

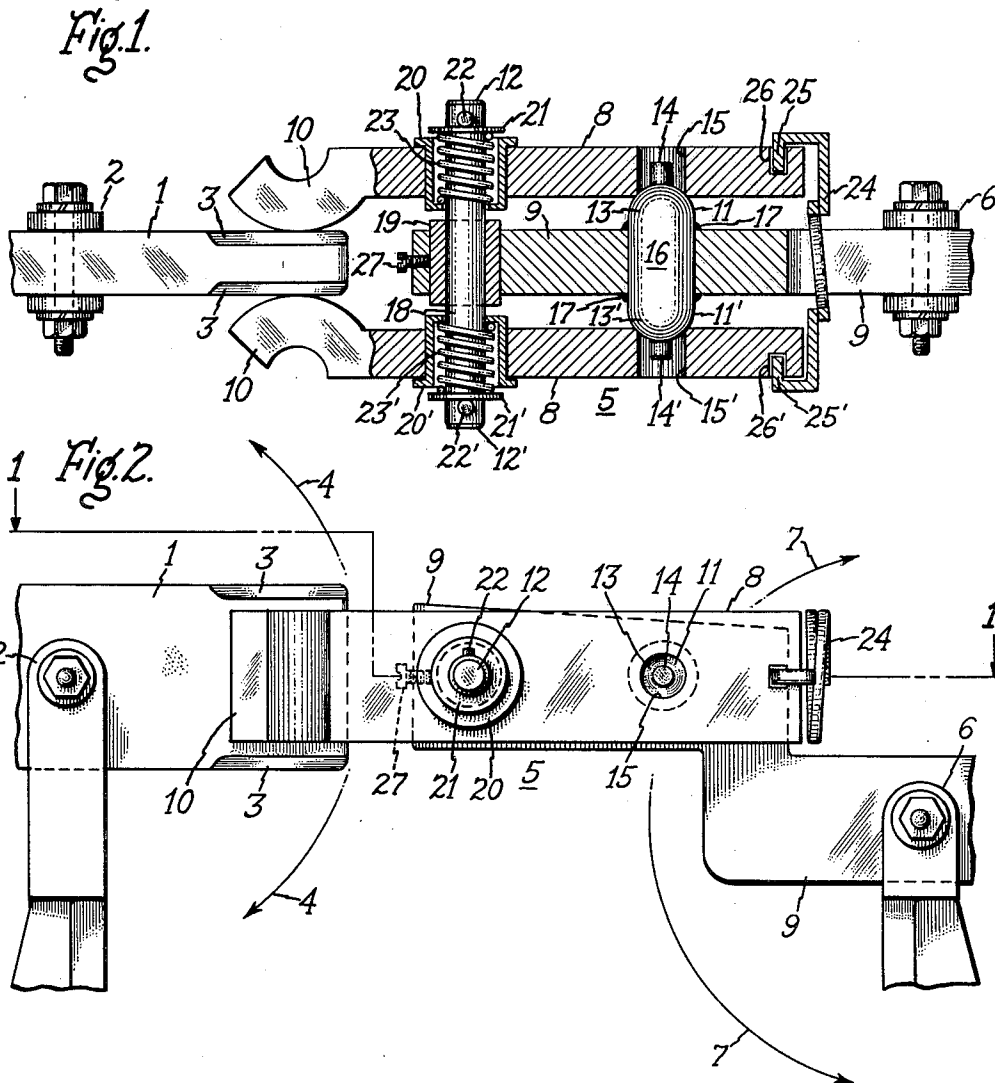
June 16, 1964

J. R. BARR

3,137,778

PIVOTALLY MOUNTED DISCONNECT SWITCH CONTACTS

Filed April 16, 1962



Inventor,
James R. Barr,
by ~~Gilbert P. Tarleton~~
His Attorney.

1

3,137,778

PIVOTALLY MOUNTED DISCONNECT
SWITCH CONTACTS

James R. Barr, Rome, Ga., assignor to General Electric Company, a corporation of New York
Filed Apr. 16, 1962, Ser. No. 187,575
4 Claims. (Cl. 200-164)

This invention relates to an electrical switch and more particularly to improvements in disconnect switches for liquid filled transformers.

Heretofore, switches of this type have comprised a movable blade contact which is adapted to be engaged on opposite sides and pinched between a pair of contact fingers of the other switch contact. In order to carry the necessary current, these contact fingers have been electrically connected to the circuit through heavy metallic braid or the like which is relatively stiff and which interferes with the proper action of the contact fingers both as to the proper contact pressure during the pinching action and also as to proper alignment of the contacts in their plane over relative motion.

In accordance with this invention, there is provided an improved switch in which the necessity for flexible or semi-flexible connectors or leads between the contact fingers and the rest of the circuit is dispensed with and in place thereof a ball and socket type electromechanical connection is used. This ball and socket connection functions not only as a universal movement type of mechanical joint, but also because of relatively high mechanical pressures between the parts, it also provides good electrical connection between the parts.

Another feature of the invention is the provision of novel means for adjusting the relative position of the two contacts in a direction transverse to their plane of engagement for the purpose of aligning them for proper engagement and disengagement.

An object of the invention is to provide a new and improved electric switch.

Another object of the invention is to provide a new and improved non-arcing duty disconnect switch for liquid filled transformers.

The invention will be better understood from the following description taken in connection with the accompanying drawing, and its scope will be pointed out in the appended claims.

In the drawing, FIG. 1 is a side elevation view partly in section on line 1—1 of FIG. 2, of a preferred embodiment of the invention, and FIG. 2 is a plan view from the top thereof.

Referring now to the drawing, there is shown therein a blade contact 1 which may be made of any suitable material such as copper, and which is shown mounted for rotation about a pivotable support 2, in the plane of FIG. 2 and, therefore, in a plane perpendicular to FIG. 1. For facilitating engagement and disengagement of the switch contacts, the blade contact 1 preferably has its leading and trailing edges chamfered or beveled as indicated at 3. As indicated by the arrows 4 in FIG. 2 the blade contact 1 may be moved in either direction about its pivotable support 2.

The other contact of the switch is a more complex assembly designated generally by reference character 5. It can either be fixedly mounted or pivotally mounted on a support 6 and rotated in either direction as indicated by the arrows 7 in FIG. 2 in the same plane as the blade contact 1.

Ordinarily, of course, it will not be necessary for both of the contacts of the switch to be movable and one can be fixed. However, it is immaterial to the invention in its broader aspects which one of the contacts is a movable

2

one and which is the fixed one, the only essential feature being that they be relatively movable in a generally common plane parallel to the paper in FIG. 2 and perpendicular to the paper in FIG. 1.

5 The contact assembly 5 comprises a pair of duplicate contact fingers 8 which may be made of any suitable material such as copper. They are mounted on a common central supporting member 9. The double contact fingers 8 preferably are curved at their outer ends as indicated at 10 for facilitating engagement with the blade contact 1 which engagement is a wiping engagement while the switch is opening and closing.

The contact fingers 8 are supported from the central member 9 by the following construction. There are two 15 pairs of projections extending from opposite sides of the central member 9, one pair of projections being identified as 11 and 11' and the other pair of projections being identified as 12 and 12'. The pair of projections 11—11' are aligned transverse to the plane of relative movement of the contacts and likewise the pair of projections 12—12' are aligned transverse to the plane of relative movement of the contacts. However, the pair of projections 11—11' are removed from or farthest away from the blade contact 1 and the pair of projections 12—12' are between the 25 blade contact and the pair of projections 11—11'. The projections 11—11' have hemispherically shaped ends 13 and 13' from which extend outwardly, reduced diameter projections 14 and 14'. The edges of circular holes 15 and 15' in the contact fingers 8 and of a diameter slightly less than the diameter of the hemispherical sections 13—13' are seated on those hemispherical sections so as to produce a ball and socket type joint permitting universal pivoting motion of the contact fingers 8 about the ends of the projections 11—11'. Actually, if desired, the 35 projections 11—11' may be the ends of a unitary pin 16 passing through the supporting member 9. As shown, they are fastened in any suitable manner to the supporting member 9 such as by brazing as indicated at 17. The projections 14—14' serve as limit stops and facilitate mounting the contact fingers 8 on the projections 11—11'. 40

The projections 12—12' are opposite ends of a common pin 18 passing through the member 9 and pin 18 is positioned by and free to slide in sleeve 19. Seated in suitable openings in the contact fingers 8 are eyelets 20 45 and 20' between the bottoms of which and washers 21 and 21' secured by pins 22 and 22' are compression springs 23 and 23' for biasing the ends 10 of the contact fingers 8 toward each other so that they will pinch the contact blade 1 when it is moved between them so as to make good electrical contact. 50

For preventing the ends 10 of the contact fingers 8 from moving too close together so as to interfere with the proper entrance of the switch blade 1, a spring clip 24 with opposite hooked ends 25 and 25' seated in recesses 26 and 26' in the ends of the contact fingers 8 biases the contact fingers open. 55

For adjusting the position of the ends 10 of the contact fingers 8 transverse to the plane of relative movement of the contacts so as to center the blade 1 between the contact tips 10, a set screw 27 is provided in the central supporting member 9 which engages the sleeve 19 so that the latter may be adjusted up or down as shown in FIG. 1 and locked in position by the set screw. 60

It will be observed that as the ends 10 of the contact fingers 8 are spread apart by the blade contact 1 that the pressure produced by the springs 23 will cause firm engagement between the relatively sharp edges of the holes 15 and the hemispherical surfaces 13—13' of the projections 11—11' thus assuring good electrical contact over a wide range of angular positions of the contact fingers 8. 70

3

While there has been shown and described a particular embodiment of the invention, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention and, therefore, it is intended by the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

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

1. In an electrical switch of the type having a pair of relatively movable selectively engageable and disengageable contacts, one of said contacts being a blade contact and the other being a double finger contact whose fingers engage opposite sides of said blade contact as said contacts are moved into and out of engagement and which contact fingers pinch said blade contact therebetween when said contacts are in engagement, said double finger contact having a central supporting member for its double contact fingers, said central supporting member having two pairs of projections extending from opposite sides thereof and spaced lengthwise of said contact fingers, the pair of projections farthest from said blade contact being aligned in a direction transverse to said contact fingers and having hemispherically shaped ends, circular holes through said contact fingers of a diameter slightly less than the diameter of said hemispherically shaped ends, said holes being respectively seated on said hemispherically shaped ends so as to form a ball and socket type universally pivoted electromechanical connection between said contact fingers and said central supporting member, the other pair of projections extending through a second pair of aligned holes in said contact fingers, and resilient means for biasing said contact fingers toward each other, said ball and socket type connection being the principal electrical connection between said contact fingers and said central member.

2. In an electrical switch of the type having a pair of relatively movable selectively engageable and disengageable contacts, one of said contacts being a blade contact and the other being a double finger contact whose fingers engage opposite sides of said blade contact as said contacts are moved into and out of engagement and which contact fingers pinch said blade contact therebetween when said contacts are in engagement, said double finger contact having a central supporting member for its double contact fingers, said central supporting member having two pairs of projections extending from opposite sides thereof and spaced lengthwise of said contact fingers, the pair of projections farthest from said blade contact being aligned in a direction transverse to said contact fingers and having hemispherically shaped ends, circular holes through said contact fingers of a diameter slightly less than the diameter of said hemispherically shaped ends, said holes being respectively seated on said hemispherically shaped ends so as to form a ball and socket type universally pivoted electromechanical connection between said contact fingers and said central supporting member, the other pair of projections extending through a second pair of aligned holes in said contact fingers, resilient means associated with said other pair of projections and said contact fingers for biasing the latter toward each other, and connecting means between the ends of said contact fingers which are most remote from said blade contacts for restraining the motion produced by said resilient biasing means, said ball and socket type connection being the principal electrical connection between said contact fingers and said central member.

3. In an electrical switch of the type having a pair of relatively movable selectively engageable and disengageable contacts, one of said contacts being a blade contact and the other being a double finger contact whose fingers engage opposite sides of said blade contact as said con-

4

tacts are moved into and out of engagement and which contact fingers pinch said blade contact therebetween when said contacts are in engagement, said double finger contact having a central supporting member for its double contact fingers, said central supporting member having two pairs of projections extending from opposite sides thereof and spaced lengthwise of said contact fingers, the pair of projections farthest from said blade contact being aligned in a direction transverse to said contact fingers and having hemispherically shaped ends, circular holes through said contact fingers of a diameter slightly less than the diameter of said hemispherically shaped ends, said holes being respectively seated on said hemispherically shaped ends so as to form a ball and socket type universally pivoted electromechanical connection between said contact fingers and said central supporting member, the other pair of projections extending through a second pair of aligned holes in said contact fingers, resilient means associated with said other pair of projections and said contact fingers for biasing the latter toward each other, connecting means between the ends of said contact fingers which are most removed from said blade contacts for restraining the motion produced by said resilient biasing means, and means for adjusting the position of said other pair of projections transverse to the plane of relative movement of said contacts for aligning said contacts relative to each other with respect to said plane, said ball and socket type connection being the principal electrical connection between said contact fingers and said central member.

4. In an electrical switch of the type having a pair of relatively movable selectively engageable and disengageable contacts, one of said contacts being a blade contact and the other being a double finger contact whose fingers engage opposite sides of said blade contact with a side-wise as opposed to an end-wise wiping action as said contacts are moved into and out of engagement and which contact fingers pinch said blade contact therebetween when said contacts are in engagement, said double finger contact having a central supporting member for its double contact fingers, said central supporting member having two pairs of projections extending from opposite sides thereof and spaced lengthwise of said contact fingers, the pair of projections farthest from said blade contact being aligned in a direction transverse to said contact fingers and having hemispherically shaped ends with a reduced diameter outwardly extending projection thereon, circular holes through said contact fingers of a diameter slightly less than the diameter of said hemispherically shaped ends, said contact fingers being respectively seated on said hemispherically shaped ends with said reduced diameter projections extending into said holes so as to form a ball and socket type universally pivoted electromechanical connection between said contact fingers and said central supporting member, the other pair of projections extending through a second pair of aligned holes in said contact fingers, resilient means between the ends of said other pair of projections and said contact fingers for biasing the latter toward each other, connecting means between the ends of said contact fingers which are most remote from said blade contacts for restraining the motion produced by said resilient biasing means, and means for adjusting the position of said other pair of projections transverse to the plane of relative movement of said contacts for aligning said contacts relative to each other with respect to said plane, said ball and socket type connection being the principal electrical connection between said contact fingers and said central member.

References Cited in the file of this patent

FOREIGN PATENTS

851,729 Great Britain _____ Oct. 19, 1960