

## UNITED STATES PATENT OFFICE

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## ALLOY FOR ELECTRICAL CONTACTS

No Drawing.

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This invention relates to alloys for use in connection with electrical apparatus, such as electrical contacts.

An object of the invention is to reduce the cost and improve the efficiency of electrical contact materials.

Considerable difficulty has been experienced in the use of electrical contact materials on relays, switches and similar apparatus.

In the case of noble metals, which are frequently used as contact materials, the continuous making and breaking of the contacts produces minute sparks which cause the material to be transferred from one contact to another, thus causing a fine needle point to be built up on one contact which ultimately causes a permanent short-circuit across the contacts. Furthermore, owing to excessive heating, such materials are vaporized, thus resulting in the deleterious pitting of the contact members.

Difficulty is also experienced in the use of base metals as contact materials due to the fact that these metals oxidize quite readily and build up a film of oxide on the contact of which causes the false operation of the relay.

An illustration of the difficulties heretofore met may be found in the case of telephone and telegraph terminal and repeater relays. The current employed for operating such relays is frequently small, and consequently the contact pressures are so small that there is considerable heating and a resultant transfer of material from one contact to the other.

In accordance with a feature of the invention, a relatively inexpensive contact alloy is provided which contains a noble metal and a base metal in such proportions that the contact resistance is not appreciably increased and at the same time the material will oxidize just sufficiently to prevent the transfer of material from one contact to another. Owing to the absence of excessive heating, furthermore, the pitting of the contacts is greatly diminished, thus increasing their period of service.

This alloy possesses a homogeneity of

composition which is essential in contact alloys since the actual contact area at any one time is extremely small and it is impossible to obtain consistent results where an appreciable non-uniformity exists. In the case of many alloys heretofore proposed, even a severe mechanical working does not produce a homogeneity of structure sufficient for contact purposes.

The invention in its preferred form comprises a binary alloy containing a metal of the platinum group and a base metal. By the platinum group is meant noble metals of the eighth periodic group according to Mendelejeff's arrangement and comprises ruthenium, rhodium, palladium, osmium, iridium and platinum. Palladium is considered preferable because of its density and because it is less expensive and more readily available than other metals of the platinum group. The composition which has been found most desirable consists of palladium and copper in which the palladium constitutes from 30 to 70% by weight of the whole.

The invention is not limited to an alloy of palladium and copper since one or more other metals of the platinum group, such as platinum, may be substituted in whole or in part for the palladium. Furthermore, other base metals, such as nickel, may be substituted in whole or in part for the copper to produce an alloy containing palladium and for example nickel. It has been found that the best results are obtained with an alloy comprising palladium and copper containing about 60 weight per cent of palladium and substantially 40 weight per cent of copper, but these proportions may be varied as pointed out above.

It is also to be understood that small amounts of other metals may be added to the alloy without departing in any way from the invention. For example, the hardness of the alloy may be increased by the addition of small amounts of a second base metal such as zinc.

Furthermore, ordinary commercial palladium often contains traces of other metals such as gold and silver, and hence the presence of small quantities of such metals in the

alloy is not to be construed as a departure from the scope and spirit of the invention.

What is claimed is:

1. A contact element composed of an alloy comprising as essential elements thereof palladium and a minor percentage of copper.
2. A contact element composed of an alloy comprising as essential elements thereof palladium and a base metal forming a homogeneous alloy with palladium, and containing substantially from 30 to 70% by weight of palladium.
3. A contact element composed of an alloy comprising as essential elements thereof palladium and copper and containing substantially from 30 to 70% by weight of palladium.
4. A contact element composed of an alloy of the following metals in substantially the following proportions by weight: palladium 60%, copper 40%.

In witness whereof, I hereunto subscribe my name this 15th day of May, A. D. 1924.

EDWIN F. KINGSBURY.

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