relates to electrical contacts and more particularly to electrical contact materials having good electrical conductivity combined with superior wear resisting properties.

In modern telephone practice, particularly in the panel dial and cross-bar dial systems, a tremendous number of electrical contacts are continuously made by automatic mechanisms. In such systems it is, of course, extremely important that a good contact be completed in order to obtain efficient transmission. Of necessity the contact points employed must be of materials which possess low contact resistance and good wear resisting characteristics. Further the contact material in manufacture must be capable of easy working and ready attachment by welding to relay armatures or other electrical apparatus. It has been found that certain of the alloys and metals heretofore employed for use as contact materials with other mechanisms and switches did not function satisfactorily when used in panel dial and cross-bar telephone switches.

An object of this invention, therefore, is an improved contact material which has low contact resistance, superior wear resisting characteristics, is easily worked and can be readily attached to electrical apparatus by welding.

In accordance with this invention, this object is attained by the use of electrical contacts composed of an alloy containing between 90 and 99 per cent. silver and between 10 to 1 per cent. tin. Preferably the electrical contact material comprises a binary alloy containing 95 to 97.5 per cent. silver and the remainder tin. For example, an alloy containing 95 per cent. silver and 5 per cent. tin, and another containing 97.5 per cent. silver and 2.5 per cent. tin are admirably adapted for electrical contacts in panel dial and cross-bar dial systems. These latter alloys may be easily fabricated into thin sheets or wires from which the electrical contacts are obtained. Contacts of these alloys may be welded without difficulty to electrical switches or relays and while possessing nearly as low contact resistance as pure silver, they have a considerably greater period of serviceability.

The range of proportions of silver and tin of the alloys in accordance with this invention is critical. If the binary alloys of silver and tin contain less than 1 per cent. of tin, the compositions are too soft and the specific resistivity of the contact materials are not sufficiently high to weld readily to the armatures of switches or relays. If the amount of tin exceeds 10 per cent. of the alloy, the material cannot be worked conveniently to obtain the contacts. Accordingly, an alloy containing 1 per cent. tin and 99 per cent. silver and one containing 10 per cent. tin

and 90 per cent. silver represent the compositions within the scope of this invention.

For panel dial and cross-bar dial systems it is preferred that the alloys be restricted to compositions containing approximately 2½ per cent. to 5 per cent. tin and the remainder silver without any substantial quantity of impurities. The Rockwell hardness (B-1½-60) of annealed samples of electrical contact materials containing pure silver, an alloy containing 97.5 per cent. silver and 2.5 per cent. tin and an alloy containing 95 per cent. silver and 5 per cent. tin are 20, 30, and 39, respectively. The resistivity and tensile strength of electrical contacts of pure silver and an alloy containing 95 per cent. silver and 5 per cent. tin are as follows:

	Resistivity microhm-cm. (23° C.)		Tensile strength lbs/sq. in.	
	Hard drawn	Annealed	Hard drawn	Annealed
Ag-----	1.99	1.88	35,000	26,000
AgSn (95-5)-----	20.7	20.0	74,000	39,000

The contact resistance of alloys within the preferred range is not appreciably different from that of pure silver. It is observed that when the silver and the alloys within the preferred range are compared, both the hardness—a factor in the wearability—and the specific resistivity—important in the weldability of the contacts—of the alloys within the preferred range are markedly greater than those of pure silver. Possessing substantially all the advantages of pure silver contacts, the alloys within the preferred range wear longer, are more easily welded to electrical apparatus, and due to the differential in cost between silver and tin, are more economical of manufacture.

What is claimed is:

1. An electrical contact material containing from 90 to 99 per cent. silver and from 10 to 1 per cent. tin.
2. An electrical contact composed of an alloy containing from 95 to 97.5 per cent. silver and from 5 to 2.5 per cent. tin.
3. An electrical contact composed of an alloy containing approximately 97.5 per cent. silver and approximately 2.5 per cent. tin.
4. An electrical contact composed of an alloy containing approximately 95 per cent. silver and 5 per cent. tin.
5. An electrical contact composed of an alloy consisting of 95 to 97.5 per cent. silver and 5 to 2.5 per cent. tin.

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