

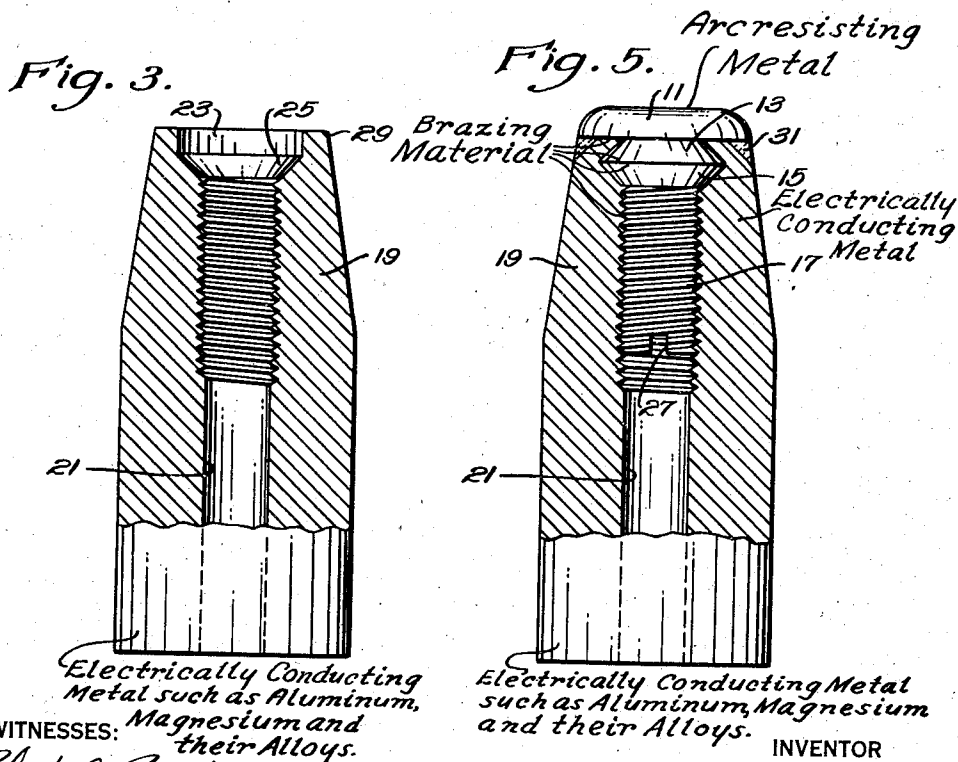
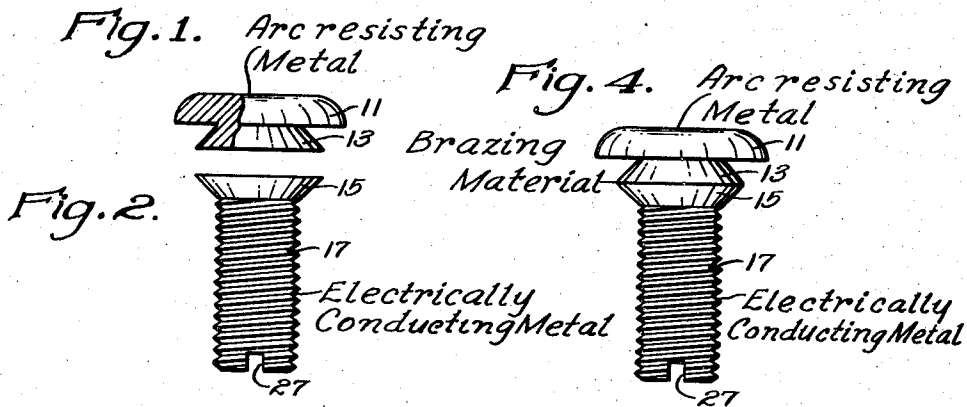
Aug. 27, 1946.

R. E. FRIEDRICH

2,406,327

CONTACT STRUCTURE

Filed Dec. 26, 1942



WITNESSES:
Robert C. Baird
Paul H. Harlow

INVENTOR
Robert E. Friedrich.
BY
F. W. Lyle
ATTORNEY

UNITED STATES PATENT OFFICE

2,406,327

CONTACT STRUCTURE

Robert E. Friedrich, Pittsburgh 16, Pa., assignor
to Westinghouse Electric Corporation, East
Pittsburgh, Pa., a corporation of Pennsylvania

Application December 26, 1942, Serial No. 470,159

6 Claims. (Cl. 200-166)

1

This invention relates to contact structures and, more particularly, to the art of attaching contacts of precious metals and refractory metals and their alloys to supporting structures of base metal.

It is desirable to make the contacts for use on high-speed circuit interrupters of a light, electrically conducting metal selected from the group consisting of aluminum, magnesium and their alloys, such as zinc, silicon or copper, in order to provide a minimum weight. An example of an alloy which has been found satisfactory for the main contact member consists of 94½% aluminum and 4½% copper. Such metals are unsuitable for use as an arcing contact. Heretofore it has been common practice to secure an arcing tip of arc-resisting material to the main contact element in order to prevent excessive burning of the contact. Such arc-resisting materials usually consist of copper-tungsten or silver-tungsten mixtures formed to provide a refractory contact tip which satisfactorily resists the damaging effects of current arcs. Great difficulty has been encountered in attaching arc-resisting contact tips to such contact members, since these arc-resisting materials do not braze satisfactorily to such metals. In trying to obtain good mechanical and electrical connections of such arcing tips to contact structures of aluminum, magnesium and their alloys, various methods of attaching the arcing tips to the contact structure have been resorted to. Such methods include riveting, swaging, or soldering, etc. It has been found, however, that repeated hammering of the contact tips, due to repeated operation of the interrupter, has a tendency to loosen swaged tips and riveted tips and to crack the soldered joints, thus introducing high resistance where the arcing occurs and to thereby further impair the efficiency of the contact.

The principal object of the instant invention is the provision of an improved contact structure wherein an arc-resistant tip is secured to a contact member of aluminum, magnesium and their alloys in a manner to provide maximum mechanical strength and electrical conductivity.

Another object of the invention is the provision of an improved contact assembly.

Another object of the invention is the provision of an improved method of attaching an arc-resisting contact tip to a support or contact member of aluminum, magnesium and their alloys.

Another object of the invention is the provision of an improved contact structure of low mass

2

having an arcing tip of arc-resisting material which provides great mechanical strength, high conductivity and which requires a minimum amount of arc-resisting material.

These and other objects and advantages of the invention will appear from the following detailed description of one embodiment thereof when read in connection with the accompanying drawing, in which:

Figure 1 is a side view, partly in section, of an arcing tip adapted to be attached to the contact assembly;

Fig. 2 is a side view of a flanged screw adapted to receive the arcing tip shown in Fig. 1;

Fig. 3 is an elevational view, partly in section, showing the main contact body;

Fig. 4 is an elevational view of the arcing contact attached to the head of the screw; and

Fig. 5 is an elevational view, partly in section, showing the completed contact assembly.

According to the invention, a contact 11 (Fig. 1) of an arc-resisting material, such, for example, as pressed and sintered mixtures of copper-tungsten or silver-tungsten or other known arc-resisting materials, is formed substantially as illustrated, having a projection 13 in the shape of a truncated cone integral therewith. Since it has been found exceedingly difficult to obtain a satisfactory joint between such arc-resisting materials and aluminum, magnesium and their alloys, the arcing contact 11 is secured by brazing to the flanged head 15 of a screw or bolt 17 composed of a metal to which it may readily and strongly be brazed, such, for instance, as brass. Brazing the arcing tip 11 to the bolt 17 is accomplished by means of a high-strength brazing material, such as silver solder.

The main body 19 (Fig. 3) of the contact structure, which is of aluminum, magnesium and their alloys, is prepared to receive the arcing tip assembly (Fig. 4) by drilling a hole 21 axially through the center of the member. This opening is tapped from the contact end a distance sufficient to receive the threaded bolt 17. The tapped end of main contact member 19 is then counter-bored as at 23, the counterbore having a diameter substantially equal to the diameter of the annular projection formed by the projection 13 and the flanged head 15 of the bolt 17. The counterbore 23 provides the member 19 with a conical shoulder 25 having the same angle with reference to the axis of the member 19 as the angle of the flanged head with reference to the axis of the bolt 17.

All of the surfaces of the assembly illustrated

in Fig. 4 and of the main contact member, which will come into contact with each other, are next coated with a brazing material, such as tin, after which the bolt 17 with the arcing contact 11 attached thereto is screwed into the tapped opening in the member 19. The head 15 of the bolt is seated firmly against the shoulder 25 by inserting a screwdriver through the opening 21 from the base of the member into a slot 27 provided for that purpose in the end of the bolt, and turning the bolt to seat it securely in the member 19.

After the bolt and contact assembly 11-17 have been firmly seated in the member 19, the metal comprising the shoulder 29 of the main contact member is forced into the groove defined by the bottom of the contact tip 11 and the projection 13 thereof by a swaging operation. The complete assembly (Fig. 5) is then passed through a suitable welding furnace and brought to welding temperature sufficiently high to melt the brazing material with which the contacting surfaces were coated. Thus all of the contacting surfaces of the members 11, 17 and 19 are firmly brazed or welded together.

After this brazing operation, the annular groove, formed by the swaging tool between the arcing contact and the shoulder 29 of the main contact member 19, is filled with solder as at 31 (Fig. 5) to provide better conductivity and a flush smooth surface to the contact assembly.

It can be seen that a contact assembly made in accordance with procedure set forth has great mechanical strength and is capable of withstanding repeated heavy blows, and also has a maximum of electrical conductivity due to the brazing of all contacting surfaces.

Having described a preferred embodiment of the invention in accordance with the patent statutes, it is to be understood that various changes and modifications may be made therein without departing from the spirit of the invention. It is, therefore, desired that the language of the appended claims be given as reasonably broad interpretation as the prior art permits.

I claim as my invention:

1. A contact assembly comprising a contact member of arc-resisting material, a screw having a flanged head to which said contact member is brazed, said flanged head together with a part of said contact member forming an annular projection, a support member having an opening in which said screw and a part of said contact members are threadedly mounted, a portion of said support member embracing said projection to hold the parts together.

2. A contact assembly comprising a contact member of arc-resisting material having a projection forming an annular groove, a screw hav-

ing a flanged head to which said contact member is attached, said projection and said head forming an annular projection, a support member of a light, electrically conducting metal selected from the group consisting of aluminum, magnesium and their alloys, said support member having an opening in which said screw and said contact members are threadedly mounted, said opening forming a shoulder on said support member, said shoulder having a portion extending into the annular groove to embrace said annular projection and securely hold all of the parts together.

3. A contact assembly comprising a threaded intermediate member, a contact of arc-resisting material secured to said intermediate member by brazing, said threaded member and said contact forming an annular projection, a support member of a light, electrically conducting metal selected from the group consisting of aluminum, magnesium and their alloys, said support member having a threaded opening in which said intermediate member is threadedly mounted, a part of said support member embracing said projection to form a rigid mechanical connection between all of said members, the adjoining surfaces of said members having a coating of brazing material to integrally secure said members together.

4. A contact assembly comprising a contact member of arc-resisting material and a threaded support member brazed thereto, said members forming an annular projection, and a member having a threaded opening in which said support member and said annular projection are mounted, a portion of said support member extending over said projection and a part of said contact member.

5. A contact assembly comprising a contact member of refractory material having a peripheral groove formed therein, a headed screw brazed to said contact member, a member having a threaded and counterbored recess for receiving said screw and a part of said contact, a portion of said member extending into the peripheral groove in the contact member, and the adjoining surfaces of the contact member, the screw and the member being integrally secured together by a brazing material.

6. A contact assembly comprising a contact member of a light, electrically conducting metal selected from the group consisting of aluminum, magnesium and their alloys, said contact member having a threaded opening in one end thereof, a metal screw mounted in said opening, and a contact tip of arc-resisting material brazed on the head of said screw, the end of said contact member having a portion swaged over against a portion of said contact tip.

ROBERT E. FRIEDRICH.