

[54] **SELF-ALIGNING JAW CONTACT**

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[51] Int. Cl. **H01n 1/48, H01n 1/50**

[58] Field of Search. **200/166 E, 166 D, 170 R, 170 A, 200/162**

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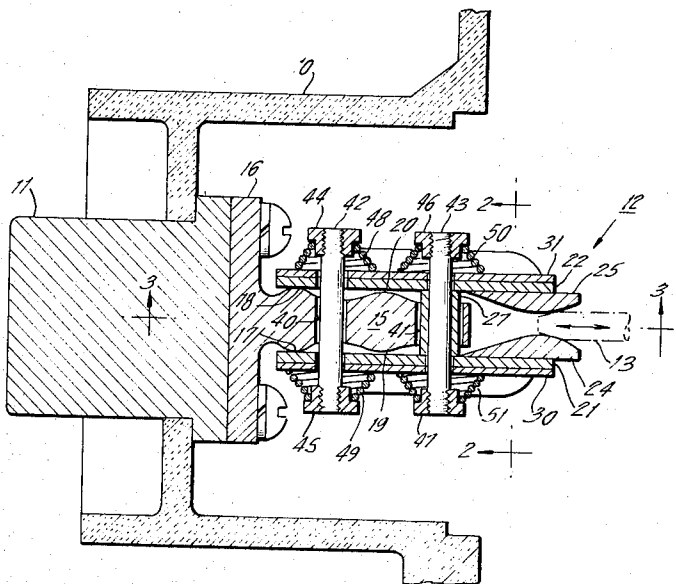
Primary Examiner—H. O. Jones

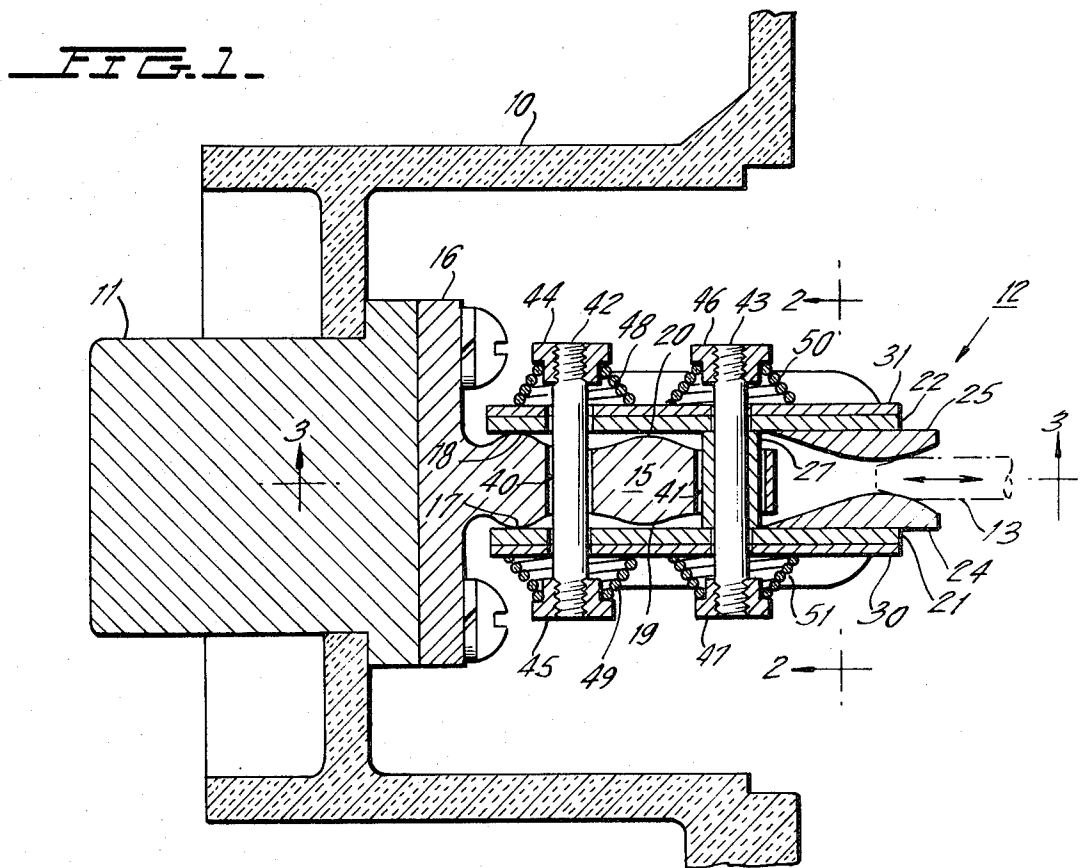
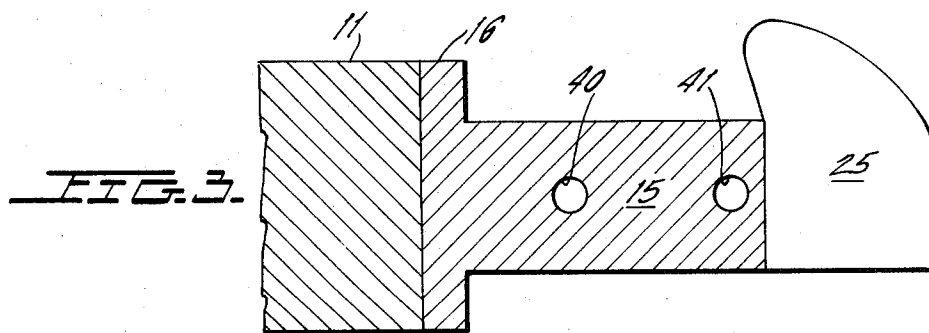
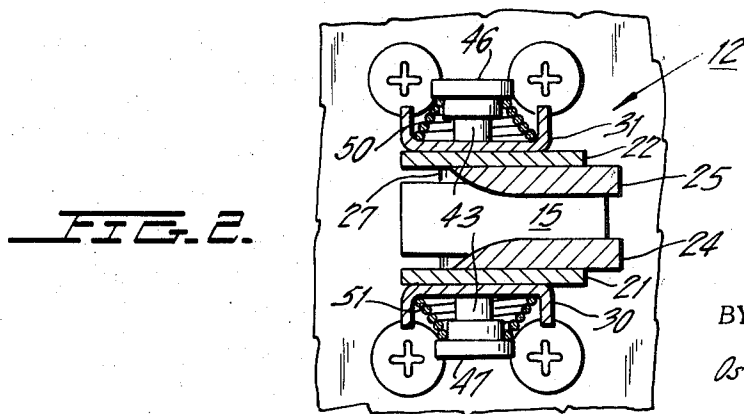
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[57] **ABSTRACT**

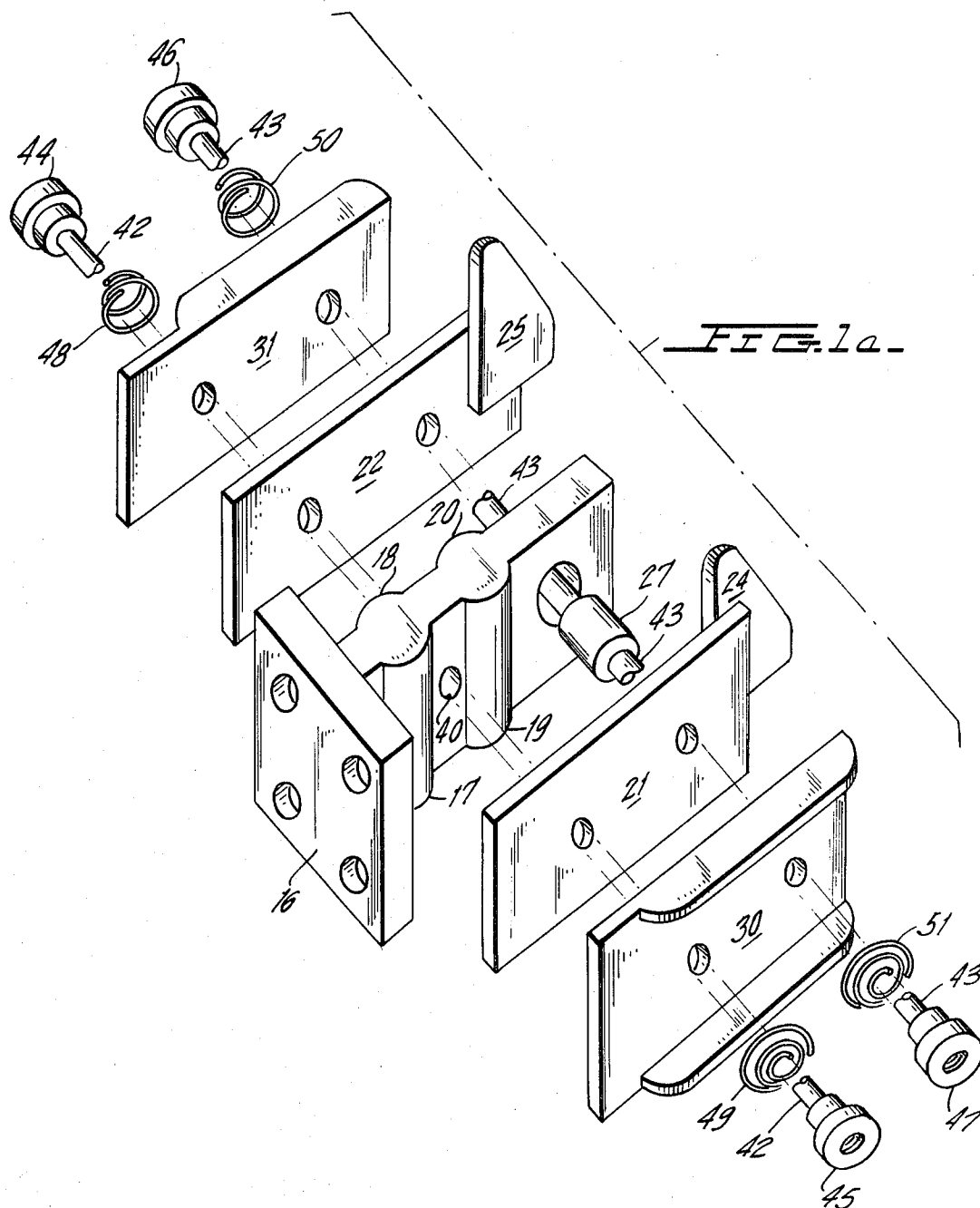
A jaw contact for receiving a relatively movable contact blade. The jaw contact consists of two elongated contact members supported on the opposite sides of a stationary support and are connected to the stationary support through two spaced pivots and contact points which are spaced from one another in the direction of elongation of the contact members. Biasing forces are applied to the side members at two axially spaced locations; one between the spaced pivot points; and the second being on the opposite side of the pivot point adjacent the jaw contact opening.

6 Claims, 6 Drawing Figures





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FIG. 4.

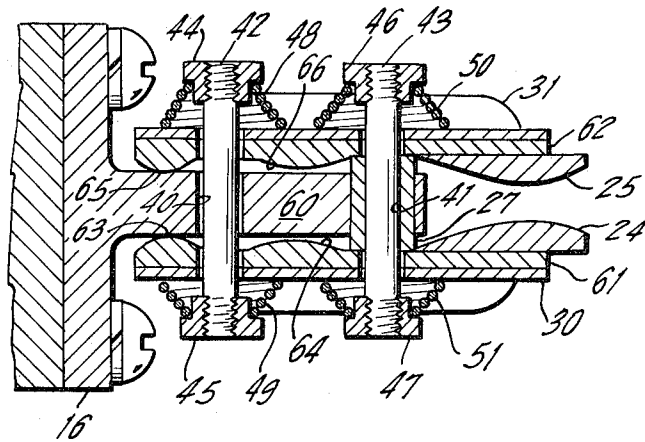


FIG. 5.

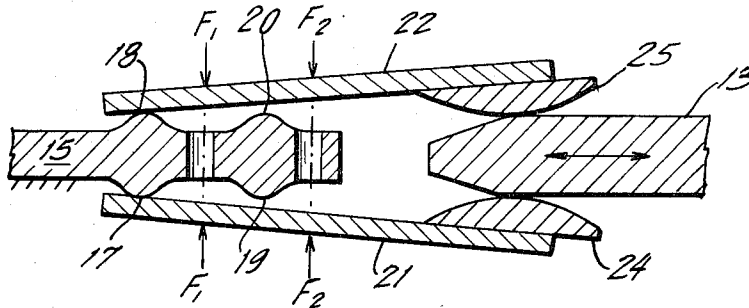
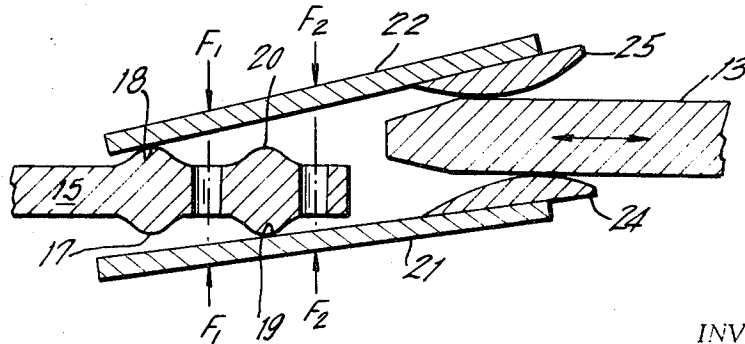


FIG. 6.



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SELF-ALIGNING JAW CONTACT

BRIEF SUMMARY OF THE INVENTION

This invention relates to jaw contact structures which receive a blade-type contact, and more specifically relates to a jaw contact structure which is self-aligning to provide low resistance connection between a blade-type contact and two jaw sides even though the blade contact may be misaligned with the jaw opening.

Jaw-type contacts are well known which provide two spaced contact surfaces which are biased toward one another and are adapted to receive a movable blade therebetween. Normally, the movable contact blade enters into the center of the spacing between the spaced jaws so that the spaced jaws will apply equal pressures to the opposite sides of the blade so that efficient current transfer is made from the blade to the stationary contact jaw. In the event of a misalignment of the blade, however, it may come in at a sufficient displacement from the center of the jaw that contact is made to only one side of the jaw while only a poor contact or no contact at all is made to the opposite jaw side.

In accordance with the present invention, the jaw structure is so arranged that the jaw blades are each provided with two spaced pivots which can be points of current transfer from the side blades to the main blade support. Biasing springs are then provided for pressing the jaw blades toward one another and are disposed respectively between the spaced pivots and between the first pivot and the movable blade. By then properly arranging the relative moment arms of the two spring forces bearing on the diverse pivotal regions, relatively high current pressure will be provided from the movable contact blade to both jaw blades even though the movable contact is substantially displaced from the normal center of the jaw contact opening.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top cross-sectional view of a self-aligning jaw contact constructed in accordance with the present invention.

FIG. 1a is an exploded perspective view of the contact arrangement of FIG. 1.

FIG. 2 is a cross-sectional view of FIG. 1 taken across the section line 2—2 in FIG. 1.

FIG. 3 is a cross-sectional view of FIG. 1 taken across the section line 3—3 in FIG. 1.

FIG. 4 shows a cross-sectional view similar to that of FIG. 1 of one possible modification of the present invention.

FIG. 5 is a schematic drawing of the structure of FIG. 1 illustrating the operation of the jaw contacts when the main contact blade enters the jaw contacts and is aligned with the jaw contact opening.

FIG. 6 is similar to FIG. 5 and illustrates the self-aligning action of the novel invention for a movable contact blade which is substantially misaligned with the center of the jaw contact opening or wherein the motion of the movable blade is not in line with the central axis of the stationary jaw contact.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIGS. 1 to 3, there is illustrated a jaw contact consisting of a stationary insulation support 10 having a main conductive terminal 11 approximately supported thereon. The terminal 11 can, for example, be a draw-out disconnect contact of a circuit breaker of any conventional type. The jaw contact structure 12 of the invention may then be used, for example, as a part of the circuit breaker arcing contact structure which could receive a cooperating arcing contact blade connected to the circuit breaker movable contact structure. Thus, in FIG. 1, a movable blade 13 is schematically illustrated to be representative of the contact blade which cooperates with the contact jaw 12 of the invention. It will be apparent to those skilled in the art that the self-aligning jaw contact of the invention can be used in many different environments other than for application to a stationary circuit

breaker contact and the jaw contact of the invention can be movable or stationary and applied to any situation in which conventional jaw contacts may be used.

In a first embodiment of the invention, elongated stationary contact member 15 has, integral therewith, a base 16 which is suitably mounted on the conductive member 11. The elongated member 15 is shown in FIG. 1 as having two increased thickness regions which define pivotal contact surfaces 17—18 and 19—20, respectively. A first contact blade 21 normally engages pivotal surface 17 while contact blade 22 normally engages the surface defined by pivotal surface 18. A spacer bushing 27 has a length slightly greater than the distance between surfaces 19 and 20 and normally holds blades 21 and 22 out of contact with surfaces 19 and 20, respectively. The ends of blades 21 and 22 are terminated by suitable arcing inserts 24 and 25, respectively, which are made of materials specially adapted for arcing duty.

Two flat trays 30 and 31 having outwardly bent side sections are then mounted adjacent blades 21 and 22, respectively, and serve to receive and position the bases of conical springs used to provide pressure for holding the contact blades 21 and 22 against the pivotal surface regions 17 to 20. More specifically, elongated blade support member 15 is provided with openings 40 and 41 (FIGS. 1 and 3) which pass pins 42 and 43, respectively (FIGS. 1 and 2). Bushing 27 is carried on pin 43 and prevents the inward collapse of blades 21 and 22 toward one another and into contact with surfaces 19 and 20, respectively, when the movable contact blade is in a disconnected position.

The opposite ends of pins 42 and 43 receive spring retaining caps 44—45 and 46—47, respectively, which in turn press conical spring members 48 to 51 against the spring locating trays 30 and 31 in order to provide the desired contact pressure which normally presses the contact blades 21 and 22 toward one another and into engagement with pivots 17 and 18, respectively. Note that this connection between the blades 21 and 22 and the pivotal regions 17 and 18 forms the normal current carrying connection from the jaw blades 21 and 22 into the main elongated conductive body 15.

While the arrangement of FIGS. 1, 2 and 3 illustrates the pivot regions 17 to 20 being formed as an integral part of member 15, these regions could be separate conductive elements or could be formed as a part of the blades 21 and 22. Thus, as shown in FIG. 4, which is similar to the arrangement of FIG. 1, the central contact member 15 has been replaced by a central contact member 60 having flat parallel sides. The opposing contact blades 21 and 22 of FIG. 1 have been replaced in FIG. 4 by the contact blades 61 and 62 which have projecting sections or pivot regions 63—64 and 65—66, respectively. In all other respects the structure of FIG. 4 is identical to the structure of FIG. 1 and will operate in an identical manner.

The operation of the novel self-aligning jaw contact for the embodiment of FIGS. 1 to 3 or the embodiment of FIG. 4 is best understood in connection with the schematic illustrations of FIGS. 5 and 6 which are directed to the embodiment of FIGS. 1 to 3. In FIG. 5, the movable contact blade 13 is shown in an engaged position (with the blade dimensions being exaggerated for purposes of clarity), with the blade 13 disposed in the center of the open gap between blades 21 and 22 and with the contact 13 being moved in a direction parallel to a plane taken through the center of member 15, and generally parallel to the blades 21 and 22. Thus, in FIG. 5, when the contact blade 13 enters the self-aligning jaw contact, it spreads blades 21 and 22, as shown, so that high pressure contact due to the spring forces F_1 and F_2 of the springs (not shown in FIG. 5) exists between arcing contact segments 24 and 25 and both sides of blade 13. The current from blade 13 is, in turn, transmitted to the main member 15 through the pivotal regions 17 and 18 which are also under high pressure due to the forces F_1 and F_2 .

Assume now, as shown in FIG. 6, that the movable contact blade 13 is not properly aligned with the center of the contact gap and/or the blade 13 does not move in the plane defined through the center of contact 15 and generally parallel to con-

tact blades 21 and 22. The end result of either misalignment is shown in FIG. 6.

FIG. 6 also illustrates the manner in which the self-aligning jaw structure accommodates the misalignment between the jaw contact and the blade contact 13, whereby blade 21 5 rotates counterclockwise so that its contact surface leaves pivot 17 and engages and rotates on pivot 19 as the blade 21 is pulled counterclockwise by the spring force of springs 50 and 51 (FIG. 1).

In FIG. 6 there will be a good current path from the side of the blade 13 engaging arcing contact 25 through the blade 22 and into member 15 through pivot region 18. In accordance with the invention, there is also an efficient current conducting path from blade 13 through the blade 21 which, with prior art constructions, would either be an open path or a very low contact pressure path. Thus, arcing contact 24 is pressed against the blade 13 by the resultant moment of the forces F_1 and F_2 acting about pivot 19. The spring members and their spacings relative to pivot 19 are so selected that the moment of F_2 is greater than the moment of F_1 so that appropriately high contact forces between contact 24 and blade 13 are assured. Clearly there is a high pressure contact between blade 21 and pivot 19 to insure a good contact at this point to the main center conductor 15.

In accordance with an important feature of the invention and where identical springs are used for the springs 48 to 51 of FIG. 1, the distance along the length of contact member 15 from pivotal regions 19 and 20 to the center of springs 50 and 51 is greater than the distance from regions 17 and 18 to the center of springs 48 and 49. Thus, there will always be a positive moment of force pressing the end of either contact blade 24 or contact blade 25 against the cooperating blade 13 when the blade 13 is misaligned as in FIG. 6. Note that if the misalignment of blade 13 is below the center line of support 15 rather than above the support as in FIG. 6, the blades 21 and 22 would be in a reversed position, with blade 21 engaging pivot region 17 and blade 22 engaging pivot 20.

Although this invention has been described with respect to its preferred embodiments, it should be understood that many variations and modifications will now be obvious to those skilled in the art, and it is preferred, therefore, that the scope of the invention be limited not by the specific disclosure herein, but only by the appended claims.

The embodiments of the invention in which an exclusive privilege or property is claimed are defined as follows:

1. A self-aligning jaw contact structure for cooperating with an elongated blade contact relatively movable into and out of contact engagement with said jaw contact structure; said jaw

contact structure comprising, in combination:

an elongated support blade;

a pair of jaw blade contacts disposed adjacent the opposing surfaces of said elongated support blade and extending beyond one end of said elongated support blade to define a jaw contact gap adapted to receive said elongated blade contact;

biasing means connected to said pair of jaw blade contacts for biasing said pair of jaw blade contacts toward said elongated support blade and into high pressure contact engagement therewith;

and first and second pairs of contact pivot supports interposed between said pair of jaw blade contacts and said elongated support blade; said first and second pairs of contact pivot supports being longitudinally spaced from one another in the direction of elongation of said elongated support blade; said second pair of contact pivot supports being disposed between said jaw contact gap and said first pair of contact pivot supports;

said biasing means including first and second spring bias means applied to first and second longitudinal locations, respectively, on said pair of jaw blade contacts; said first longitudinal location being disposed between said first and second pairs of contact pivot supports; said second longitudinal location being disposed between said jaw contact gap and said second pair of contact pivot supports.

2. The self-aligning jaw contact structure of claim 1 wherein the moment of force of said second spring bias means about said second pair of contact pivot supports is greater than the moment of force of said first spring bias means about said second pair of contact pivot supports.

3. The self-aligning jaw contact structure of claim 1 wherein said first and second pairs of contact pivot supports are defined by integral projections of said elongated support blade.

4. The self-aligning jaw contact structure of claim 1 wherein said first and second pairs of contact pivot supports are defined by integral projections of said pair of jaw blade contacts.

5. The self-aligning jaw contact structure of claim 2 wherein said first and second pairs of contact pivot supports are defined by integral projections of said elongated support blade.

6. The self-aligning jaw contact structure of claim 2 wherein said first and second pairs of contact pivot supports are defined by integral projections of said pair of jaw blade contacts.

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