H. ANSCHÜTZ-KAEMPFE.
ELECTRICAL CONTACT.
APPLICATION FILED SEPT. 7, 1911.

1,170,388.

Patented Feb. 1, 1916.

Fig. 1.

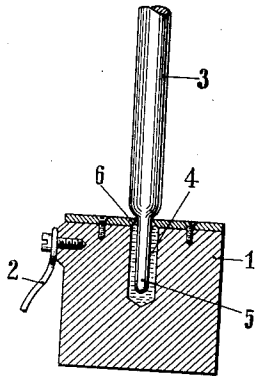


Fig. 4.

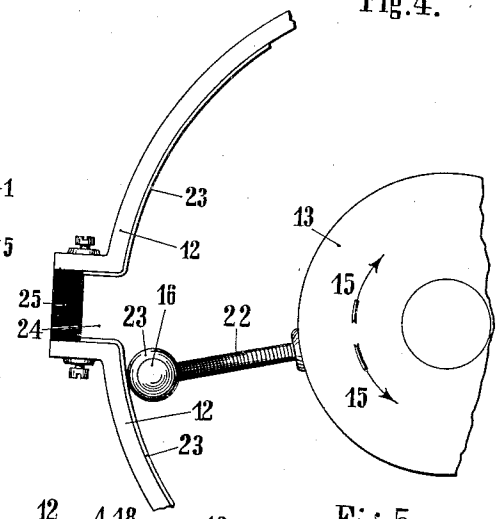


Fig. 2.

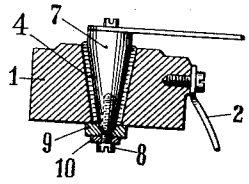


Fig. 3.

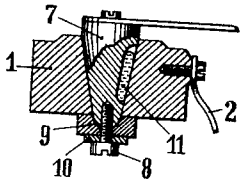
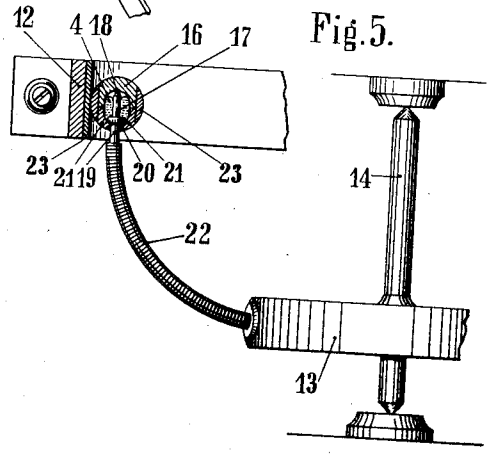


Fig. 5.



WITNESSES

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ELECTRICAL CONTACT.

1,170,388. Specification of Letters Patent. Patented Feb. 1, 1916.

Application filed September 7, 1911. Serial No. 648,248.

To all whom it may concern:

Be it known that I, Dr. HERMANN ANSCHÜTZ-KAEMPFE, a subject of the Emperor of Germany, residing at Heikendorferweg 9, Neumühlen, near Kiel, Germany, have invented certain new and useful Improvements in or Relating to Electrical Contacts, of which the following is a specification.

Mercury contacts which are used in electrical apparatus for supplying current to moving parts, are generally satisfactory only when the method of operating the apparatus in question precludes any danger of the mercury escaping.

The object of this invention is to avoid this limitation of the application of mercury or like contacts.

The invention consists in giving the two parts of the apparatus to be electrically connected together by the contact such a shape and arranging them relatively to each other in such a way that the escape of the mercury is rendered impossible by reason of its own cohesion.

Several constructions and methods of applications of the invention are illustrated by way of example in the accompanying drawing in which—

Figure 1 shows an arrangement for the supply of current to a rotating spindle. Figs. 2 and 3 show a different construction for the supply of current to a rotating crank, and Figs. 4 and 5 are respectively a plan and side elevation of apparatus partly in section, for supplying current from a circular member to a part concentrically rotating with regard to the member.

In all these constructions of the contact, the part which contains the mercury, that is to say, the part with the mercury cup, can be brought into any desired position without any fear of spilling the mercury.

In Fig. 1, 1 is a part of an electrical apparatus from which the current admitted through the wires 2, is to be supplied to a rotating spindle 3. To that end, the part 1 is provided with a recess 4 containing mercury, into which the spindle 3 penetrates by means of a pin 5. In order to prevent the mercury from escaping when the part 1 is not standing still, but is moved in any desired manner, it is provided with a cover 6 which surrounds the pin 5 so closely that only a very narrow slot is left which may be compared to a capillary vessel. In this case, the mercury cannot escape from the cup 4, even when the parts are moved in any desired manner, or placed upside down, as the cohesion of the mercury prevents it from escaping. The dimensions of the part 1, the pin 5 and the mercury cup 4, are calculated so that current of a very considerable strength can be transmitted. The spindle 3 may be supported by parts (not shown) so as not to rest upon the cover 6.

Fig. 2 shows the application of the invention to an electric connection between a rotatable crank and the crank bearing, which can be used for numerous feed-apparatus, regulating resistances, etc. The part 1 is provided with a mercury cup 4 into which is introduced a crank pin 7 held fast, for instance by a screw 8, plate 9 and washer 10. The crank pin must fit fairly closely in its bearing, so that the space between the two constitutes in effect a capillary vessel, and the mercury contained therein is retained in the cup by cohesion, even when the parts are turned to an angle of 90°, or even 180° from the position shown in Fig. 2. The mercury acts at the same time as a lubricating medium. The width of the intermediate space left between the crank pin 7 and the walls of the mercury cup 4, is shown in the drawing on an enlarged scale, merely for the sake of clearness.

In Fig. 3 the crank pin 7 is assumed to be inserted into its bearing in part 1 in a fairly tight manner, and is provided laterally with a recess 11 in which is introduced mercury. This mercury which is carried around during the rotation of the crank pin, forms an always reliable electric connection between the crank pin and the part 1, but it cannot escape, whatever be the changes of position of the part 1, as the space left between the parts 7 and 1 is too narrow. Obviously the materials from which the parts 1, 5, 7, etc., are made, must be of the kind which are not corroded by mercury.

Figs. 4 and 5 show the construction of a good electric connection offering only a slight frictional resistance, between a circular member 12 and a body 13 which can be rotated about its spindle 14 in the direction of the two arrows 15. This is an arrangement such as for instance frequently used for transmission of readings of indices to a distance. In this case, the mercury cup 4 is arranged in a ball 16; into a mercury cup dips a pin 17 which forms, on the one hand, by means of a point 18, and on the other

hand by means of the neck 19, two bearings for the ball, about which the latter can rotate. The ball is prevented from shifting in the direction of the axis of the pin 17 by a collar 20 which engages under the cover 21 of the mercury cup surrounding the neck 19 and is secured to the ball in any desired manner. The pin 17 or its neck 19, is connected to the part 13 by means of a flexible shaft 22, and the relative position of the parts 12 and 13 is calculated so that the axis of the pin 17 is approximately parallel to the axis of rotation 14 of the part 13, when the circumference of the ball 16 is resting on the bar 12.

The mercury in the cup 4 forms, as will be seen, a reliable electric connection between the ball 16 and the pin 17, the shaft 22 electrically connected to the latter, and the further conductors on the part 13. The mercury cannot escape from the cup 4, as the space left between the neck 19 and the cover 21 of the mercury cup, is so narrow that it constitutes a capillary vessel. If the part 13 rotates relatively to the bar 12, the ball 16 will roll on the said bar, so that the friction is therefore a rolling, and not a sliding one, and thus the frictional resistance is correspondingly decreased. For improving the electric connection the bar 12 as well as the contact zone of the ball, can be provided with a silver or platinum lining 23.

In the construction shown in the drawing, it is assumed that electric connection between 12 and 13 takes place only during the rotation of 13 from a given position of rest in one or the other direction. For that reason, the bar 12 is made of two parts separated by a space or gap 24 and connected together by an insulating part 25. This arrangement has however nothing to do with the invention.

Obviously instead of mercury, any other conducting liquids can be used which do not electrolyze.

What I claim is:

1. An electrical contact comprising a relatively rotatable contact pin and bearing as two elements each of which is adapted to constitute terminal points of an electrical circuit, the pin and bearing being spaced apart over part of their length so as to hold mercury between them and there being a capillary space between pin and bearing where the former enters the latter so that the mercury may not escape.

2. In a mercury electrical contact, the combination of a spherical cup to hold the mercury and a pin, entering said cup and surrounded by but spaced from the inner wall thereof, on which the cup is carried rotatably, the space between cup and pin being of capillary dimensions where the pin enters said cup.

3. An electrical contact comprising a fixed contact pin, a bearing for said pin adapted to rotate thereupon and having inner surfaces separated from the pin so as to form a space for mercury said space being so small where the pin enters the bearing that the mercury will be maintained by cohesion, and a member upon which said bearing is adapted to roll.

4. An electrical contact comprising a pivoted arm carrying a fixed pin, a spherical cup rotatably mounted upon said pin said cup being adapted to contain mercury and the pin projecting into the cup but spaced from the inner wall thereof, the pin as it enters the cup being separated therefrom by a capillary space, and a track upon which said cup is adapted to roll as the arm moves upon its pivot.

In witness whereof I have hereunto signed my name this 19th day of August 1911 in the presence of two subscribing witnesses.

DR. HERMANN ANSCHÜTZ-KAEMPFE.

Witnesses:
HUGO LIEBOLT,
KURT BUNDE.