FIG. 1

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ELECTRICAL STAB CONNECT/DISCONNECT DEVICE

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ABSTRACT OF THE DISCLOSURE

A stab contact assembly consisting of a right angle gear train acting upon a gear rack. The gear rack connects to one end of a snap-action mechanism which at its other end connects to a slidable contact block assembly. When the gear rack is moved in one direction, the snap action mechanism, consisting of spring-urged members operating on sliding members of the contact block assembly, is loaded. Toward the end of travel of the gear rack, the snap-action mechanism causes the contact block assembly to be impelled in the opposite direction, thereby producing a fast acting connection, or disconnection, between stab contact and busbar.

Background of the invention

In general stab connectors are used for the electrical connection of removable equipment to a fixed positioned busbar assembly. Upon removal of the equipment, the stab connector disengages from the busbar assembly, thereby breaking the connection between the power supply connected to the busbar and the equipment which is removed. Since the equipment should not be removed while under load, and in fact many equipments incorporate safety features which prevent the removal of the equipment under load, an isolating switch is provided which must first be turned off to isolate the load from the power supply before removal of the equipment is permitted. It is therefore generally required that all equipment provided with stab connectors for removal and isolation of the equipment is provided with an isolating switch for the separation of the load and power supply prior to the removal of the equipment.

The stab connector and the isolating switch both perform the same task, that is, to isolate the load from the power supply in addition to which the stab connector provides for the removal of the equipment. The difference between the isolating function of both means lies in the mode of operation. The stab connector generally depends directly on the ability and the speed of the operator; and if a stab connector is disconnected under load, damage due to arcing is likely. The disconnect switch on the other hand does not depend on the speed of the operator. Its operation relies on a mechanism which provides the switch with a fast making and breaking action.

Summary of the invention

This invention is related to stab contact assemblies, and particularly to stab contact assemblies of the type for detachable engagement with busbar conductors.

It is therefore a primary objective of this invention to provide a stab connector of improved construction which may be inserted or withdrawn from the busbar at speeds equivalent to the operating speed of a typical isolation switch, thereby eliminating the necessity of a separate isolating switch.

Brief description of the drawings

FIGURE 1 shows the stab contact assembly together with its operating mechanism and snap-action device.

FIGURES 2 and 3 show the relative positions of the stab and snap-action mechanism in the OFF and ON position, respectively.

Description of the preferred embodiment

Referring now to FIGURE 1, the operating mechanism consists of an operating shaft 11 having pin 13 for engagement with an operating handle (not shown), and a bevel gear 15, which engages with a bevel gear 17, thereby forming a right angle drive. The operating shaft 11 is supported by bearing blocks 19 and 21. Shaft 23, which couples gear 17 to a pinion gear 25, is supported by bearing blocks 21 and 27. Pinion gear 25 engages with a gear rack 29 having an enlarged section 31 for providing pivot points 33 and 35 of a snap-action mechanism. The snap-action mechanism consists of two toggle joints, the first consisting of pivot block 37 pivotally attached to the enlarged section 31 of gear rack 29, by pin 39, and a cylindrical member 41 attached to pivot block 37 and slidably engaged with a pivot block 43 which is pivotally assembled to slide 47.

The second toggle joint is identical to the first and consists of pivot block 49, pivotally attached to the enlarged section 31 of gear rack 29 by pin 51, and a cylindrical member 53 attached to pivot block 49, and slidably engaged with pivot block 55 which is pivotally assembled to slide 57. Springs 45 and 59 surround cylindrical members 41 and 53, respectively, and are under compressive force created by the limiting space between pivot blocks 37 and 43 in the first toggle joint and pivot blocks 49 and 55 in the second toggle joint.

Backstop 67 limits the motion of the gear rack in the backward direction and frontstop 69 limits travels of the gear rack in the forward direction.

Both slides 47 and 57 and the gear rack 29 are slidably supported by base support 71, which limits the slides and the gear rack to a bidirectional parallel motion with each other and the base. Bolts 73—75, respectively, attach slides 47 and 57 to contact block 61, which supports contacts 66, as described in U.S. Patent 3,086,191, issued Apr. 16, 1963 to Albert H. Addams and William F. Olashaw.

A slot 77 is provided in busbar 65 for the insertion of the stab contact 63, thereby providing an electrical connection between the busbar 65 connected to the power supply (not shown), and the equipment (not shown) to which the stab contact 63 is connected.

Referring now to FIGURES 2 and 3, stab contact 63 is shown withdrawn from opening 77 in busbar 65, that is, the electrical connection is broken. The stab contact 63 may include a spring for normally holding the contact leaves apart, thereby providing a fractional retention of the contact in the slot 77 of the busbar 65. The operation of opening and closing the electrical connection is performed by rotating the operating shaft 11, and thereby rotating bevel gear 15. This in turn causes bevel gear 17 to rotate; and through the corresponding motion of gear 25, which shares a common shaft 23 with bevel gear 17, a linear motion in the gear rack 29 is caused. Depending on the direction of rotation of the operating shaft 11, the gear rack 29 is moved forward to the maximum front position determined by frontstop 69, or backward to a maximum back position determined by backstop 67.

With the stab contact in the closed position as presented in FIGURE 1, the rack must be positioned in its maximum back position. To open the stab contact connector, a hom, a clockwise rotation of the operator isolation shaft 11 is required. This causes the gear rack 29 to move toward the frontstop 69 and with it, move pivot points 33 and 35, located in the enlarged section 31 of gear rack 29.

With a continuation of motion in the forward direction of gear rack 29, the springs 45 and 59 are compressed to a point where the pivot points of pivot blocks 43 and 55 are aligned with pivot points 33 and 35, at which
point maximum compression is reached. Further motion of gear rack 29 in the forward direction will cause the pivot points 33 and 35 to move ahead of the pivot points of pivot blocks 43 and 55, which will cause the springs 45 and 59 to exert pressure on the slides 47 and 57 in the backward direction. When the pressure exerted by the springs 45 and 59 in the backward direction is greater than the combined friction of the slides 47 and 57 and the stab contact 63 in the slot 77 of the busbar 65, the slides 47 and 57 are impelled toward the backstop 67, removing the stab contact 63 from the slot 77 in busbar 65, thereby providing fast disconnect between power supply and load (not shown).

Re-establishing of the connection is performed in similar manner except that the directions of motion are reversed. Therefore, operating shaft 11 must be rotated in the counterclockwise direction, causing the gear rack 29 to slide backward toward backstop 67. As pivot points 33 and 35 align with the pivot points of pivot blocks 43 and 55 and pass this point, pressure from the compressed springs 45 and 59 produce a force on slides 47 and 57 and upon overcoming the inherent friction of the apparatus will impel the slides 47 and 57 in the direction of busbar 65.

Contact block 61 supporting stab contact 63 is coupled to slides 47 and 57 with bolts 73 and 75, respectively, and will therefore move with the slides in the direction of busbar 65. Electrical connection is completed when stab contact 63 is fully inserted in the slot 77 in busbar 65.

I claim:

1. In combination with a busbar having an opening for the insertion of a stab type connector, a stab connector, a reciprocating rack for carrying said connector, resilient means attached to said rack opposing its motion, said resilient means being arranged to provide a snap-action motion to said rack, and means for moving said rack opposed by said resilient means to advance or retract said rack to insert or withdraw said connector with respect to said opening.

2. The invention set forth in claim 1 with the further provision of pinion means for advancing or retracting said rack.

3. The invention of claim 1 wherein said connector includes spring urged frictional means for retaining said connector in said opening.

4. The invention according to claim 1 wherein said resilient means comprises a pair of toggle type springs attached to and over-riding said rack.

References Cited

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