April 23, 1963 A. BACHMAN 3,087,039

ELECTRICAL CONTACT BRIDGING ASSEMBLY

Filed July 14, 1961 2 Sheets-Sheet 1

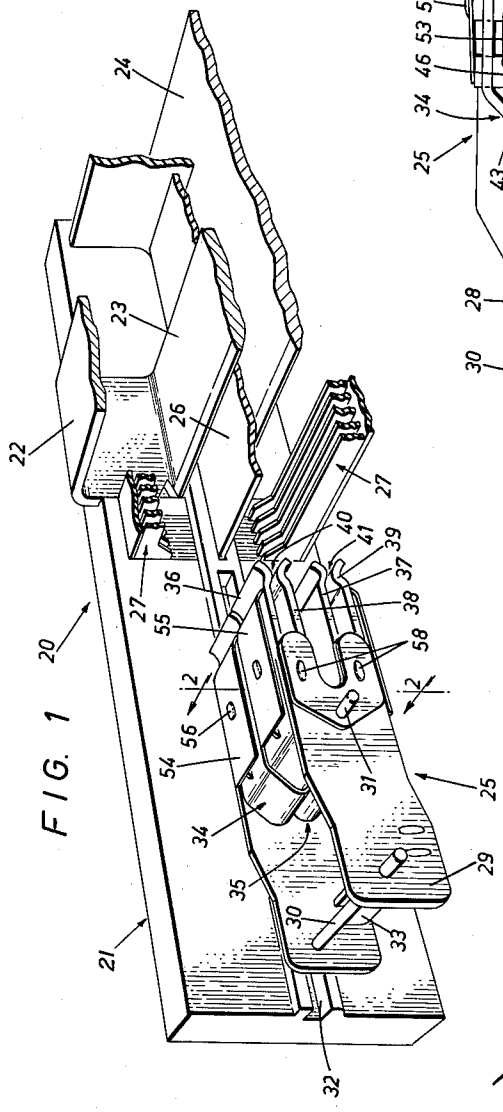


FIG. 1

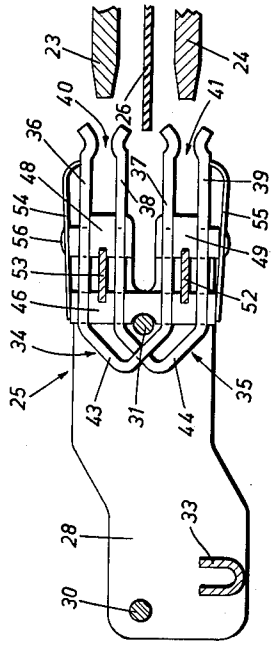


FIG. 2

Anatole Bachman

Inventor

by: Peter A. McBurney

Attorney

April 23, 1963 A. BACHMAN 3,087,039

ELECTRICAL CONTACT BRIDGING ASSEMBLY

Filed July 14, 1961 2 Sheets-Sheet 2

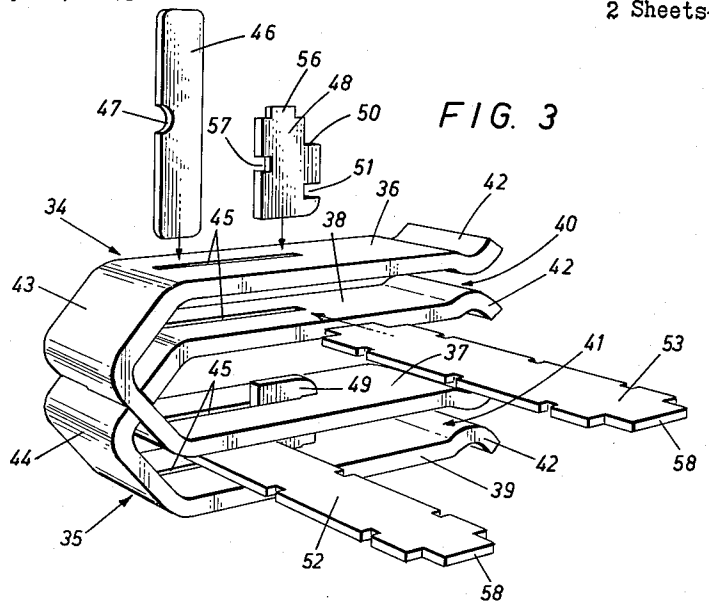


FIG. 3

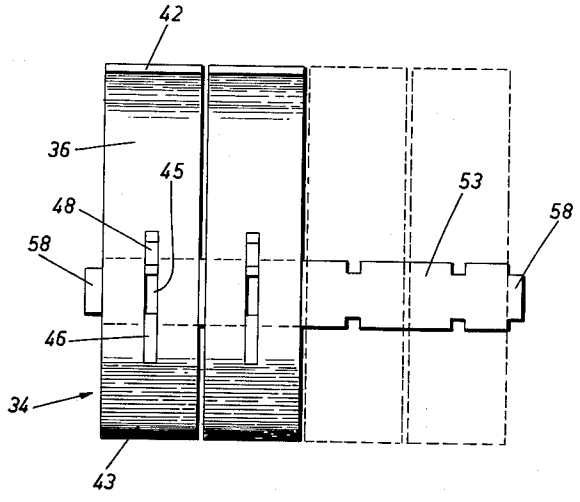


FIG. 4

ANATOLE BACHMAN

Inventor

by: Victor W. McBurney

Attorney

United States Patent Office 3,087,039 Patented Apr. 23, 1963

3,087,039

ELECTRICAL CONTACT BRIDGING ASSEMBLY

Anatole Bachman, Willowdale, Ontario, Canada, assignor to Amalgamated Electric Corporation, Limited, Toronto, Ontario, Canada

Filed July 14, 1961, Ser. No. 124,206
11 Claims. (Cl. 200—166)

This invention relates to an electrical contact bridging assembly and to a switch employing the same. More particularly this invention relates to a readily and simply manufactured and assembled contact bridging assembly which is self-aligning, requires no rivets, screws or other fasteners and which overcomes certain disdavantages of prior art type bridging assemblies.

Prior art type bridging assemblies commonly consist of a pair of spaced apart electrically conductive arms rigidly secured together or to another member and adapted to receive a contact in the form of a plate, in the contact receiving space defined between the arms, the plate being in large area surface contact with the pair of arms. Either the pair of arms or the plate is movable. Each of the pair of arms is provided with a spring which bears against an arm.

In some prior art type bridging assemblies the springs are omitted. In such cases the contact gripping ability of the assembly depends upon the resilience of the pair of arms, and care must be taken to assure that when the contact plate is inserted, the arms are not stressed to a point where the yield point of the arms is exceeded and the arms assume a permanent set or deformation. This may not be a difficult design problem where the operating temperature of the assembly is known. However, the yield point of an electrically conducting material such as copper decreases materially at elevated temperatures. Indeed, a slow annealing process commences at about 200° F. and results in a decrease in the yield point of the copper. If elevated temperatures are to be encountered, springs must be provided in order to prevent the arms of the assembly from assuming a permanent set. It will be appreciated that these springs must be very strong in order to achieve the desired result. Thus it can be said that springs are required in order to impart the desired degree of resilience to the arms in order to prevent the arms from assuming a permanent set.

Accordingly, it is one object of my invention to provide an electrical contact bridging assembly where springs are provided only to pivotally urge the contact arms toward each other to cause a high pressure between the contact arms and contact plate, and are not required to cause flexure of the arms to achieve this result, nor to impart resilience to the arms to prevent the arms from assuming a permanent set.

It is another object of my invention to provide an electrical contact bridging assembly which requires no fastening devices such as screws or rivets to fasten the contact arms together.

It is another object of my invention to provide a bridging assembly which is self-aligning, i.e. which will tolerate a limited amount of line-load contact misalignment without undesirable effects.

It is yet another object of my invention to provide a contact bridging assembly which not only will tolerate a limited amount of up and down line-load contact misalignment without undesirable effects, but also will tolerate a limited amount of lateral line-load contact misalignment, i.e. an assembly constructed to permit limited lateral movement of its contact making arms.

Yet another object of my invention is to provide a contact bridging assembly which is constructed to achieve high contact efficiency even under conditions of limited line-load contact misalignment.

It is yet a further object of my invention to provide a contact bridging assembly which can be manufactured from strip or extruded, electrically conductive material such as copper without wastage.

Another object of my invention is to provide an electrical contact bridging assembly which can be simply manufactured and assembled.

A further object of my invention is to provide a contact bridging assembly which may be built to carry any desired amperage simply by the addition to an assembly of a lower amperage rating than desired of identical parts to those already employed with the original assembly.

In brief, an electrical contact bridging assembly adapted to bridge and electrically connect a pair of spaced apart contacts and embodying my invention consists of first and second electrically conductive members pivotally connected together in a manner to be hereinafter described. The first and second members each have a pair of upstanding arms joined together at adjacent ends thereof. The members are pivotally connected together adjacent the aforementioned adjacent ends thereof. One arm of the first member lies between the pair of arms of the second member, and one arm of the second member lies between the pair of arms of the first member. A pair of contact receiving spaces are provided thereby. Means are provided for urging the outer arms of each pair of members towards one another.

Other objects and advantages of my invention will be apparent from the following description taken in conjunction with the drawings, in which,

FIGURE 1 shows, partially broken away, a switch structure employing an electrical contact bridging assembly embodying my invention,

FIGURE 2 is a view taken along line 2—2 in FIGURE 1,

FIGURE 3 shows part of and is a partially exploded view of my novel bridging assembly, and

FIGURE 4 is a top elevation of a bridging assembly embodying my invention.

Referring now to FIGURES 1–4 for a more detailed description of apparatus embodying my invention, I have shown a part of a switch structure **20**, the switch structure comprising a housing, only one insulating side wall **21** of which is shown, a load contact **22** connected to a blade member **23**, a line contact blade member **24** and an electrical contact bridging assembly **25**. Positioned between blade members **23** and **24** is an insulating member **26**. Permeable elements **27** which are well known in the art are positioned adjacent the tips of blade members **23** and **24** and aid in spark inhibition.

Electrical contact bridging assembly **25** comprises frame members **28** and **29** mounted side-by-side in spaced-apart, secured relationship, the frame members being made of any suitable insulating material. Passing through frame members **28** and **29** are rollers **30** and **31** having ends which run in tracks **32** on the inner side of side walls **21**. Secured to each of frame members **28** and **29** is a U-shaped channel member **33**. This latter member is adapted to be engaged by the lug of a contact operating mechanism so that bridging assembly **25** may be moved forward or backward to engage or disengage with blade members **23** and **24**.

As best shown in FIGURES 2 and 3, an electrical contact bridging assembly **25** embodying my invention includes at least a pair of generally U-shaped, electrically conductive members **34** and **35**. Each member has upstanding arms **36**, **37** and **38**, **39** respectively, arm **38** lying between arms **36** and **37** and arm **37** lying between arms **38** and **39**. Arms **36**, **37**, **38** and **39** may be parallel to one another and define contact receiving spaces **40** and **41** therebetween. Arms **36–39** inclusive may be designed, or members **34** and **35** may be juxtapositioned

such that arms 36 and 38 and arms 37 and 39 incline slightly away from one another from the free ends 42 thereof so that contact receiving spaces 40 and 41 taper inwardly towards free ends 42. Arms 36 and 37 and arms 38 and 39 are joined together at adjacent ends by the bights 43 and 44 respectively of U-shaped members 34 and 35. The members 34 and 35 are pivotally connected together at bights 43 and 44, each bight having a slot or notch (not shown) therein which receives the corresponding notch in the other bight.

Each of the upstanding arms has a slot 45 therein. A member 46 passes through these slots and has a notch 47 therein which engages roller 31. A pair of spacing members or spacers 48 and 49 is provided. Spacing member 48 slips into slots 45 in arms 36 and 38 and spaces these arms apart, arm 36 resting on ledge 50, and a portion of arm 38 being inserted into notch 51. Arms 37 and 39 are similarly spaced by spacer 49.

While, in practising my invention, only two members 34 and 35 may be employed, usually a number of such members mounted side-by-side in aligned relationship with one another, as shown in FIGURE 4, will be employed. In order to provide such a structure, connecting members 52 and 53 are utilized. These connecting members have notches on opposite sides thereof which engage member 46, and spacers 48 and 49 and provide the means whereby a plurality of assemblies of the type shown in FIGURE 3 may be connected together in aligned relationship as shown in FIGURE 4.

As best shown in FIGURES 1 and 2, means are provided for urging arms 36 and 38 and arms 37 and 39 together. These means are springs 54 and 55. Spring 54 has an aperture (not shown) therein through which extends the tab end 56 (FIGURE 3) of spacer 48. This tab end is bent over spring 54 and secures the same. One free end of spring 54 bears against an end of member 46. The other free end of spring 54 is bent downwardly and bears against arm 36. Spring 55 is similarly secured to spacer 49 and bears down on the other end of member 46 and arm 39.

It is important to note that the function of springs 54 and 55 is quite different from the function that such springs have served in prior art bridging assemblies. Springs 54 and 55 need not impart resilience to arms 36 and 39 as has been their function in the prior art. By virtue of the pivotal engagement of members 34 and 35, spring 54 urges U-shaped member 34 downwardly, while spring 55 urges U-shaped member 35 upwardly. Thus these springs tend to make contact receiving spaces 40 and 41 smaller, so that arms 36 and 38 and arms 37 and 39 will provide a strong grip on blade members 23 and 24 respectively.

In order to assemble apparatus such as is shown in FIGURE 3, the U-shaped members 34 and 35 are pivotally connected together at bights 43 and 44 by inserting the notches at the bights into one another. Spacer members 48 and 49 are inserted through slots 45 and are positioned as shown in FIGURE 2. Connecting members 52 and 53 are inserted, the notches on the front sides thereof engaging notches 57 in spacers 48 and 49. Member 46 then is inserted and engages notches on the back sides of members 52 and 53. Following this springs 54 and 55 are positioned and connected as aforementioned and as shown in FIGURES 1 and 2. A number of sets of members 34 and 35 may be so assembled on connecting members 52 and 53 as is best shown in FIGURE 4. Spacers 48 and 49 and member 46 facilitate lateral alignment of arms 36–39 inclusive, i.e. each arm is aligned with the arm above and below it as shown in FIGURE 4. Connecting members 52 and 53 connect each set of members 34 and 35 in aligned relationship as shown in FIGURE 1.

The assembly just described is connected to frame members 28 and 29 by means of tab ends 58 on connecting members 52 and 53 which are inserted through apertures in frame members 28 and 29 and bent over as shown in FIGURE 1.

It will be appreciated from the foregoing description that a bridging assembly embodying my invention requires no strong springs to impart resilience to its contact arms, nor does my assembly require rivets, screws and the like.

It also will be appreciated that since each set of members 34 and 35 of a group such as is shown in FIGURE 4 is individually mounted on connecting members 52 and 53, each set is individually movable both laterally and up and down to a slight extent. Hence apparatus embodying my invention will not only tolerate a limited amount of line-load contact misalignment, such as, for example, blade members 23 and 24 not lying in parallel planes, but will tolerate a limited amount of lateral line-load contact misalignment.

It will be noted that each set of members 34 and 35 may be rated to carry a current of say 200 amperes. Four sets of these members then may be employed to carry a current of 800 amperes. All parts of an 800 ampere assembly are the same as a 200 ampere assembly except that longer connecting members 52 and 53 will be employed with the former than with the latter.

It should be noted that an electrical contact bridging assembly embodying my invention is particularly suited for use with an actuating device of the type shown in my copending application Serial No. 131,778, filed August 16, 1961. This actuating device has a lug which engages channel member 33 and permits assembly 25 to be moved forward to a contact making position, or drawn back to a contact breaking position. In the contact making position arms 36 and 38 grip blade member 23, and arms 37 and 39 grip blade member 24 thereby establishing electrical contact between line contact 22 and load blade member 24 through blade member 23 and members 34 and 35.

While I have described certain preferred embodiments of my invention, those skilled in the art will realize that numerous modifications and changes may be made thereto without departing from the spirit and scope of my invention as defined in the appended claims.

What I claim as my invention is:

1. An electrical contact bridging assembly adapted to bridge and electrically connect a pair of spaced-apart contacts, said assembly comprising a first electrically conductive member having a pair of upstanding arms joined together at two adjacent ends thereof, a second electrically conductive member having a pair of upstanding arms joined together at two adjacent ends thereof, said first and second electrically conductive members being pivotally connected together adjacent said adjacent ends of said first and second electrically conductive members with one upstanding arm of said second electrically conductive member lying between said pair of upstanding arms of said first electrically conductive member and one upstanding arm of said first electrically conductive member lying between said pair of upstanding arms of said second electrically conductive member, whereby a first contact receiving space is provided between said one upstanding arm of said second electrically conductive member and the other upstanding arm of said first electrically conductive member, and a second contact receiving space is provided between said one upstanding arm of said first electrically conductive member and the other upstanding arm of said second electrically conductive member, and means urging said other upstanding arms of said electrically conductive members towards one another.

2. An electrical contact bridging assembly according to claim 1 including spacing means, said spacing means spacing apart said other upstanding arm of said first electrically conductive member and said one upstanding arm of said second electrically conductive member and also spacing apart said one upstanding arm of said first

electrically conductive member and said other upstanding arm of said second electrically conductive member.

3. A plurality of electrical contact bridging assemblies according to claim 2, each of said assemblies being aligned with one another, and including connecting means mechanically connecting each of said assemblies in aligned relationship.

4. An electrical contact bridging assembly adapted to bridge and electrically connect a pair of spaced apart contacts, said assembly comprising a first electrically conductive member having a pair of at least substantially parallel, upstanding arms joined together at two adjacent ends thereof, a second electrically conductive member having a pair of at least substantially parallel, upstanding arms joined together at two adjacent ends thereof, said first and second electrically conductive members being pivotally connected together adjacent said adjacent ends of said first and second electrically conductive members with one upstanding arm of said second electrically conductive member lying between said pair of upstanding arms of said first electrically conductive member and one upstanding arm of said first electrically conductive member lying between said pair of upstanding arms of said second electrically conductive member, all of said upstanding arms being at least substantially in lateral alignment with one another, whereby a first contact receiving space is provided between said one upstanding arm of said second electrically conductive member and the other upstanding arm of said first electrically conductive member, and a second contact receiving space is provided between said one upstanding arm of said first electrically conductive member and the other upstanding arm of said second electrically conductive member, and means urging said other upstanding arms of said electrically conductive members towards one another.

5. An electrical contact bridging assembly according to claim 4 including spacing means, said spacing means spacing apart said other upstanding arm of said first electrically conductive member and said one upstanding arm of said second electrically conductive member and also spacing apart said one upstanding arm of said first electrically conductive member and said other upstanding arm of said second electrically conductive member, all of said upstanding arms lying in at least substantially parallel planes.

6. An electrical contact bridging assembly according to claim 4 including spacing means, said spacing means spacing apart said other upstanding arm of said first electrically conductive member and said one upstanding arm of said second electrically conductive member and also spacing apart said one upstanding arm of said first electrically conductive member and said other upstanding arm of said second electrically conductive member, said other upstanding arm of said first electrically conductive member and said one upstanding arm of said second electrically conductive member inclining slightly away from one another from the free ends thereof and said one upstanding arm of said first electrically conductive member and said other upstanding arm of said second electrically conductive member inclining slightly away from one another from the free ends thereof.

7. An electrical contact bridging assembly adapted to bridge and electrically connect a pair of spaced apart contacts, said assembly comprising a first, electrically conductive, generally U-shaped member having a bight and a pair of at least substantially parallel upstanding arms, a second, electrically conductive, generally U-shaped member having a bight and a pair of at least substantially parallel upstanding arms, said first and second electrically conductive members being pivotally connected together at said bights thereof with one upstanding arm of said second electrically conductive member lying between said pair of upstanding arms of said first electrically conductive member and one upstanding arm of said first electrically conductive member lying between said pair of upstanding arms of said second electrically conductive member, all of said upstanding arms being at least substantially in lateral alignment with one another, whereby a first contact receiving space is provided between said one upstanding arm of said second electrically conductive member and the other upstanding arm of said first electrically conductive member, and a second contact receiving space is provided between said one upstanding arm of said first electrically conductive member and said other upstanding arm of said second electrically conductive member, said second spacing means spacing apart said other upstanding arm of said first electrically conductive member and said one upstanding arm of said second electrically conductive member and having one end extending beyond said other upstanding arm of said first electrically conductive member, said second spacing means spacing apart said one upstanding arm of said first electrically conductive member and said other upstanding arm of said second electrically conductive member and having one end extending beyond said other upstanding arm of said second electrically conductive member, a member passing through said upstanding arms and having a pair of ends one of said ends of said member extending beyond said other upstanding arm of said first electrically conductive member and the other of said ends of said member extending beyond said other upstanding arm of said second electrically conductive member, said first and second spacing means being positioned in front of said member, said member being positioned adjacent said bights, a first and second flat spring means urging said other upstanding arms of said electrically conductive members towards one another, said first spring means being secured to said one end of said first spacing means and having portions bearing on said one of said ends of said member and said other upstanding arm of said first electrically conductive member, said second spring means being secured to said one end of said second spacing means and having portions bearing on

said other of said ends of said member and said other upstanding arm of said second electrically conductive member.

9. A plurality of electrical contact bridging assemblies according to claim 8, each of said assemblies being aligned with one another, and including first and second connecting means mechanically connecting each of said assemblies in aligned relationship, said first connecting means being positioned and secured between said member and said first spacing means, said second connecting means being positioned between said member and said second spacing means.

10. An electrical contact bridging assembly according to claim 8 including a frame of electrical insulating material, said assembly being mounted in said frame.

11. An electrical contact bridging assembly according to claim 10 wherein said frame comprises a pair of side members each lying adjacent an opposite side of said assembly, and including roller means adapted to permit said frame and assembly to move back and forth in a track.

References Cited in the file of this patent

UNITED STATES PATENTS

1,586,682	McCoy	June 1, 1926
2,433,115	Green	Dec. 23, 1947