This invention relates to high tension electric switches and has more particular reference to high tension electric switches of the rocking insulator type.

An object of the present invention is to provide, in a high tension electric switch of the type comprising a base member on which is mounted a stationary insulator carrying switch jaws and a rocking insulator carrying a switch blade, a novel and improved bearing assembly for the rocking insulator including an insulator support plate having at least two arms positioned one above the other in spaced and generally parallel relation, the uppermost of which provides a mounting surface for the rocking insulator, the lowermost of which carries journal means rockably mounted in bearings carried by the switch base member.

Another object of the present invention is to provide a novel and improved bearing assembly for the rocking insulator of a high tension electric switch, as characterized above, wherein means are provided for adjusting the rocking insulator angle.

Another object of the present invention is to provide in a group of high tension electrical switches mounted in spaced parallel relation on a common support with each switch including a base member on which is mounted a stationary insulator carrying switch jaws and a rocking insulator carrying a switch blade, novel and improved means for operating the switches simultaneously as a unit comprising a bearing assembly for each of the rocking insulators including an insulator support plate having at least two arms positioned one above the other in spaced and generally parallel relation, the uppermost arm providing a mounting surface for the rocking insulator, the lowermost arm carrying journal means pivotally mounted in bearings carried by the switch base member and shafting rigidly connecting all of the insulator support plates together so that all of the rocking insulators will be operated simultaneously as a unit.

Another object of the present invention is to provide novel and improved means for operating the switches of a group of high tension electric switches simultaneously as a unit, as characterized above, wherein each of said insulator support plates is provided with means for adjusting the rocking insulator angle.

A further object of the present invention is to provide novel and improved means for operating the switches of a group of high tension electric switches simultaneously as a unit, as characterized above, which is simple in construction and efficient in operation and one which is relatively inexpensive to manufacture and reduces the overall cost by eliminating extra fittings now normally employed with a group or gang of switches.

Other objects and advantages of the invention will appear in the following specification when considered in connection with the accompanying drawings, wherein:

Fig. 1 is a side elevation of a switch unit of the rocking insulator type, showing one embodiment of an improved bearing assembly for the rocking insulator, constructed in accordance with the present invention;

Fig. 2 is a view similar to that shown in Fig. 1, drawn to a larger scale but with parts broken away and certain parts omitted;

Fig. 3 is a vertical sectional view taken on the line 3-3 of Fig. 2, with parts broken away;

Fig. 4 is an end elevation of the bearing assembly shown in Fig. 2, but drawn to a larger scale;

Fig. 5 is an end elevation of a modified bearing assembly;

Fig. 6 is a side elevation of the bearing assembly shown in Fig. 5;

Fig. 7 is a vertical sectional view taken on the line 7-7 of Fig. 6, with parts broken away;

Fig. 8 is a side elevation of another modified bearing assembly;

Fig. 9 is an end elevation of the bearing assembly shown in Fig. 8;

Fig. 10 is a vertical sectional view taken on the line 10-10 of Fig. 8, with parts broken away;

Fig. 11 is a diagrammatic end elevation drawing illustrating the manner in which a plurality of switch units, as shown in Fig. 1, are mounted on a common support and connected by shafting for simultaneous operation as a unit;

Fig. 12 is a view similar to that shown in Fig. 11, but showing a group of switches having bearing assemblies, as shown in Fig. 5;

Fig. 13 is a view similar to that shown in Fig. 11, but showing a group of switches having bearing assemblies, as shown in Fig. 8, and

Fig. 14 is a view similar to that shown in Fig. 13, but showing a group of switches having bearing assemblies, as shown in Fig. 8, with the bearing assemblies connected by an elongated one-piece square shaft.

The present invention provides in a high tension electric switch of the type including a base member on which is mounted a stationary insulator carrying switch jaws and a rocking insulator carrying a switch blade, a novel and improved bearing assembly for the rocking insulator and, in general, comprises an insulator support plate having at least two arms positioned one above the other in spaced and generally parallel relation, the uppermost arm providing a mounting surface for the rocking insulator, the lowermost arm carrying journal means pivotally mounted in bearings carried by the base member, and means mounted on the insulator plate for adjusting the rocking insulator angle. The present invention also provides, in a group of high tension electric switches, of the type above set forth, mounted on a common support, novel and improved means for operating the switches simultaneously as a unit including a bearing assembly as above set forth for each switch and shafting rigidly connecting all of the bearing assemblies together so that all of the rocking insulators will be operated simultaneously as a unit.

While the improved bearing assembly of the present invention can be used with high tension electric switches of the type employing a rocking insulator and two stationary insulators, such as shown in my Patent No. 2,333,011, for the purposes of illustration, it will be shown and described as used with a high tension electric switch having a rocking insulator and a single stationary insulator as shown in Fig. 1 of my Patent No. 2,231,809.

Referring now to the drawings, there is shown in Fig. 1, a high tension electric switch similar to that shown in Fig. 1 of my Patent No. 2,231,809, but employing one embodiment of an improved bearing assembly for the rocking insulator constructed in accordance with the present invention. As there shown, the switch unit comprises a stationary insulator 10 fixedly mounted on one end of an ordinary structural channel forming the base member 11 of the switch unit; and a rocking insulator
mounted on the other end of the base member by means of a bearing assembly, indicated generally at 13. The stationary insulator 10 carries the usual switch jaws and terminal connections, indicated generally at 14, and the rocking insulator carries the usual switch blade assembly and terminal connections, indicated generally at 15.

The improved bearing assembly, indicated generally at 13, and as best shown in Figs. 2, 3 and 4, comprises a pair of bronze upright support members 16, each secured to one side of the base member 11 and having a circular bearing 17 formed in its upper end; a shaft 18 in the form of a short section of hollow pipe journaled in the bearing 17 and provided with a spaced pair of bronze bearing rings 19 press fitted thereon in position to form a bearing surface to engage the bronze surface of the bearing; an S-shaped insulator support plate 20 positioned between the bearings 17 and rigidly secured to the shaft 18, as by means of a spaced pair of depending lugs 21 welded to the plate 20 and the shaft 18; and a pair of spacer rings 22, each loosely mounted on the shaft 18 and positioned between one of the bearing members 17 and the adjacent edges of the depending lugs 21. The plate 20 is preferably made of an elongated piece of strap metal bent on itself to the S-shape form, as shown in Fig. 1, to provide an upper arm 23, an intermediate arm 24, and a lower arm 25, positioned one above the other in a spaced and generally parallel relation. The upper arm 23 carries the rocking insulator 12, which is suitably secured thereto as by bolting. The lower arm 25 carries the depending support lugs 21, by means of which the S-shaped member is secured to the shaft 18. The space between the lower arm 25 and the intermediate arm 24 provides a mounting space for a short beam or shaft 26, generally rectangular in cross section, which is tightly clamped between the two arms as by an elongated spaced pair of bolts which extend through the two arms, see Fig. 2. The shaft 26, preferably and as shown, is made of wood.

The inner "free" end of the upper arm 23 is adjustably secured to the inner end of the intermediate arm 24, as by means of a spaced pair of bronze bolts 27. The bolts 27 carrying adjusting nuts and a locking nut, by means of which the plane of the upper arm can be varied about its transverse axis and/or its longitudinal axis, to adjust the rocking insulator angle in two directions. The outer end of the lower arm 25 is bent downwardly, as shown at 28, to provide a limiting stop for the rocking insulator when swung to open position, and an adjustable bronze nut 29 is carried by the channel member 11 to provide an adjustable stop for the rocking insulator when swung to closed position.

High tension electric switches of the rocking insulator type are usually employed as a group or gang in which each of the switch units are mounted in spaced parallel relation on a common support for operation simultaneously as a unit. High tension switch units having bearing assemblies as described above are particularly adapted to be employed as a group or gang in which each of the switch units are mounted in spaced parallel relation on a common support, usually cross arms fixedly secured to the top of a pole, for operation simultaneously as a unit.

In Fig. 11 there is diagrammatically illustrated the manner in which such a group of switch units is mounted. As there illustrated, three such switch units S, S, S, are shown as being mounted in spaced parallel relation on cross arms C. When so mounted, the short wooden shafts 26 of the bearing assemblies of the three switch units are replaced by an elongated generally rectangular in cross section shaft 30, preferably and as shown, made of wood, which extends through the bearing assemblies and is tightly clamped between the intermediate arms 24 and the lower arm 25 of each of the S-shaped rocking insulator support plates, so that all of the rocking insulators will be operated simultaneously as a unit. The shafts 18 of the bearing assemblies of the two outer switch units are shown as carrying the usual balancing springs B, while the shaft 18 of the bearing assembly of the middle switch unit is shown as carrying the usual operating arm A connected to the usual operating rod R by which the switches are operated.

The wood beam or shaft 30 can be removed without affecting the adjustment of the switch, thus enabling the switches to be adjusted before being shipped. The shaft 30 is made of wood, lightning is less apt to jump across from one switch to the other, when the switches are mounted on a wooden structure.

A modified form of bearing assembly is illustrated in Figs. 5, 6 and 7. In this particular modification, the bearing assembly is mounted and positioned on the structural channel base member 11, as is the bearing assembly shown in Fig. 1, and the upright support members 16, with their bearings 17, together with the shaft 18 with its spaced bronze bearing rings 19, and the spacer rings 22 are identical in construction to the corresponding members as shown in the modification illustrated in Fig. 2. However, in this particular modification, the rocking insulator support plate 20' is bent to the C-shaped configuration, as shown in Fig. 6, to provide an upper arm 31 and a lower arm 32. The upper arm 31 carries the rocking insulator 12, which is suitably secured thereto as by bolting. The lower arm 32 is spaced from and is generally parallel to the upper arm 31 and is secured to the shaft 18, as by welding.

The outer free end of the upper arm 31 is adjustably connected to the outer end portion of the lower arm 32, as by means of a spaced pair of bronze bolts 27. The bolts 27 carry adjusting nuts and a locking nut, by means of which the plane of the upper arm can be varied about its transverse axis and/or its longitudinal axis to adjust the rocking insulator angle in two directions.

The outer end of the lower arm 32 is bent downwardly as shown at 33, is provided with a limiting stop for the rocking insulator when swung to open position and the usual adjustable bronze bolt 29 is mounted on the channel member 11 in position to engage the curved portion of the insulator support plate to provide an adjustable stop for the rocking insulator when swung to closed position.

When this particular modification of bearing assembly is employed in a single switch unit, the ends of the shaft 18 extend beyond the bearings 17 a sufficient distance to provide a mounting for the usual balancing springs, as well as for a conventional operating arm. However, switch units having this particular bearing assembly are well adapted to be employed in a group or gang for simultaneous operation as a unit.

In Fig. 12, there is diagrammatically illustrated the manner in which such a group of switch units is mounted. As there illustrated, three switch units S are shown as being mounted in spaced parallel relation on cross arms C. The shafts 18 of the bearing assemblies of the three switch units are connected by intermediate shaft sections 34 which are detachably connected to the adjacent ends of the shafts 18 by suitable fittings, so that the shafts 18 of the switch units and the intermediate shaft section 34 form a continuous rigid shaft connecting all of the switch units so that all of the switch units will be operated simultaneously as a unit. The intermediate shaft sections 34 may be made of wood or metal, preferably, and as shown, they are made of wood. The shafts 18 of the bearing assemblies of the two outer switch units are shown as carrying the usual balancing springs B, while the shaft 18 of the middle switch unit is shown as carrying the usual operating arm A connected to the usual operating rod R by which the switches are operated.

Another modified form of bearing assembly is illustrated in Figs. 8, 9 and 10. In this particular modification, the bearing assembly is mounted and positioned on the structural channel base member 11, as is the bear-
ing assembly shown in Fig. 2, and the upright support members 16, with their bearings 17, are identical in con-
struction to the corresponding members as shown in the modification illustrated in Fig. 2. Also, the rocking
insulator support plate 20" is similar to the support plate 20' shown in Fig. 6, and is of a C-shape form to provide
an upper arm 31' and a lower arm 32'. The lower arm 32' is spaced from and is generally parallel to the upper
arm 31' and is secured, as by welding, to two separate space-apart trunnion journal members 35 in the form
of short hollow pipe sections, each journaled in one of the bearings 17. Each of the trunnion or pipe sections
35 has a bronze bearing ring 36 pressed therein in position to form a bearing surface to engage the bronze
surface of the bearing 17.

A short shaft 37 in the form of a hollow pipe of re-
tangular cross section extends through the pipe sections
35 and projects beyond the bearings 17 a sufficient dis-
tance to provide a mounting for the usual balancing
springs, as well as for a conventional operating arm.

The shaft 37 is detachably secured to the lower arm
32' of the insulator support plate 20", as by means of
a clamping spacer plate 38 engaging the bottom surface
of the arm 32' and one side of the shaft 37, and a clamping
plate 39 engaging the opposite side of the shaft 37.

These clamping plates are tightly clamped on the square
shaft 37 by a pair of clamping bolts 40, one on each side
of the pipe 37 and extending through the clamping plates,
the lower arm 32' and a reinforcing plate 41 mounted
on the upper surface of the arm 32 and secured thereon
as by a bolt 42. This construction permits the shaft 37
to be removed and/or replaced without affecting the ad-
justment of the switch.

The outer end of the upper arm 31' is adjustably
connected to the outer end portion of the lower arm 32',
as by means of a spaced pair of bronze bolts 27'. The
bolts 27' carry adjusting nuts and a locking nut, by means
of which the plane of the upper arm can be varied about
its transverse axis and/or longitudinal axis to adjust the
rocking insulator angle in two directions.

The outer end of the lower arm 32' is bent downwardly,
as shown at 33', to provide a limiting stop for the rock-
ing insulator when swung to open position and the usual
adjusting shaft 29 is mounted on the cast iron
member 11 in position to engage the curved portion of
the insulator support plate to provide an adjustable stop
for the rocking insulator when swung to closed position.

When this particular modification of bearing assembly
is employed, the switch unit 1, the ends of the square
shaft 37 extend beyond the bearings 17 a sufficient dis-
tance to provide a mounting for the usual balancing
springs, as well as for a conventional operating arm.

However, switch units having this type of bearing assembly
are particularly adapted to be employed as a group or
gang for simultaneous operation as a unit.

In Fig. 13, there is diagrammatically illustrated one
manner in which such a group of switch units is mounted
for operation as a unit. As there illustrated, three such
switch units 5' are shown as being mounted in spaced
parallel relation on cross arms C. The short square
in cross section shafts 37 of the bearing assemblies are
replaced by an elongated square in cross section shaft
43 which extends through the bearing assemblies and is
tightly clamped to the lower arm 32' of each of the bearing
assemblies, so that all of the rocking insulators will be
operated simultaneously as a unit. The shaft 43 is
shown as carrying a pair of balancing springs B, each
mounted on the shaft adjacent one of the outer switch
units and an operating arm A mounted on the shaft
adjacent the middle switch unit and connected to the
usual operating rod R. The shaft 43 can be removed
without affecting the adjustment of the switches, thus
enabling the switches to be adjusted before shipment.

Under certain conditions, when switches of this type
are mounted as a gang or group, it may be preferable to
employ intermediate shaft sections made of wood con-
nected to the adjacent ends of the shafts 37 of adjacent
switches by suitable fittings so that the shafts 37 of the
switches and the intermediate shaft section form a con-
tinuous rigid shaft connecting all of the switches for
simultaneous operation, as diagrammatically illustrated
in Fig. 14. As there illustrated, three switch units 5'
are shown as being mounted in spaced parallel relation
on cross arms C. The square in cross section shafts 37
of the bearing assemblies of the three switches are con-
ected by intermediate wooden shaft sections 44 which
are detachably connected to the adjacent ends of the
shafts 37 by suitable fittings so that the shafts 37 of the
switch units and the intermediate wooden shaft sections
44 form a continuous rigid shaft connecting all of the
switch units so that all the switch units will be oper-
ated simultaneously as a unit. The shafts 37 of the
bearing assemblies of the two outer switch units are shown
carrying the usual balancing springs B, while the shaft
37 of the middle switch is shown carrying the usual
operating arm A connected to the usual operating rod R
by which the switches are operated.

From the foregoing description, it readily will be ap-
parent that there has been provided in a high tension
electric switch of the rocking insulator type, a novel
and improved bearing assembly for mounting the rock-
ing insulator, which is simple in construction, inexpen-
sive to manufacture, efficient in operation, extremely flexi-
ble in its adaptations, and provides means for adjusting
the rocking insulator angle in two directions.

Furthermore, there has been provided in a group of
high tension electric switches of the rocking insulator
type, mounted in spaced parallel relation on a common
support, novel and improved means for operating the
switches simultaneously as a unit, which means also is
simple in construction, efficient in its operation, extreme-
ly flexible in its adaptations, and greatly reduces the over-
all cost by eliminating extra fittings now normally em-
ployed with a group or gang of switches.

Obviously, the invention is not restricted to the vari-
ous modifications herein illustrated and described.

What is claimed is:

1. In a group of high tension electric switches mounted
in spaced parallel relation on a common support with

2. Each switch including a stationary insulator carrying
switch jaws and a rocking insulator carrying a switch
blade mounted on a base member, the combination
with the rocking insulators of means for operating them
as a unit, whereby all of said switches will simultaneously
be opened or closed, said means comprising a bearing
assembly for each rocking insulator including a pair of
upright support members mounted on opposite sides of
the switch base member and having ring shaped bearings
formed in their upper ends, a shaft extending through
and journaled in said bearings, an insulator support
plate having an S-shaped configuration to provide three
arms positioned one above the other in spaced and gen-
erally parallel relation, the uppermost of said arms pro-
viding a mounting surface for the rocking insulator, the
lowermost of said arms being rigidly attached to said
shaft intermediate said bearings, and adjusting means
mounted on said support plate for varying the plane of
said uppermost arm to thereby adjust the rocking insula-
tor angle in two directions; and an elongated shaft rigid-
ly connecting all of the bearing assemblies together,
said elongated shaft being received in the space between
the uppermost and intermediate arms of each of the insula-
tor support plates and detachably clamped therein, where-
by all of the rocking insulators will be operated simulta-
neously as a unit.

2. In a group of high tension electric switches mounted
in spaced parallel relation on a common support with
each switch including a base member on which is mounted
a stationary insulator carrying switch jaws and a rock-
ing insulator carrying a switch blade, the combination
with the rocking insulators of means for operating them as a unit, whereby all of said switches will be simultaneously opened or closed, said means comprising a bearing assembly for each rocking insulator including a pair of upright support members mounted on opposite sides of the unit provided with said ring shaped bearings formed in their upper ends, a shaft extending through and journaled in said bearings, an insulator support plate having a C-shaped configuration to provide two arms positioned one above the other in a spaced apart and generally parallel relation, the upper of said arms providing a mounting surface for the rocking insulator, the lower of said arms having a pair of spaced-apart transversely extending axially aligned hollow pipe sections fixedly attached to its bottom surface with the outer free ends of each of said pipe sections journaled in one of said arms, and adjusting means mounted on said insulator support plate for varying the plane of said upper arm to thereby adjust the rocking insulator in two directions; an elongated shaft, rectangular in cross section, extending through the hollow pipe sections of all of said bearing assemblies; and clamping means carried by the lower arm of each of said bearing assemblies and positioned between the short pipe sections thereof for rigidly and detachably clamping said square shaft to the lower arm, whereby all of the rocking insulators will be operated simultaneously as a unit.

5. In a high tension electric switch of the type wherein a stationary insulator carrying switch jaws and a rocking insulator carrying a switch blade are mounted in spaced relation on a common elongated base member, the combination with said rocking insulator of a bearing assembly for pivotally mounting the rocking insulator on said base member, said bearing assembly comprising a pair of upright support members mounted on opposite sides of said base member and having ring shaped bearings formed in their upper ends; a shaft extending through and journaled in said bearings; an insulator support plate having an S-shaped configuration to provide three arms positioned one above the other in a spaced and generally parallel relation, the uppermost of said arms providing a mounting surface for the rocking insulator, the lowermost of said arms being rigidly connected to said shaft and plate; clamping means mounted on said insulator support plate for varying the plane of said uppermost arm to thereby adjust the rocking insulator angle in two directions; and a reinforcing wooden block generally rectangulard in cross section extending transversely of said insulator support plate and clamped between the intermediate and lowermost of said arms.

6. In a high tension electric switch of the type wherein a stationary insulator carrying switch jaws and a rocking insulator carrying a switch blade are mounted in spaced relation on a common elongated base member, the combination with said rocking insulator of a bearing assembly for pivotally mounting the rocking insulator on said base member, said bearing assembly comprising a pair of upright support members mounted on opposite sides of said base member and having ring shaped bearings formed in their upper ends; a shaft extending through and journaled in said bearings; an insulator support plate having a C-shaped configuration to provide two arms positioned one above the other in a spaced and generally parallel relation, the upper of said arms providing a mounting surface for the rocking insulator, the lower of said arms being fixedly attached to said shaft intermediate said bearings; and adjusting means mounted on said insulator support plate for varying the plane of said upper arm to thereby adjust the rocking insulator angle in two directions.

7. In a high tension electric switch of the type wherein a stationary insulator carrying switch jaws and a rocking insulator carrying a switch blade are mounted in spaced relation on a common elongated base member, the combination with said rocking insulator of a bearing assembly for pivotally mounting the rocking insulator on said base member, said bearing assembly comprising a pair of upright support members mounted on opposite sides of said base member and having ring shaped bearings formed in their upper ends; an insulator support plate having a C-shaped configuration to provide two arms positioned one above the other in a spaced-apart and generally parallel relation, the upper of said arms providing a mounting surface for the rocking insulator, the lower of said arms having a pair of spaced-apart transversely extending axially aligned hollow pipe sections fixedly attached to its bottom surface with the outer free ends of each of said pipe sections journaled in one of said arms, and adjusting means mounted on said insulator support plate for varying the plane of said upper arm to thereby adjust the rocking insulator angle in two directions; and a reinforcing wooden block generally rectangular in cross section extending transversely of said insulator support plate and clamped between the intermediate and lowermost of said arms.
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pipe sections for rigidly clamping said square shaft to said lower arm; and adjusting means mounted on said insulator support plate for varying the plane of said upper arm to thereby adjust the rocking insulator in two directions.

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