ABSTRACT: A wire or cable stringing block having a frame provided with a grounding connection, a sheave mounted in the frame for rotation about a fixed axis over which the conductor passes, and a pair of swing arm mounted guide rollers on opposite sides of the sheave which bear downwardly on the conductor under the influence of tension springs, the positions of the guide rollers being independently adjustable relative to the sheave so that the conductor may assume different sags on the opposite sides of the sheave and still be positively grounded and maintained in proper alignment.
CONDUCTOR STRINGING GROUNDING BLOCK

BACKGROUND OF THE INVENTION

This invention relates to blocks for stringing wire and cable conductors on overhead pole lines, and more particularly to wire stringing blocks which not only support and guide the wire being strung, but also provide a positive and continuous grounding of the wire.

In stringing conductors, particularly bare wire, over or adjacent to energized lines, there is a possibility of accidental contact between the conductor being installed and one in service, and consequent injury to linemen. Various efforts have therefore been made to guard against energization of the reel or stringing equipment on the ground by grounding the stringing blocks mounted on the pole crossarms and providing means for maintaining rolling contact between the conductor being strung and the grounded blocks.

One example of the type of wire stringing grounding block used prior to the present invention is that disclosed in Pat. No. 2,786,092, dated Mar. 19, 1957, comprising a crossarm mounted grounded saddle or frame having a pair of rollers journaled in extensions at the opposite sides of the frame for rotation about fixed horizontal axes and over which the wire passes, and a center roller riding on top of the wire and journaled in a carrier which is vertically slidable in the frame relative to the two side rollers, a tension spring being provided for resiliently urging the carrier and center roller in a downward direction.

Although this prior type of block is adequate for handling the smaller sizes of wire up to No. 3/0 A.W.G., it is not suitable for the larger size conductors which are being used more and more frequently in current installations. Furthermore, this form of block is limited to crossarm mounted use, and frequently causes nicking or scarring of the conductor being strung because of the relatively sharp edges of the rollers, particularly when the conductor is slightly out of alignment.

SUMMARY OF THE INVENTION

The present invention resides in a conductor stringing grounding block of improved construction which is capable of supporting and guiding relatively large diameter conductors up to about 800,000 circular miles in size, while providing a positive and continuous grounding of the conductor. The improved block is versatile in use in that it can be either crossarm mounted or suspended from a suspension assembly or a pole mounted adapter.

In general, the block of the present invention comprises a frame provided with an electrical grounding connection, a conductor supporting sheave mounted centrally of the frame for rotation about a fixed horizontal axis, a pair of guide rollers on opposite sides of the frame each of which is journaled in the outer ends of a pair of arms having their inner ends pivotally mounted on the frame, each pair of arms being moveable independently of the other pair, and tension spring means which urge the rollers individually downwardly into contact with the upper surface of the conductor, whereby the latter may assume different sag angles on opposite sides of the sheave and yet remain positively grounded and in proper alignment. One side plate of the block has an openable hinged portion defining one wall of the throat of the block, and one arm of each pair of roller supporting arms is detachable from its associated roller and individually movable to a lowered position, so as to permit placement of the hight portion of a conductor in the block without threading the conductor through the throat of the block.

BRIEF DESCRIPTION OF THE DRAWING

FIGS. 1 and 2 are an end view and a side view, respectively, of one form of conductor stringing grounding block embodying the present invention, showing the block mounted on a pole crossarm, certain parts being omitted in FIG. 1 in the interest of clarity, and FIG. 2 indicating the individual adjustability of the guide rollers to accommodate different sag angles on the opposite sides of the block;

FIGS. 3 and 4 are a side view and a plan view, respectively, on an enlarged scale, of the detachable guide roller supporting arm shown extending to the right in FIG. 2, FIG. 4 showing the roller retaining latch pin FIG. 4 showing the roller retaining latch pin in its normal position while FIG. 3 shows the pin in its withdrawn or roller releasing position;

FIG. 5 is an end view of the roller supporting arm shown in FIGS. 3 and 4, looking from the right in the latter FIGS.; and

FIG. 6 is a side view of the right-hand pair of roller supporting arms of FIG. 2, omitting certain parts in the interest of clarity, showing the detachable arm in released position to permit lateral insertion of the conductor.

DESCRIPTION OF THE PREFERRED EMBODIMENT

There is illustrated in the accompanying drawings, wherein like reference numerals indicate like views in the several views, a presently preferred form of conductor stringing grounding block embodying the invention which is especially well adapted for stringing wire and cable conductors on overhead pole lines.

Referring first to FIGS. 1 and 2, the block of the present invention comprises an electrically conductive metallic frame 10 of the snatch block type having a base 12 and a series of flanged side plates 14 and 16 which extend upwardly from the base substantially parallel to one another, and between which is disposed a conductor supporting sheave 18 rotatably mounted on a horizontal shaft 20 carried by, and extending at both ends outwardly beyond, the side plates. Side plate 14 has a lower portion 21 extending vertically to a point just above the sheave 18, an integrally formed upper portion 22 which is curved inwardly to form one wall of the throat 24 of the block, and an upwardly extending boss 26 which serves as one of the bearings for a transversely extending pin 28 forming part of the block locking means hereinafter described. Side plate 16 differs from side plate 14 in that the upper portion 30 thereof, which normally forms the other wall of throat 24 and carries a boss 32 normally forming a second bearing for block locking pin 28, is formed separately from and hinged to the stationary lower portion 33 of said side plate for outward movement about a trunnion pin 34 carried by the enlarged upper ends of the flanges 35 of said lower portion of side plate 16. A double helix torsion spring 36 is mounted on pin 34 with its offset central portion in engagement with the outer face of hinged plate 30 and its ends in engagement with the outer face of the lower portion 33 of side plate 16, so that said upper plate moves inwardly to the position shown in solid lines in FIG. 1 to close the throat of the block, but yields to permit movement of said plate to the broken line position when the block is opened to receive a conductor.

In order to lock the hinged plate 30 in closed position, the boss 32 carried thereby is provided with a vertically elongated slot 28 which is adapted to receive a similarly shaped lug or ear 40 formed integrally with the end of pin 28 when said pin is turned counterclockwise through an angle of 90° from the position shown in FIG. 2. Fixed to the opposite end of pin 28 is a manually actuable handle 42 by which the pin and its lug 40 may be turned back and forth so as to unlock and lock hinged plate 30 from and to the upper portion 22 of side plate 14.

As shown in FIGS. 1 and 2, the block may be mounted on a pole crossarm 44 by means of a bracket 46 which rests on top of the crossarm and is secured thereto by means of a pair of downwardly extending bolts 48, a clamping plate 50 having openings through which the lower threaded ends of the bolts extend, and a pair of wing nuts 52 which are threaded onto the lower ends of the bolts so as to clamp the clamping plate upwardly against the lower surface of the crossarm. The frame 10 of the block is detachably connected to mounting bracket 46 by means of a triangular tongue 54, formed integrally with and projecting downwardly from the base 12 of the frame,
which is adapted to pass between a pair of laterally spaced upwardly projecting cheek plates 56 forming part of the mounting bracket and to be secured thereto by a mounting pin 58 extending through openings in both the lower portion of cheek plates 56. Accidental withdrawal of mounting pin 58 from the assembly is prevented by means of a cotter pin 60 passing through a hole in one end of the pin, while loss of the pin when intentionally withdrawn is avoided by connecting its other end to mounting bracket 46 by a chain and ring connector indicated at 62 in FIG. 2. As previously mentioned, the block of the present invention is not limited to crossarm mounted use, but may also be suspended from a suspension assembly or a pole mounted adapter. To this end, a socket connector 64 of known construction is pivotally mounted on block locking pin 28 between the bosses 26 and 32 of side plates 14 and 16. When the block is to be used in suspended condition, the frame 10 is disconnected from mounting bracket 46 by withdrawal of pin 58.

In order to enable grounding of the block and the conductor being strung, the stationary lower portion 33 of side plate 16 is provided with a terminal lug 66 to which a ground wire 68 (not shown to scale) may be clamped in any suitable manner, it being understood that the ground wire may lead either to a conductor earth return or to a driven ground rod in accordance with standard power line practice. However, with a block of the construction thus far described, positive and continuous grounding of the conductor being strung is not assured, particularly in the case of the larger size conductors. The block of the present invention solves this problem by the use of a pair of conductor guiding and grounding rollers 70 and 72, positioned on opposite sides of the sheave 18, which are so supported by the frame 10 as to be capable of independent swinging movement in paths outside the periphery of the sheave and, as shown in FIG. 2, are spring urged downwardly into contact with the upper surface of the conductor 73 as it passes over the sheave, whereby the conductor may assume different sag angles on opposite sides of the sheave and still be positively grounded and maintained in proper alignment.

In the embodiment illustrated, each of rollers 70 and 72 is supported by a pair of swing arms 74 and 76 extending outwardly from the frame 10 and having their inner ends pivotally mounted on the ends of shaft 20 outwardly of the frame side plates 14 and 16, shaft 20 being provided with bushings 78 and 80 which maintain the arms in proper relationship with respect to the side plates so as not to interfere with their own swinging movement or with opening of hinged plate 30, and with washers 79 and cotter pins 81 which maintain the arms in proper position on the ends of shaft 20. The rollers 70 and 72 are rotatably mounted on shafts 82 and 84, respectively, the ends of which shafts are journaled in suitable bearings in the outer ends of each pair of arms 74 and 76. The length of roller supporting arms 74 and 76 is so selected that, as will be evident from FIG. 2, the paths of swinging movement of rollers 70 and 72 lie outside the periphery of sheave 18. Because of the overlapping of the inner ends of arms 74 and 76 consequent to their common pivotal mounting on shaft 20, it will be seen from FIG. 1 that the rollers are of different axial dimensions, roller 72 being longer than roller 70, and that the shafts 82 and 84 are likewise of different lengths. As is also indicated in FIG. 1, the central portion of each roller is tapered inwardly to form a cylindrical portion 86 of reduced diameter which lies in the same vertical plane as the base portion of the groove of sheave 18, a construction providing proper alignment of the conductor 73 as it approaches and leaves the block and avoids nicking or scarring of the conductor.

In order to continuously urge rollers 70 and 72 downwardly into positive grounding and guiding contact with the conductor 73, and to maintain that contact as the conductor assumes different sag angles during the stringing operation, each pair of arms 74 and 76 is provided with a pair of tension wound springs 88 and 90, spring 88 being connected at one end to arm 74 by a screw 92 adjacent the bearing for roller shaft 82 or 84, and at its other end to one of the flanges 93 of the lower portion 21 of side plate 14 at a point adjacent the base 12 of frame 10, well below the axis of shaft 20. Spring 90 is similarly connected to arm 76. The tension of the springs 88 and 90, individually movably to a lowered position, leaving the roller shaft and roller supported by the associated arm 74 as indicated in FIG. 6, so that, assuming that hinged plate 30 of the block frame has also been opened, the bight portion of conductor 73 may be placed in the block without threading the conductor through the throat 24 and between the arms 74 and 76.

To this end, each arm 76 is in the form of a bar, substantially rectangular in vertical cross section, having a transversely extending opening 94 adjacent its inner end adapted to receive one end of shaft 20, and a U-shaped cutout 96, open at the upper edge of the arm, adjacent the outer end thereof adapted to form a bearing for one end of the roller shaft 82 or 84. The end of the roller shaft is normally retained in the bearing cutout 96 by a manually operable latch pin 98 which is slidable in a longitudinal extending recess 100 formed in the outer end of the arm slightly below the upper edge thereof and intersecting the bearing cutout. A compression spring 102 is interposed between the base of recess 100 and the inner end of latch pin 98, and normally urges the latch pin outwardly to the position shown in FIGS. 2 and 4 wherein it closes the upper end of bearing cutout 96 and thus holds the end of shaft 82 or 84 in the bearing.

In order to lock latch pin 98 in its normal shaft retaining position, it is provided with a manually operable lever 104 in the form of a screw which is threaded radially into pin 98 adjacent its inner end and is movable in an L-shaped slot 106 formed in the upper edge and the outer side of arm 76. When lever 104 is moved outwardly along the horizontally disposed longer leg of slot 106 and then turned downwardly through 90° in the vertically extending shorter leg of the slot, to the position shown in FIG. 4, the latch pin 98 is locked in its normal position. To release the latch pin, lever 104 is turned upwardly to the vertical position indicated in FIG. 5 and then moved inwardly along the longer leg of slot 106, against the pressure of spring 102, to the position shown in FIG. 3. Arm 76 is thereby released from roller shaft 82 or 84 and may be moved downwardly, with the assistance of spring 90, to a position such as that indicated in FIG. 6, whereupon the bight of conductor 73 may be laterally inserted between arms 74 and 76, underneath the roller 70 or 72. Arm 76 may then be raised into its original position, as shown in FIG. 2, and latch pin 98 returned to its normal position of FIG. 4, so as to again support one end of roller shaft 82 or 84.

Roller arms 74 are of the same dimensions as arms 76 and are provided with transverse openings corresponding to openings 94 for receiving the ends of shaft 20, but differ from arms 76 in that, instead of the U-shaped bearing cutouts and associated latch pins, their outer ends are simply provided with transversely extending cylindrical bearing openings in which the ends of roller shafts 82 and 84 are retained by means of washers 108 and cotter pins 110 (FIG. 1).

There is thus provided by the present invention an improved conductor stringing grounding block for either crossarm mounted or suspended use which provides positive and continuous grounding of the outer edge of arm 76 and the conductor being strung, particularly the larger sizes of conductors which cannot be adequately handled by the stringing blocks of the prior art. The block herein disclosed is characterized by the inclusion of two independently supported conductor guiding and grounding rollers disposed on opposite sides of the conductor supporting sheave which are spring urged downwardly into contact with the conductor at all times, each roller reacting independently to any change in the sag angle of the conductor on its side of the block. Another feature of the block is that
both the block frame and the roller assemblies may be readily opened for lateral insertion of a conductor, thereby avoiding the necessity for threading the conductor through the block.

Although only one specific embodiment of the invention has been described and illustrated in the accompanying drawings, it will be obvious to those skilled in the art that various modifications may be made in the form, details of constructions and arrangement of the parts of the block without departing from the inventive concept. For example, it will be evident that, by interchanging the two arms at one side of the block, rollers of identical size could be used instead of the different size rollers illustrated, and that it is not essential that the shaft on which the arms are mounted be coaxial with the main sheave. It will also be apparent that means specifically different from those disclosed may be provided for supporting the rollers in the outer ends of the arms. Reference is therefore to be had to the appended claims for a definition of the limits of the invention.

I claim:

1. A conductor stringing grounding block comprising an electrically groundable frame, a conductor supporting sheave mounted in said frame for rotation about a horizontal axis fixed with respect to said frame and over which the conductor being strung is adapted to pass, a pair of conductor guiding and grounding rollers on opposite sides of said sheave under and in a contact with which the conductor is adapted to pass, and means for supporting said rollers from said frame for independent swinging movement in paths outside the periphery of said sheave, whereby the conductor may assume different sag angles on the opposite sides of the sheave while remaining in contact with said rollers.

2. A conductor stringing grounding block as claimed in claim 1, including spring means for maintaining said rollers in contact with the upper surface of the conductor as it passes over said sheave.

3. A conductor stringing grounding block as claimed in claim 1 wherein said roller supporting means comprises a shaft on which each of said rollers is mounted, and a pair of arms extending outwardly from said frame on each side thereof, the inner ends of said arms being pivotally mounted on said frame and the outer ends thereof including bearings for said shafts.

4. A conductor stringing grounding block as claimed in claim 2 wherein said spring means comprises a plurality of tension springs each connected at one end to said roller supporting means and at the other end to said frame below the axis of rotation of said sheave.

5. A conductor stringing grounding block as claimed in claim 3 wherein said arms are pivotally mounted on a common axis which is coaxial with the axis of rotation of said sheave.

6. A conductor stringing grounding block as claimed in claim 3 wherein one arm of each of said pairs of arms is detachable from the roller shaft normally journalled in the bearing at the outer end of said arm and independently movable to a position clear of the associated roller so as to enable lateral placement of a bight portion of the conductor beneath said roller.

7. A conductor stringing grounding block as claimed in claim 6 wherein each of said detachable arms includes a U-shaped bearing, open at one edge of said arm, for receiving one end of the shaft of the associated roller, and manually releasable latch means normally closing the upper end of said bearing.

8. A conductor stringing grounding block comprising a frame having a pair of side plates plates, a conductor supporting sheave mounted between said side plates for rotation about a horizontal axis fixed with respect to said frame and over which the conductor being strung is adapted to pass, an electrical grounding connection on said frame, two pairs of arms extending outwardly from said frame in opposite directions in planes parallel to the plane of rotation of said sheave, the inner ends of said arms being pivotally mounted on said side plates and the outer ends thereof being movable in arcuate paths outside the periphery of said sheave, each pair of arms being movable independently of the other pair, a conductor guiding and grounding roller rotatably supported by each pair of arms adjacent the outer ends thereof, and means for urging each of said rollers individually downwardly into contact with the upper surface of the conductor as it passes over said sheave.

9. A conductor stringing grounding block as claimed in claim 8, including a shaft supported by said side plates on which said sheave is journalled, and wherein said roller supporting arms are pivotally mounted on the ends of said shaft.

10. A conductor stringing grounding block as claimed in claim 9 wherein the means for urging each of said rollers downwardly includes a pair of tension springs each connected at one end to one of the associated pair of roller supporting arms adjacent the axis of said roller and at the other end to said frame below the axis of said shaft.

11. A conductor stringing grounding block as claimed in claim 8 wherein one of said side plates includes a portion normally defining one wall of the throat of the block but movable outwardly away from the opposite side plate to open the throat, and wherein one arm of each of said pairs of arms is detachable from the roller normally supported thereby and swingable downwardly clear of the roller, whereby a bight portion of the conductor may be placed in the block without threading the conductor through the throat and between said arms.

12. A conductor stringing grounding block as claimed in claim 11 wherein each of said detachable arms includes a U-shaped bearing, open at the upper edge of said arm, for supporting one end of the associated roller, and a manually releasable latch member normally closing the upper end of said bearing.