

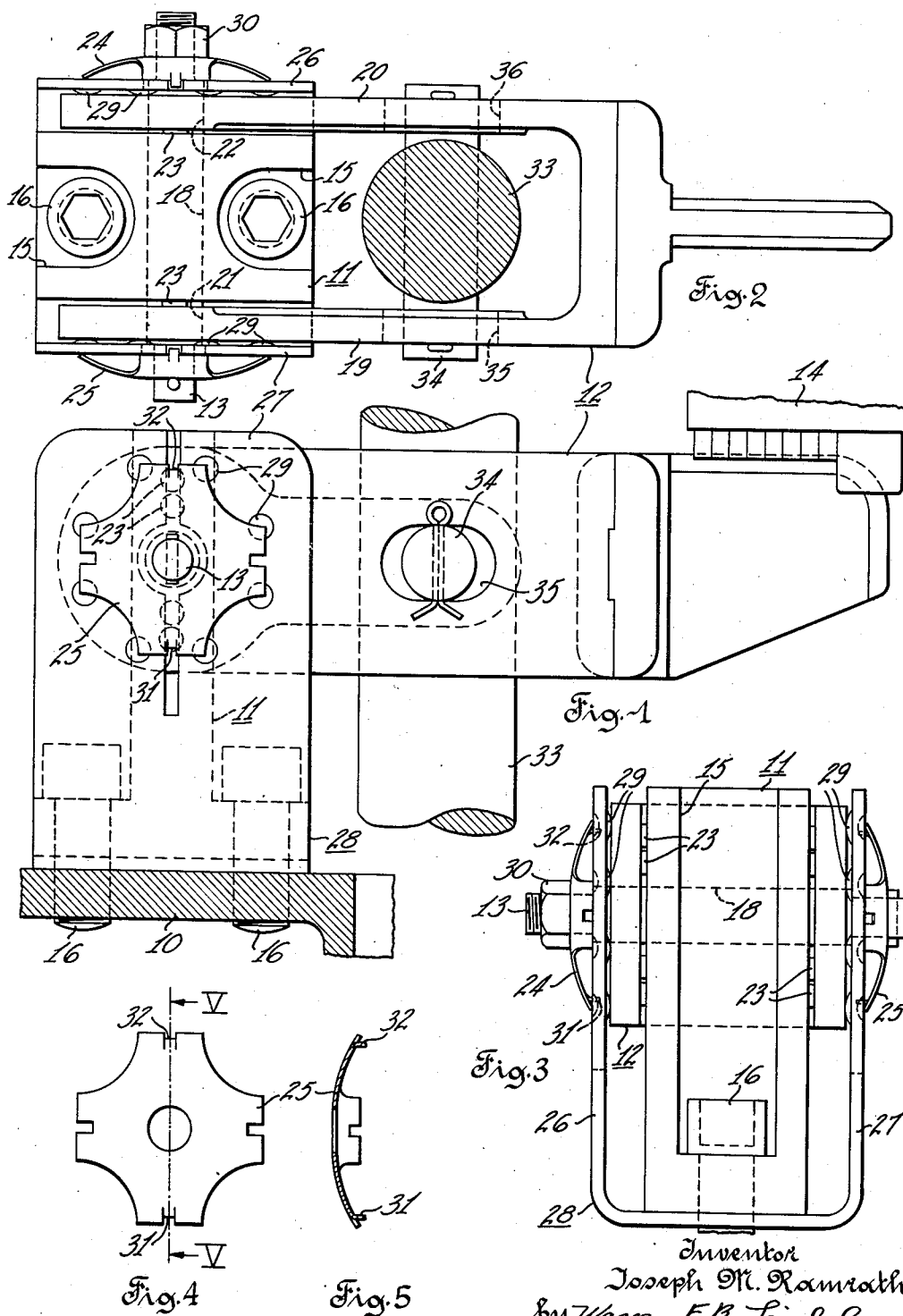
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J. M. RAMRATH

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HINGED ELECTRICAL CONNECTION

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Inventor
Joseph M. Ramrath
by Warren F. B. Lindsley
Attorney

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HINGED ELECTRICAL CONNECTION

Joseph M. Ramrath, Mattapan, Mass., assignor to Allis-Chalmers Manufacturing Company, Milwaukee, Wis.

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This invention relates to electric switches and more particularly to a pressure contact hinge for switches employing pivotally mounted switch blades.

Pivotally mounted switch blades have been used for a great many years and the prior art is replete with disclosures of arrangements for improving the hinge contact of such switches. The main concern in pivotally mounted switch blades is that of providing good electrical contact at the hinge. A good electrical hinge contact is particularly important in switches where relatively large currents are carried since such hinge contacts are likely to be a source of difficulty. In order to improve the current carrying capacity of such switches employing hinged switch blades, the contact areas of the hinged members were decreased and the contact pressure increased. Many types of pressure hinge contacts have been devised, but most of these arrangements had limiting or undesirable features such as large surface contact which would result in a slow acting switch, too high contact pressure over a reduced area which would result in abnormal wearing of the switch contacts and excessive contact corrosion.

In accordance with the invention claimed, a new and improved pivoted electrical connection is provided which employs a current carrying blade member pivotally mounted by means of a pin or bolt on a current conducting member. A U-shaped electrical conducting means is provided for connecting the current conducting member to the blade member. This U-shaped conducting means comprises a pair of legs and a bight. Each of the legs are slotted at its end to fit around the bolt on opposite sides of the blade member, and the bight is electrically secured to the current conducting member. The legs are further deformed along their plane surfaces to provide a plurality of protrusions for engaging juxtapositioned surfaces of the blade member. In order to produce a substantially constant pressure between the current conducting member and the blade member, a pair of cup shaped maltese cross spring means are mounted one on each end of the bolt used for forming the blade pivoting means.

It is therefore an object of this invention to provide a new and improved pivoted electrical connection.

Another object of this invention is to provide a new and improved electric switch in which a substantially constant pressure is provided between the current conducting and current carrying members.

A further object of this invention is to provide an electric switch in which new and improved resilient means are provided along a pivoting means of the movable switch element to bias the switch elements together with substantially constant pressure.

A still further object of this invention is to provide a new and improved high pressure contact hinge for switches employing a pivotally mounted switch blade which is capable of carrying large currents without overheating.

A still further object of this invention is to provide a

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new and improved high pressure contact hinge for switches employing a pivotally mounted switch blade which requires only a relatively small rotational force to actuate the switch blade.

Objects and advantages other than those set forth will be apparent from the following description when read in connection with the accompanying drawing, in which:

Fig. 1 is an illustration partly in elevation of an electric switch embodying the present invention;

Fig. 2 is a plan view of Fig. 1;

Fig. 3 is a partial left end view of Fig. 1;

Fig. 4 is a view of the cup shaped maltese cross illustrated in Fig. 1; and

Fig. 5 is a cross sectional view of the cup shaped maltese cross taken along the line V—V in Fig. 4.

Referring to Figs. 1–5 of the drawing by characters of reference, the electric switch illustrated is of the knife blade type comprising a rigid supporting base 10, a hinge terminal or current conducting member 11, a knife blade 12 pivoted on the hinge member 11 for rotation about a common axis or bolt or pin means 13, and a contact terminal or stationary current conducting member 14 disposed on one side of the hinge member 11 in position to be engaged by blade 12 when it is rotated to a closed circuit position.

The current conducting member 11 is shown as formed out of a block of suitable conducting material which is provided with grooves 15 for receiving bolts 16 which are threaded into base 10 to rigidly secure member 11 thereto. Member 11 is provided with an aperture or bore 18 for receiving pin 13.

Knife blade 12 comprises a U-shaped current carrying member which comprises a pair of leg members 19 and 20. Leg members 19 and 20 are provided with aligned apertures 21 and 22 which are arranged to line up with bore 18 one on each end thereof when knife blade 12 is arranged for pivotal mounting on member 11. Knife blade 12 is pivotally mounted on member 11 by means of bolt 13 when bolt 13 is arranged to extend through bore 18 and apertures 21 and 22.

The current conducting member 11 is provided with a plurality of silver, button type contacts 23 arranged on each side of member 11. These contacts are axially aligned with bore 18 and are welded to each side of member 11 so as to face the inner surfaces of the leg members 19 and 20. By deflecting each leg member of the knife blade 12 toward member 11 contact pressure on these buttons results. The leg members 19 and 20 are yieldingly biased toward each other and against the opposite sides of member 11 by means of cup shaped spring biasing means, 24 and 25 and a nut 30 secured to bolt 13.

Arranged between the biasing means 24 and 25 and the leg members 19 and 20 are the legs 26 and 27 of a U-shape connecting means 28. Means 28 may be made from a bar of pliable copper which is bent in a U-shape to form the legs 26 and 27. Legs 26 and 27 are slotted at their ends thereof to form fingers of great flexibility. These fingers or leg ends are arranged to fit around pin or bolt 13 on the outer sides of leg members 19 and 20 (as shown in Figs. 1, 2 and 3). The bight of the U-shaped connecting means 28 is suitably secured to the current conducting member 11 to form an electrical path from member 11 through connecting means 28 to knife blade 12. Each leg of the connecting means 28 is provided with a plurality of contact protrusions 29 which are axially arranged around the aperture extending therethrough so as to face the movable leg members of the knife blade 12. These protrusions 29, usually eight in number on each leg of connecting means 28, are formed by cold working a tool into the connection bar so as to form a dimple on

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one side of the leg member and a protrusion on the other side of that leg member. Cold working hardens these protrusions and improves their wearing qualities.

In order to provide a substantially constant pressure between the current conducting member 11 and the blade member 12 the cup shaped spring means 24 and 25 are held in stressed condition against the legs 26 and 27 of the connecting means 28 by bolt 13 and nut 30. The cup shape spring means 24 and 25 may have the geometry of a maltese cross. The four ends of each cross are slotted. Two of the slots arranged on diametrically opposed ends thereof are pierced so as to provide tabs 31 and 32 shown in Figs. 4 and 5. These tabs are arranged to fit between the finger ends of the leg members 26 and 27 of the connecting means 28 when the hinge is in the assembled position shown in Figs. 1-3. The tabs 31 and 32 lock the spring means 24 and 25 in a given position with relation to leg members 26 and 27.

A connecting rod 33 is pinned in a lost motion connection to knife blade 12 by a rod 34 which is fitted into apertures 35 and 36 formed in leg members 19 and 20. In operating the switch or in moving it to open position from the position shown in Fig. 1, a pull is exerted on rod 33 secured to knife blade 12 which tends to move knife blade 12 in a clockwise direction about its pivot pin 13.

Although but one embodiment of the present invention has been illustrated and described, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

It is claimed and desired to secure by Letters Patent:

1. In a pivoted electrical connection, the combination comprising: a current conducting member, a current carrying blade member, pin means extending through aligned apertures in said current conducting member and said blade member for pivotally mounting said blade member on said current conducting member, U-shaped means for electrically connecting said current conducting member to said blade member, said U-shaped means comprising a pair of legs and a bight, each of said legs being slotted at the ends thereof to fit around said pin means on opposite sides of said blade member, said bight being electrically secured to said current conducting member, said legs being deformed along the plane surfaces thereof to provide a plurality of protrusions for engaging juxtapositioned surfaces of said blade member, and spring means mounted on the ends of said pin means for producing a substantially constant pressure between said current conducting member and said blade member.

2. In a pivoted electrical connection, the combination comprising: a current conducting member, a current carrying blade member, pin means extending through aligned apertures in said current conducting member and said blade member for pivotally mounting said blade member on said current conducting member, U-shaped means for electrically connecting said current conducting member to said blade member, said U-shaped means comprising a pair of legs and a bight, each of said legs being slotted at the ends thereof to fit around said pin means on opposite sides of said blade member, said bight being electrically secured to said current conducting member, said legs being deformed along the plane surfaces thereof to provide a plurality of protrusions for engaging juxtapositioned surfaces of said blade member, and means comprising cup shaped springs one mounted on each end of said pin means for producing a substantially constant pressure between said current conducting member and said blade member.

3. In a pivoted electrical connection, the combination comprising: a current conducting member, a current carrying blade member, pin means extending through aligned apertures in said current conducting member and said blade member for pivotally mounting said blade

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member on said current conducting member, U-shaped means for electrically connecting said current conducting member to said blade member, said U-shaped means comprising a pair of legs and a bight, each of said legs being slotted at the ends thereof to fit around said pin means on opposite sides of said blade member, said bight being electrically secured to said current conducting member, said legs being deformed along the plane surfaces thereof to provide a plurality of protrusions for engaging juxtapositioned surfaces of said blade member, and means comprising cup shaped maltese crosses one mounted on each end of said pin means for producing a substantially constant pressure between said current conducting member and said blade member.

4. In a pivoted electrical connection, the combination comprising: a current conducting member, a current carrying blade member, pin means extending through aligned apertures in said current conducting member and said blade member for pivotally mounting said blade member on said current conducting member, U-shaped means for electrically connecting said current conducting member to said blade member, said U-shaped means comprising a pair of legs and a bight, each of said legs being slotted at the ends thereof to fit around said pin means on opposite sides of said blade member, said bight being electrically secured to said current conducting member, said legs being deformed along the plane surfaces thereof to provide a plurality of protrusions for engaging juxtapositioned surfaces of said blade member, and spring means comprising a cup shaped maltese cross mounted on the ends of said pin means for producing a substantially constant pressure between said current conducting member and said blade member, said cross being slotted to form diametrically opposed tabs which are arranged within the slots of said legs to lock said cross and said connecting means together.

5. In a pivoted electrical connection, the combination comprising: a current conducting member, a current carrying blade member, pin means extending through aligned apertures in said current conducting member and said blade member for pivotally mounting said blade member on said current conducting member, U-shaped copper bar means for electrically connecting said current conducting member to said blade member, said U-shaped bar means comprising a pair of flexible mounted legs and a bight, each of said legs being slotted at the ends thereof to form a pair of fingers for fitting around said pin means on opposite sides of said blade member, said bight being electrically secured to said current conducting member, said plane surface of said legs being deformed to provide a plurality of protrusions for engaging juxtapositioned surfaces of said blade member, spring means comprising cup shaped maltese crosses mounted one on each end of said pin means, and means for forcing said spring means against said connecting means for producing a substantially constant pressure between said current conducting member and said blade member.

6. In a pivoted electrical connection, the combination comprising: a current conducting member providing an aperture extending therethrough to form a bearing surface, a U-shaped current carrying blade member comprising a pair of leg members, said leg members being provided with aligned apertures, pin means extending through said aligned apertures in said current conducting member and said aperture in said blade member for pivotally mounting said blade member around said current conducting member, said current conducting member being provided with a plurality of contacts secured to the outer surfaces thereof around said aperture for engaging the juxtapositioned surfaces of said leg members, U-shaped means for electrically connecting said current conducting member to said blade member, said U-shaped means comprising a pair of legs and a bight, each of said legs being slotted at the ends thereof to fit around said pin means on the outer sides of said leg members,

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said bight being secured to said current conducting member, said legs being deformed to provide a plurality of protrusions for engaging juxtapositioned surfaces of said leg members, and spring means comprising cup shaped maltese crosses one mounted on each end of said pin means for producing a substantially constant pressure between said current conducting member and said blade member.

7. In a pivoted electrical connection, the combination comprising: a current conducting member providing an aperture extending therethrough to form a bearing surface, a U-shaped current carrying blade member comprising a pair of leg members, said leg members being provided with aligned apertures, pin means extending through said aligned apertures in said current conducting member and said aperture in said blade member for pivotally mounting said blade member on said current conducting member, said current conducting member being provided with a plurality of contacts secured to the outer surfaces thereof around said aperture for engaging the juxtapositioned surfaces of said leg members, U-shaped means for electrically connecting said current conducting member to said blade member, said U-shaped means comprising a pair of legs and a bight, each of said legs being slotted at the ends thereof to fit around said pin means on the outer sides of said leg members, said bight being secured to said current conducting member, said legs being deformed to provide a plurality of protrusions for engaging juxtapositioned surfaces of said leg members, and spring means comprising a cup shaped maltese cross mounted on the end of said pin means for producing a substantially constant pressure between said current conducting member and said blade member, said cross being slotted to form diametrically opposed tabs which are arranged within a slot of one of said legs to lock said cross and said connecting means together.

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8. In a pivoted electrical connection, the combination comprising: a current conducting member providing an aperture extending therethrough to form a bearing surface, a U-shaped current carrying blade member comprising a pair of leg members, said leg members being provided with aligned apertures, pin means extending through said aligned apertures in said current conducting member and said aperture in said blade member for pivotally mounting said blade member on said current conducting member, said current conducting member being provided with a plurality of contacts secured to the outer surfaces thereof around said aperture for engaging the juxtapositioned surfaces of said leg members, U-shaped means for electrically connecting said current conducting member to said blade member, said U-shaped means comprising a pair of legs and a bight, each of said legs being slotted at the ends thereof to fit around said pin means on the outer sides of said leg members, said bight being secured to said current conducting member, said legs being deformed to provide a plurality of protrusions for engaging juxtapositioned surfaces of said leg members, and spring means comprising cup shaped maltese crosses mounted one on each end of said pin means for producing a substantially constant pressure between said current conducting member and said blade member, said crosses being slotted to form diametrically opposed tabs which are arranged within slots of said legs to lock said crosses and said connecting means together.

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