United States Patent

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[54] **DISCONNECT SWITCH HAVING INTERNALLY CLAMPED ROTARY COUPLING**
4 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **287/20.3,** 287/124
[51] **Int. Cl.** **F16b 1/00**
[50] **Field of Search** 287/20.3, 124, 100; 85/66, 75; 279/2

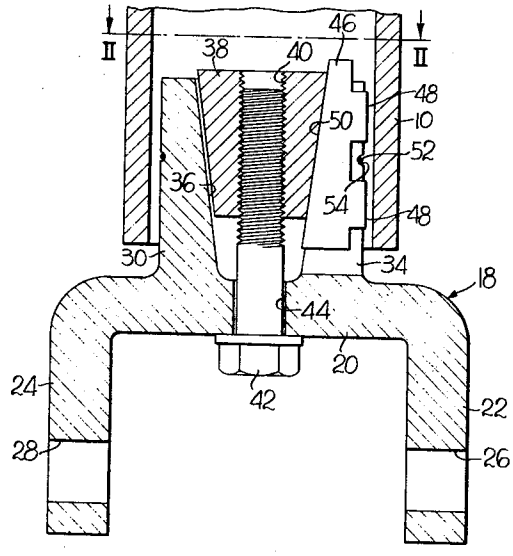
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ABSTRACT: The hollow tubular rotatable control rod of an electrical disconnect switch is connected to a yoke which effects rotary movement thereof by means of a slotted hollow cylindrical member on the yoke which projects into one end of the hollow rod. Each slot is provided with a taper key located therein. A frustoconical nut is drawn up inside the member on the yoke to cause radial movement of the taper keys and a snug fit between exterior surface of the latter and the interior surface of the rod.



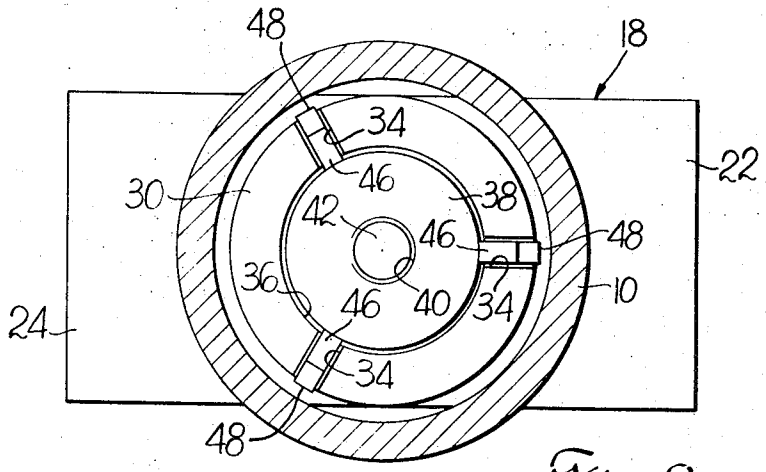


Fig. 2

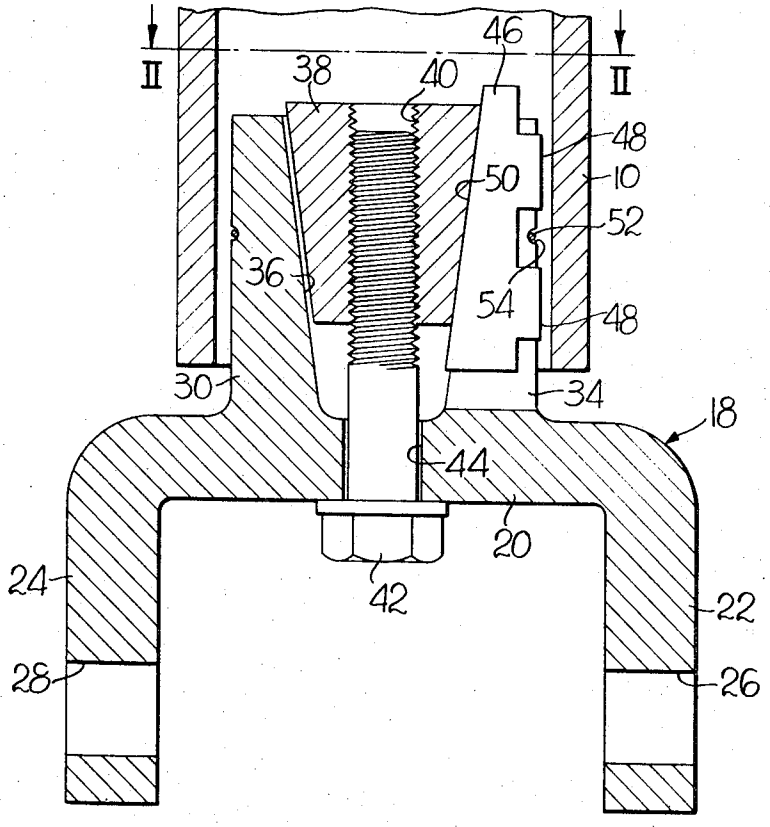


Fig. 1

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DISCONNECT SWITCH HAVING INTERNALLY CLAMPED ROTARY COUPLING

SUMMARY OF THE INVENTION

This invention relates generally to electrical disconnect switches and, particularly to improved means for connecting the tubular control rod thereof to the yoke which effects rotary movement thereof.

Heretofore, the tubular control rods of some disconnect switches were connected to the yoke which effected rotational movement thereof by means of a member on the yoke which projected into one end of the tubular rod and pins or bolts extended transversely through the blade and the member. However, disconnect switches are sometimes subjected to severe icing conditions which inhibit rotational movement of the rod when attempts are made to operate them and the high rotational forces exerted by the yokes sometimes caused damage to the pins or to the rods adjacent the pins because nearly all stresses were concentrated in these regions. Such damage interferred with proper switch operation and necessitated repair of replacement of the rods or other components.

It is desirable, therefore, to provide improved means for connecting tubular control rods to the operating yokes to overcome the aforementioned difficulties.

In accordance with the present invention there is provided a disconnect switch having a hollow tubular control rod which is connected to an operating yoke by means of a projection on the yoke which is hollow and slotted, which has a taper key in each slot, and which has a frustoconical expansion nut located therein to effect outward radial movement of the taper keys whereby the latter grip the interior of the tubular control rod.

OBJECTS OF THE INVENTION

It is an object of the present invention to provide improved disconnect switches.

Another object is to provide improved means for connecting tubular control rods to the rotatable operating yoke in disconnect switches.

Another object is to provide improved means of the aforesaid character which effect equalized distribution of shear or rotational forces at the place where the rod joins the yoke.

Another object is to provide means of the aforesaid character which reduce the number of components, manufacturing operations and assembly steps required in the manufacture of disconnect switches.

Another object is to provide improved disconnect switches which are more reliable in operation and able to operate in severe icing conditions without less risk of damage.

Other objects and advantages of the invention will hereinafter appear.

DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrates a preferred embodiment of the invention but it is to be understood that the embodiment illustrated is susceptible of modification with respect to details thereof without departing from the scope of the appended claims.

In the drawing:

FIG. 1 is a cross-sectional view of a control rod for a disconnect switch embodying the present invention; and

FIG. 2 is a partial cross-sectional view taken along line II–II of FIG. 1.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 1 of the drawing, the numeral **10** designates a control rod for an electrical disconnect switch in accordance with the present invention. A yoke **18** which is connected to the other end of control rod **10** to effect rotational movement of the latter. As hereinafter explained, yoke **18** is adapted to rotate to effect opening and closing movement of a disconnect switch. During opening and closing movement; yoke **18** is rotated a predetermined angular distance to effect corresponding rotation of rod **10** about its longitudinal axis.

As FIGS. **1** and **2** show, yoke **18** comprises a body section **20** from which two legs **22** and **24** extend and the legs are provided with holes **26** and **28**, respectively, by means of which the yoke is secured to a mechanism which rotates it. Body section **20** of yoke **18** is also provided with a member **30** which projects therefrom and with which rod **10** is associated. Member **30**, which is preferably integrally formed with body section **20** of yoke **18** by casting or machining, takes the form of a hollow cylinder. The exterior diameter of member **30** is such as to permit it to fit easily but loosely within one end of rod **10** which is hollow and cylindrical. Member **30** is provided with a plurality, in this case three, of evenly spaced apart radially disposed slots **34** which extend entirely through its wall. The hollow interior **36** of member **30** is frustoconical in shape and is adapted to accommodate an expansion nut **38**.

Expansion nut **38** is frustoconical in shape and is provided with a threaded hole **40** extending axially therethrough. A bolt **42** extends through an unthreaded hole **44** in the body section **20** of yoke **18** and takes up in threaded hole **40** in expansion nut **38**.

Each slot **34** is adapted to receive a taper key **46** which has two projections **48** thereon for engagement with the inner wall surface of rod **10** and a tapered edge or surface **50** for engagement with the exterior surface of nut **38**. The taper keys **46** are held in place by means of a retaining wire or split ring **52** in a notch **54** around the circumference of member **30** when the yoke is disassociated from said rod.

During assembly, nut **38** is inserted into hollow interior **36** of member **30** of yoke **18** and bolt **42** is inserted through hole **44** in body section **20** of the yoke and into threaded hole **40** in the nut. Bolt **42** is tightened sufficiently to secure nut **38** in place. The taper keys **46** are then placed in the slots **34** and the wire **52** is put in place. Then, the end of rod **10** is slipped over member **30** of yoke **18** as far as it will go. Finally, bolt **42** is tightened so as to cause expansion nut **38** to be drawn into the interior **36** of member **30**. Internal movement of nut **38** causes taper keys **46** to move radially outward, the slots **34** in member **30** permitting such expansion. As this occurs, the projections **48** on the taper keys **46** tightly engage with the smooth interior cylindrical surface of rod **10** and rod **10** and yoke **18** become firmly connected. Because physical contact occurs at many points, any stresses or forces transmitted from yoke **18** as it is rotated are widely and evenly distributed around the end of rod **10**. Thus, any tendency for rod **10** to tear or be deformed is substantially reduced.

Rod **10** can be disconnected from member **30** of yoke **18** by loosening bolt **42** and tapping thereon to drive nut **38** outwardly of the interior **36** of member **30** thereby relieving the pressure between rod **10** and the taper keys **46**.

I claim:

1. In a coupling,

a rod having a smooth bored opening extending axially into one end thereof,

a rotatable yoke for rigidly connecting to said rod,

said yoke having a projection with a substantially smooth outer periphery projection thereon extending into said opening,

said projection having a frustoconical opening therein and a plurality of slots therein,

a frustoconical expansion nut in said opening in said projection,

a taper key in each slot, and

a bolt extending through an opening in said yoke for engagement with said nut and rotatable to draw said nut into said projection to cause outward radial movement of said taper keys and their engagement with the wall of the opening in said rod, said frustoconical opening and slots extending the full length of said projection and said taper keys being substantially equal in length to the length of

said slots to achieve maximum physical contact and an even distribution of stresses upon transfer of torque from said yoke to said rod.

2. A coupling according to claim 1 wherein each of said taper keys has at least one projection thereon for engagement with the wall of said rod.

3. A coupling according to claim 2 including means for securing said taper keys in said slots when said yoke is disassociated from said rod.

4. A coupling according to claim 3 wherein said means for securing said taper key comprises a wire engageable in a notch in the projection on said yoke.