

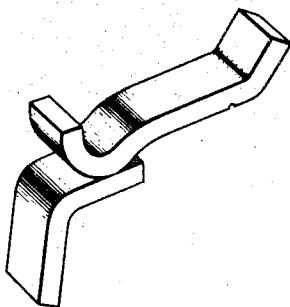
May 10, 1949.

C. H. HANNON ET AL

2,469,878

SWITCH CONTACT

Filed June 23, 1945



CONTACTS COMPRISE METAL BASE OF
HIGH ELECTRICAL CONDUCTIVITY HAVING
A THIN FUSED LAYER OF TIN THEREON

Inventors:
Cyril H. Hannon,
Alfred L. Jenny,

by 
Their Attorney.

UNITED STATES PATENT OFFICE

2,469,878

SWITCH CONTACT

Cyril H. Hannon and Alfred L. Jenny, Pittsfield, Mass., assignors to General Electric Company, a corporation of New York

Application June 23, 1945, Serial No. 601,334

5 Claims. (Cl. 200-166)

1

The present invention is an electrical switch contact and more particularly a switch contact adapted for use in ratio adjusting apparatus of the type disclosed in the copending application of Cyril H. Hannon, Serial No. 539,848, filed June 12, 1944, and which was subsequently abandoned and in Blume Patent No. 2,255,501.

It is one of the objects of the present invention to provide an electrical switch contact which has and which maintains a low contact resistance. It is a further object of the invention to provide a ratio adjusting switch with contacts which is immune to sulphide formation when immersed in oil.

In the drawing, the single figure illustrates a pair of contacts embodying the features of the present invention.

In carrying out the present invention we provide a switch which has a metal backing of high electrical conductivity. Copper provides a satisfactory backing because of its combined high conductivity and low cost. However, silver, alloys of copper and silver, and copper with a coating of silver, may be employed if desired. A very thin coating of tin applied to the high conductivity metal base provides the switch contact surface. The tin coating generally is electroplated onto the copper or other metal base. The deposition of the tin by electrodeposition is particularly desirable since the thickness of the tin coating must be closely controlled and the electrolytic process permits such control. To obtain the most satisfactory results the plating time and current density of the bath should be regulated so that the tin deposited on the base metal is less than 0.001". We have found that a plating time of twenty minutes at a current density of fifteen amperes per square foot in an alkaline stannate bath results in a very satisfactory plate thickness.

After the deposition of the tin coat the plated switch is removed from the bath and dried. Thereafter the tin coating is fused, or, in other words, melted on the copper or other metallic electrically conducting backing generally by immersion in hot oil. The fusing process provides an integral connection between the tin coating and metal backing. The thickness of the final tin coating should be at least 0.0001" but less than 0.0004" and preferably between 0.00017" and 0.00023". If the tin coating is too thick the excess tin will form globules thereby producing a rough contact surface which promotes bridging and a two-point contact rather than a straight line contact such as desired in a ratio adjuster of the type described in the Blume patent. On the other hand if the tin coating is less than 0.0001" or greater than 0.00023" the resistance of the fused coating is too great. If the fused tin surface is too thin this condition may be readily detected by the appearance of the sur-

2

face which will be darker and of slightly lower luster than that possessed by a coating about 0.0002" thick. A plated tin coating of the desired thickness has a brilliant chrome-like luster.

A tin coating over copper having a thickness of 0.000197" has an average resistance of about 180 to 160 ohms $\times 10^{-6}$ with loads varying from 1.45 pounds to 11.60 pounds, the smaller load being associated with the higher electrical resistance. Under the same test conditions a tin coating having a thickness of 0.000066" has an average resistance varying from about 1150 to 260 ohms $\times 10^{-6}$.

Ratio adjusting apparatus ordinarily is operated under oil and the sliding contact surfaces are under a pressure of about 20 pounds. If silver contact surfaces are employed, silver sulphide will form on the exposed or non-engaged areas of the contact surfaces. The sulphide is a fairly good electrical conductor and it is likely to cause transformer failures when the sulphide scale drops off the contact and settles on the insulating components of the load ratio device in such a way as to cause a short circuit by arc-over. Our improved very thin tin contact surface not only has and maintains a low electrical contact resistance but it is substantially immune to sulphide formation.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. A switch contact having a surface coating consisting of a fused layer of tin at least 0.0001" but less than 0.0004" thick.

2. A switch contact member having a surface coating consisting of a fused layer of tin about 0.00017" to 0.00023" thick.

3. A switch contact consisting of a copper base with a fused tin coating thereon, said tin coating having a thickness of about 0.0002".

4. An oil immersed switch comprising cooperating switch contacts, each of said contacts consisting of a metal base of high electrical conductivity with a fused coating of tin thereon, said tin coating having a thickness of approximately 0.0002".

5. A switch contact consisting of a silver base with a fused tin coating thereon, said fused tin coating having a thickness of about 0.0002".

CYRIL H. HANNON.
ALFRED L. JENNY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,383,174	Udy et al.	June 28, 1921
2,177,288	Schellenger	Oct. 24, 1939
2,294,482	Siegmund	Sept. 1, 1942