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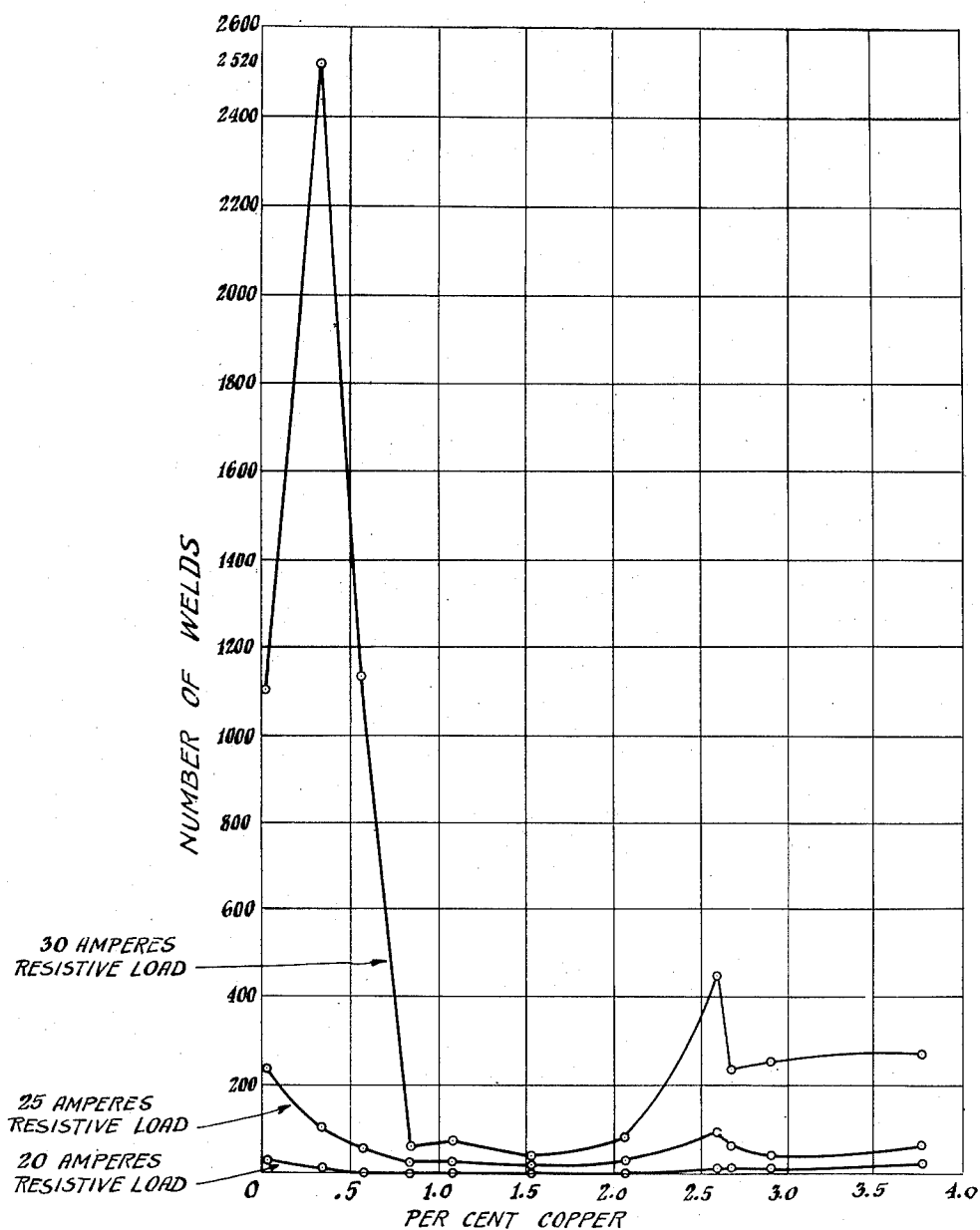
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ELECTRIC CONTACT

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NUMBER OF WELDS OF SILVER CONTACTS CONTAINING
SMALL PERCENTAGES OF COPPER
50,000 MAKE AND BREAK OPERATIONS



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UNITED STATES PATENT OFFICE

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ELECTRIC CONTACT

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4 Claims. (Cl. 200—166)

This invention relates to electric contacts.
An object of the invention is to improve silver
base electric contacts.

Other objects of the invention will be apparent
from the description and claims.

In the drawing:

The figure is a graph of the number of welds
between silver contacts containing small propor-
tions of copper during 50,000 operations in making
and breaking an A. C. electric circuit carrying
20, 25 and 30 amperes of current.

Electric make and break contacts have been
made of fine silver and also of silver containing
several percent of copper such as coin silver and
sterling silver. Such contacts have been satis-
factory for many applications but have been lim-
ited in their current carrying capacity by their
tendency to weld together during operation when
fairly high currents are carried.

I have now discovered that silver electric con-
tacts containing percentages of copper within the
range:

	Per cent by weight
Copper-----	0.85 to 2.05
Silver-----	Balance

are far superior to fine silver and to silver-copper
alloys containing higher percentages of copper
for electric contacts.

Tests conducted on silver contacts containing
different percentages of copper show that the
welding or sticking tendency of contacts contain-
ing copper in the above range is much less than
that of contacts containing either higher or lower
proportions of copper. The contact resistance of
the silver-copper alloy contacts is also appre-
ciably lower than that of fine silver. Moreover,
when the currents used are sufficient to cause
welding of a pair of contacts together, the force
required to separate these silver-copper contacts
is much less than that required to separate fine
silver contacts similarly welded. Thus if welding
does take place a greater proportion of the welds
will immediately pull apart during operation and
hence will not seriously interfere with the con-
tinued operation of the contacts.

The temperature rise encountered during oper-
ation is approximately the same for the silver-
copper contacts and for fine silver.

In the above critical range the preferred com-
positions are those containing between 1.08 and
2.05% copper and a preferred specific contact
material is one having the composition:

	Per cent
Copper-----	1.5
Silver-----	98.5

Small additions of other elements may be pres-
ent if they do not adversely affect the properties
of the contact materials.

The contacts may be fabricated by ordinary
5 methods such as by melting the silver and copper
together and casting followed by rolling, draw-
ing, heading, punching, forming, pressing and
assembling to obtain contacts of the desired form,
as is now employed in making fine silver con-
tacts.

The graph shows the results of sticking tests
on contact pairs made of silver containing vari-
ous proportions of copper. Each contact pair
was tested for 50,000 make and break operations
controlling a current 20, 25 or 30 amperes A. C.
respectively from a 115 volt supply. It will be
noted that 1100 welds occurred with 30 amperes
load during the test period for the fine silver
contacts. The weld frequency increased great-
ly with small additions of copper then dropped
sharply to 60 welds at 0.85% copper. Between
0.85 and 2.05% the weld frequency is extreme-
ly low after which it rises fairly rapidly.

The tests at 25 amperes showed almost neg-
ligible welding in th range 0.85 to 2.05% copper,
the weld frequency increasing rapidly with less
or higher copper percentages. At 20 amperes no
welding occurred in this range. Where welding
occurred the weld strength was measured and it
was found that a range of low average weld
strength coincided with the range of low weld
frequency.

Contact resistance measurements were also
made and, although somewhat irregular over the
range covered the lowest resistance material was
that containing 1.5% copper and the entire range
of 0.85 to 2.05% copper was lower than that of
fine silver.

While specific embodiments of the invention
have been described, it is intended to cover the
invention broadly within the spirit and scope of
the appended claims.

What is claimed is:

1. An electric contact containing 0.85 to 2.05%
copper, balance silver.
2. An electric make and break contact con-
taining 0.85 to 2.05% copper, balance substan-
tially all silver, said contact being characterized
by less tendency to weld during operation than
fine silver and silver-copper alloys containing
higher proportions of copper.
3. An electric make and break contact con-
taining 1.08 to 2.05% copper, balance silver.
4. An electric contact containing 1.5% copper,
balance silver.

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