Jan. 11, 1949. W. G. HARLOW 2,458,511

COMBINED SWITCH STUD AND FUSE CLIP

Filed June 6, 1945

Fig. 1.

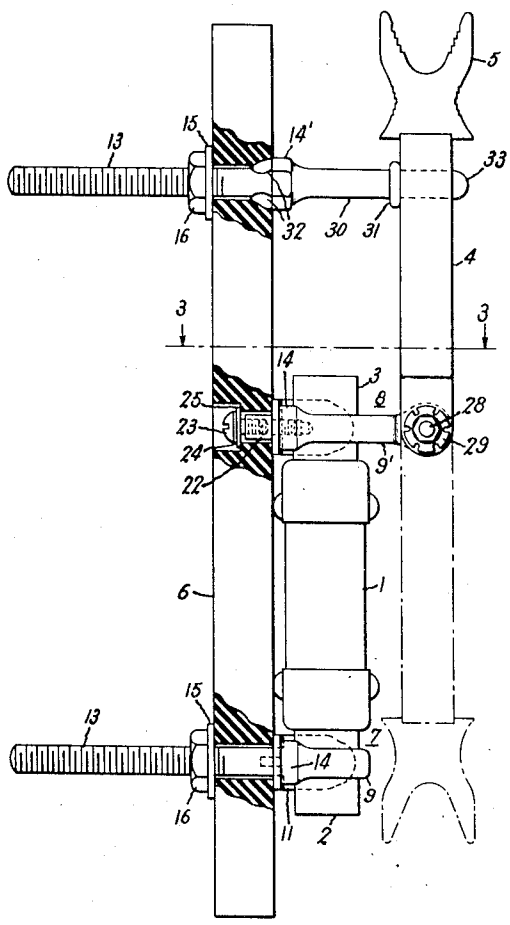


Fig. 2.

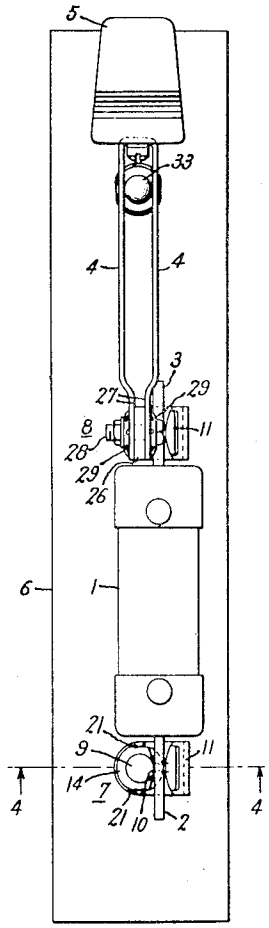


Fig. 3.

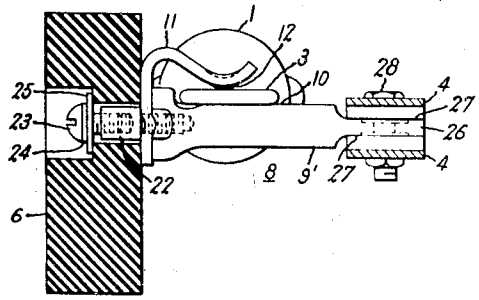
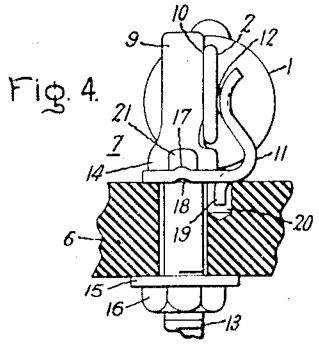


Fig. 4.



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COMBINED SWITCH STUD AND FUSE CLIP

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2 Claims. (Cl. 200—114)

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My invention relates to improvements in electric switchgear and more particularly to improvements in mountings for fuses having blade type terminals and for switches of the blade type especially when used with such fuses.

In order to be able to remove and replace fuses and also to operate knife blade switches, the usual knife switch studs and jaw type of fuse clips require an unwarranted amount of panel surface when the fuses and switches are mounted in alignment as is customary. Inasmuch as space for switchboards is limited on ships and often scarce in the modernization of old stations and may well be costly when stations are built in congested areas, it is important that the space factor be reduced as much as possible without interfering with the safety of operators and equipment. Moreover, in the usual jaw type of fuse clip, it is costly to obtain the desired conductivity between the clip and the fuse because of the necessity for close registry between surfaces which should be parallel and plane. Furthermore, the necessity for nicety of alignment of the stud and clip adds to the manufacturing cost. Also, such a space consuming stud and clip arrangement is wasteful of good conductive material.

An object of my invention is to provide, for fuses having blade type terminals, an improved clip which is relatively easy and inexpensive to manufacture and yet insures the necessary contact pressure for good conductivity without loss of such pressure in the current conducting use of the fuse. Another object of my invention is to provide an improved combination fuse clip and switch stud which requires the minimum of panel space and conducting material and yet provides suitable alignment of the fuse and the switch blade. A further object of my invention is to provide a combination fuse clip and switch stud which is simple and economical to manufacture. These and other objects of my invention will hereinafter appear in more detail.

In accordance with my invention, I provide, for a conductor having a flat surface, a current conducting clip comprising a stud of relatively high conductivity which is provided with a contact surface shaped to engage the flat surface of the conductor in substantial line-contact and means for holding the conductor with its flat surface against the contact surface of the stud comprising a resilient member of relatively low conductivity provided with a contact surface opposed to the stud and shaped to engage the conductor in a minimum of contact area. Further in accordance with my invention, I provide a combination fuse clip, as set forth above, wherein the stud further embodies one or more flat surfaces for contact by a switch blade or blade elements, the flat surfaces on the stud being substantially perpendicular to the direction of movement of the resilient member.

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

In the accompanying drawing, Fig. 1 is a side elevation, partly in section, of a knife switch and fuse arrangement provided with clips and studs embodying my invention; Fig. 2 is a front elevation of the embodiment of my invention shown in Fig. 1; Fig. 3 is a sectional elevation on the line 3—3 of Fig. 1, but to a larger scale, illustrating a combination fuse clip and switch stud embodying my invention; and Fig. 4 is a sectional elevation on the line 4—4 of Fig. 2, but to a larger scale, illustrating a fuse clip embodying my invention.

For the purpose of illustrating my invention, I have shown its application to a so-called fused knife switch which, as shown, comprises a fuse 1 provided with terminals 2 and 3 of the knife blade type and a knife switch comprising two parallel spaced blade elements 4 having a handle 5 suitably secured thereto. While I have shown only a single pole fused knife switch, it will be apparent that any desired number of poles may be provided with the handle 5 made long enough for attachment of the blade elements of all the poles if it is desired to move them simultaneously.

For mounting the fuse 1 and the knife switch on a base 6 of suitable insulating material, I provide, in accordance with my invention, a current conducting clip 7, shown in detail in Fig. 4, for the blade terminal 2 of the fuse 1 and a combination fuse clip and switch stud 8, shown in detail in Fig. 3, for the blade terminal 3 of the fuse and a hinged end of the switch blade elements 4. In accordance with my invention, the clip 7 comprises a rigid stud 9 of relatively high conductivity with a contact surface 10 shaped to engage the flat surface of the fuse terminal 2 in substantial line-contact and means for holding the fuse terminal in relatively high pressure contact against the stud surface 10 comprising a resilient member 11 of relatively low conductivity. This member, in accordance with my invention, is provided with a relatively small contact surface 12 opposed to the stud surface 10 for engaging the fuse terminal 2 in relatively high pressure contact having a minimum of area and

approximating point contact. For easy insertion of the fuse terminal, the contact surface 12 is convex and is so positioned as to localize the pressure approximately midway of the line of contact between the stud surface 10 and the fuse terminal 2. This arrangement allows some deviation of alignment of the fuse terminal 2 relatively to the clip, without materially affecting the desired line contact between the fuse terminal and the stud surface. The stud 9 may be of copper with at least the surface 10 silver plated for better contact action, and the clip member 11 may be of phosphor bronze as this is a relatively poor conductor in comparison with copper.

The stud surface 10 may be of a cylindrical form, as shown more clearly in Fig. 2, and the convex or rounded surface 12 of the clip member 11, which is not silver plated, may be of a generally spheroidal or cylindrical shape. Since the contact between the stud surface 10 and the fuse terminal 2, usually of copper, is in the nature of line-contact between two good conductors, and the engagement between the clip member 11 and the fuse terminal 2 is approximately point-contact between a good conductor and a relatively poor conductor, it will be apparent that not enough current can pass by way of the clip member 11 to cause heating thereof and thus impair its resiliency and the desired high pressure line-contact between the stud surface 10 and the fuse terminal 2.

For mounting the stud 9 and the clip member 11 on the base 6, the threaded end portion 13 of the stud projects through an opening in the clip member 11, and a shoulder 14 on the stud abuts the clip member to clamp it in place when a washer 15 and a clamping nut 16 are applied to the threaded end of the stud. For preventing relative rotation of the stud 9 and the clip member 11 whereby to maintain the desired alignment between the stud surface 10 and the surface 12 of the clip member 11, I provide interengaging means comprising a raised portion 18 on the clip member which is adapted to seat in a depressed portion or surface 17 of the stud. Thus, when the clip member 11 and the stud 9 are assembled on the base 1, the clip member is movable only in a plane including the longitudinal axis of the stud to permit the entry of the fuse terminal 2. In order to maintain suitable alignment between the current conducting clip 7 and the combination clip and fuse stud 8, the clip member 11 is provided with a projection such as a punched out portion 19 which seats in a suitable opening 20 in the base 6. For holding the stud 9 against turning when the clamping nut 16 is tightened, the shoulder portion 14 of the stud 9 may be provided with parallel flattened portions 21 for the reception of a suitable wrench.

The stud 9' of the combination switch stud and clip 8 differs from the stud 9 in that the clip 11 is secured against the shoulder 14 of the stud by a shouldered plug 22 which is threaded into the bottom of the stud, as shown in Figs. 1 and 2. The stud 9' and the clip 11 are interlocked in the same manner as the stud 9 and the clip 11. The free end of the plug 22 projects into a hole in the base 6 and, as shown, is threaded for a fastening screw 23 under the head of which are a lock washer 24 and a bearing washer 25.

For hinging the switch blades 4, the free end of the stud 9' embodies a flattened portion 26 presenting two substantially parallel faces 27 against which the blades 4 are clamped by suitable means comprising a bolt 28 and resilient washers 29. The faces 27 are so formed as to be substantially perpendicular to the direction of movement of the clip 11.

It will be apparent that since there is substantially only line-contact between the fuse terminals 2 and 3 and their respectively associated studs 9 and 9', it is only necessary to have these studs parallel to insure the desired contact. This is a much simpler problem from the standpoint of manufacture, assembly and maintenance than to align the plane surfaces of jaw contacts to obtain good contact since this requires not only parallelism of the jaws of each contact but also that corresponding jaws of the two contacts be substantially coplanar. Also, since in the combination switch and fuse stud the same stud member serves both as switch terminal and fuse terminal, there is a material saving in the over-all length required for a fused disconnecting switch in comparison with the old spaced jaw type clip and switch stud. In fact, with my combined switch and stud, the over-all length is reduced about 20% in comparison with what has heretofore been considered a reasonably compact design.

The knife switch is provided with a terminal stud 30 which, as shown, is cylindrical in form for line-contact with the blades 4. A stop collar 31 on the stud 30 limits the movement of the blades in the switch closing direction. The stud 30 also comprises a shouldered portion 14' below which are deformed lugs 32 for preventing movement of the stud relatively to the base. The stud 30 further includes the terminal threaded portion 13 for securing the stud to the base by a nut 16 bearing against a washer 15. For improved conductivity of the surfaces 27 on the flattened portion 26 of the stud 9' and also the cylindrical portion 33 of the stud 30 relatively to the blades 4, these surfaces and also the cooperating surfaces of the blades may be silver plated.

While I have shown and described my invention in considerable detail, I do not desire to be limited to the exact arrangements shown, but seek to cover in the appended claims all those modifications that fall within the true spirit and scope of my invention.

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

1. A combination switch stud and fuse clip comprising a stud of relatively high conductivity having a cylindrical contact surface and an end portion provided with a flattened surface for hinging a switch blade, and means for holding a fuse having a blade type terminal with the terminal against the cylindrical contact surface of the stud in relatively high pressure substantial line-contact comprising a resilient member of relatively low conductivity provided with a contact surface opposed to said stud below the flattened surface thereof and shaped to engage the fuse blade terminal in approximate point-contact, said member being movable in a direction substantially perpendicular to the flattened surface of the stud.

2. A combination switch stud and fuse clip comprising a stud of relatively high conductivity having a cylindrical body portion and an end portion provided with two substantially parallel flattened surfaces for hinging two substantially parallel switch blade elements, means for hold-

ing a fuse having a blade type terminal with the terminal against the cylindrical body portion of the stud in relatively high pressure substantial line-contact comprising a resilient member of relatively low conductivity provided with a rounded contact surface opposed to said stud below the flattened surfaces thereof for approximate point-contact engagement with the fuse blade terminal and movable in a direction substantially perpendicular to the flattened surface of the stud.

WINTON G. HARLOW.

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