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ELECTRICAL CONTACT

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This invention relates to electrical contacts, particularly, contacts used in apparatus wherein the contact pressure is fairly high.

One of the objects of this invention is to provide electrical contacts having a relatively high resistance to welding and transfer.

Another object of this invention is to provide electrical contacts having a relatively constant contact resistance.

A further object of this invention is to provide electrical contacts formed of a composition consisting of a major portion of silver and which has a much higher resistance to electrical erosion than contacts formed of silver.

Other objects and advantages of this invention will become apparent from a consideration of the description and claims which follow.

The present invention contemplates the addition of from the lowest useful amounts up to about 50% molybdenum oxide to silver and silver-base alloys.

The desirable improvements in electrical contact characteristics are also effected by the incorporation of like amounts of molybdenum oxide in alloys of silver with other metals such as gold and the platinum group metals.

Molybdenum oxide increases appreciably the contact resistance of silver and silver-base alloys; however, the increase is not objectionable where the contact pressure is relatively high. Although the contact resistance is somewhat higher, I have found that the presence of molybdenum oxide serves to maintain the contact resistance relatively constant throughout the life of the contacts. Compositions containing molybdenum oxide have a very high resistance to welding and an exceptionally low transfer tendency.

Small amounts of copper, that is up to about 5% by weight of the composition, may be added to improve the resistance of the contacts to mechanical wear and to harden the composition. Large amounts of copper are not desired since such amounts reduce the melting point of the silver, thereby greatly increasing the tendency of the contacts to weld, arc and erode.

A further improvement in the wear resistance and hardness of the composition may be effected by adding small amounts of nickel, for example up to about 5%. Substantially large amounts are not desired since such amounts would increase appreciably the electrical resistance of the composition and substantially increase the electrical erosion due to excessive arcing.

Small proportions of carbon, for example up to about 5%, may be added to improve the wear

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resistance of the composition and substantially improve the non-welding properties of the composition. Although the carbon may be used in very small amounts, I have found that the small amounts are very effective in lowering the contact resistance of the compositions and in stabilizing the contact resistance.

In the preparation of the compositions of this invention, I may employ copper, nickel or carbon or mixtures of two of the substances or all three of these substances in producing compositions having the desired mechanical properties.

Electrical contacts prepared from compositions contemplated by the present invention are well suited for use in apparatus such as relays, switches, circuit breakers and the like, wherein an appreciable contact pressure is used and where the contacts are normally closed. The contacts are prepared according to well-known powder metallurgy methods. In those instances where small amounts of nickel and copper are employed, the nickel or copper may be first alloyed with silver and the resulting product finely comminuted and mixed with the molybdenum oxide. The resulting mixture is molded or pressed to form the compact which is then sintered at an appropriate temperature to form a substantially solid body. The compositions are preferably sintered in a neutral atmosphere but may be sintered under a vacuum, if desired. A slight reduction of the molybdenum oxide may occur if a reducing atmosphere is used in the sintered operation; however, a slight reduction of the oxide to molybdenum will not affect adversely the properties of the compositions.

I claim:

1. An electrical contact suitable for use in apparatus such as relays, switches, circuit breakers and the like, wherein an appreciable contact pressure is used, said contact having an electrical contact surface and being made of a compacted, sintered and non-porous composition containing silver, molybdenum oxide in an amount up to about 50% by weight of the silver, and carbon in an amount up to about 5% by weight of the contact composition.

2. An electrical contact suitable for use in apparatus such as relays, switches, circuit breakers and the like, wherein an appreciable contact pressure is used, said contact having an electrical contact surface and being made of a compacted, sintered and non-porous composition consisting of silver, molybdenum oxide in an amount up to about 50% by weight of the silver, and from 0 to about 5% by weight each of copper, nickel and

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carbon, based on the weight of the contact composition.

3. An electrical contact suitable for use in apparatus such as relays, switches, circuit breakers and the like, wherein an appreciable contact pressure is used, having an electrical contact surface, said contact being made of a compacted, sintered and non-porous composition containing an electrical contact material of the class consisting of silver and a silver base alloy electrical contact material consisting of silver and a noble metal selected from the class consisting of gold and platinum, from 0 to about 5% by weight each of copper, nickel and carbon, based on the weight of the contact composition, and molybdenum oxide in an amount up to about 50% by weight of the said silver or silver base alloy contact material.

4. An electrical contact suitable for use in apparatus such as relays, switches, circuit breakers and the like, wherein an appreciable contact pressure is used, said contact having an electrical contact surface and being made of a compacted, sintered and non-porous composition containing an electrical contact material of the class con-

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sisting of silver and a silver base alloy electrical contact material consisting of silver and a noble metal selected from the class consisting of gold and platinum, molybdenum oxide in an amount up to about 50% by weight of the said silver or silver base alloy contact material, and carbon in an amount up to about 5% by weight of the contact composition.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,937,381	Bond et al.	Nov. 28, 1933
1,986,210	Maas	Jan. 1, 1934
2,005,645	Bond et al.	June 18, 1935
2,057,604	Zickrick	Oct. 13, 1936
2,145,690	Hensel	Jan. 31, 1939
2,151,905	Emmert	Mar. 28, 1939
2,200,854	Ruben	May 14, 1940
2,200,855	Ruben	May 14, 1940
2,255,120	Kiefer	Sept. 9, 1941
2,394,501	Weiller	Feb. 5, 1946
2,396,101	Hensel et al.	Mar. 5, 1946