The present invention relates to a tool for use with electrical transmission lines and the appurtenances which support the lines.

In the industry, electrical transmission lines, distribution lines and secondary lines are constructed with wood poles, wood cross arms and the like. Wood is subject to shrinkage and the hardware mounted on the poles supporting the transmission line appurtenances becomes loose because the nuts holding the hardware on the bolts which extend through the wood members become loose due to vibrations and other factors. It is customary to make repairs to the transmission hardware without de-energizing the transmission lines.

The primary object of the present invention is to provide a tool for starting nuts onto bolts holding transmission hardware at an elevated point on a transmission pole or the like.

Another object of the present invention is to provide a tool which is safe for a linesman to use in starting and taking nuts off of bolts holding hardware to elevated brackets on poles and arms, one which is highly efficient in action, one which is sturdy in construction, and one which may be manufactured in quantity at reasonable cost.

These and other objects and advantages of the present invention will be more fully apparent from the following description when taken in connection with the annexed drawings.

FIGURE 1 is an elevational view of the tool of the present invention, the dotted line showing indicating the swinging movement of the wrench socket on the upper end of the tool in response to wobbling movement of the crank 24 on the lower end of the tool.

FIGURE 2 is an elevational view partially in section with parts broken away, on an enlarged scale, of the assembly shown in FIGURE 1, and

FIGURE 3 is a view taken on the line 3--3 of FIGURE 2.

With reference to the drawings in detail the device of the present invention comprises a first upright cylindrical fixed shank 10 fabricated of wood or other non-conductive material such as fiberglass or the like. A horizontally disposed support member 12 is positioned adjacent the lower end of the shank 10 and has on one end an upright socket 14. On the other end of the support member 12 is a depending boss 16.

The shank 10 is provided on its lower end portion with a reduced portion 18 receivable engaged in the socket 14. The boss is provided with a bore 20 which has its ends of a greater diameter than its mid-part, as shown most clearly in FIGURE 2. The bore 20 tapers smoothly from the mid-part to the ends and permits wobbling movement of a shaft 22 which is also slidable and rotatably connected to the boss 16 through the bore 20. The lower end portion of the shaft 22 carries a crank 24 having a handle 26 rotatably mounted thereon. The upper end portion of the shaft 22 carries a vertically disposed socket 28 receivable engaging the lower end portion of a second shank 30 which has a universal joint end portion 32 secured to its upper end. The other end portion 34 of the universal joint 36 carries a stub shaft 38.

The upper end portion of the shank 10 is received in a socket 40 on the lower end of an extension 42 which carries on its free end a hollow casing 44.

The upper end portion of the extension 42 is bifurcated so as to form arms 46, as shown in FIGURE 3, between which the casing 44 is mounted for rotary movement on oppositely disposed bolts 48 which extend through the arms 46. Lock nuts 50 form a means for tightening the arms 45 against the casing 44 for holding the casing 44 in any position of its adjusted movement relative to the extension 42. The free end of the stub shaft 36 is a miter gear 52 within the casing 44. Also within the casing 44 is another miter gear 54 meshingly engaged with the miter gear 52. The miter gear 54 is carried on one end of a driven shaft 56 which has a socket wrench 58 on the other end.

Within the socket wrench 58 is a magnet 60 closing the lower end of the socket. A handle 62 is circumposed about the lower end of the shank 10 and overlaps the socket 14 as shown most clearly in FIGURE 2. In use, the tool of the present invention is employed to tighten or loosen nuts or to place nuts on bolts on elevated cross arms and wooden poles of electrical transmission lines and appurtenances. Both of the shanks 10 and 30 are fabricated of electrically non-conductive material and the handle 62 is also electrically non-conductive.

The magnet 60 within the socket 58 is employed to hold a nut within the socket 58 and all positions of the socket 58 while starting the nut upon an exposed bolt at any elevation relative to the workman employing the tool.

The tool of the present invention permits the user thereof to safely and with efficiency mount nuts on bolts in overhead hardware of transmission lines and permits the tightening or removal of nuts from bolts which hold electrical hardware on elevated cross arms and the like.

The shape of the bore 20 is in the boss 16 on the one end of the support member 12 permits wobbling movement of the crank 24 to effect wobbling movement of the universal joint 36, as shown in full and dotted lines in FIGURE 3. URE 1 so as to swing the casing 44 relative to the arms 46 and position the socket 58 at various angles with respect to the horizon.

A feature of the invention resides in the number of teeth on the gear 52 relative to the number of teeth on the gear 54 which permits a single rotation of the shaft 36 for every two rotations of the shank 30. This enables the user of the tool to apply more power to the tightening of nuts when one is temporarily held in the socket 58 by the magnet 60.

While only a preferred embodiment of the present invention is shown and described it is contemplated that other embodiments are possible within the terms of the invention as defined by the appended claims.

What is claimed is:

1. A tool comprising an upright cylindrical fixed shank, a casing connected to the upper end of said shank, said shank having a reduced portion adjacent the lower end thereof, a horizontally disposed support member disposed adjacent the lower end of said shank and having an upright socket on one end receivable engaged by said shank reduced portion, a boss dependingly carried on the other end of said support member, there being a vertically disposed bore extending through said boss, a shaft connected to said boss for rotary, sliding, and wobbling movement in said bore, a second socket carried on the upper end of said shaft, a crank operatively connected to the lower end of said shaft, a vertically disposed rotatable shank having its portion adjacent the lower end receivable engaged in said second socket, a universal joint disposed adjacent the upper end of said rotatable shank and having one end connected to the upper end of said rotatable shank, a stub shaft projecting from the other end of said joint and having the portion adjacent the free end rotatably mounted in said casing, a first miter gear carried on the portion of said stub shaft within said casing, a driven shaft having the portion adjacent one end projecting into said casing, a second miter gear carried on said driven
shaft end portion meshingly engaged with said first gear, and a wrench carried on the other end of said driven shaft.

2. A tool comprising an upright cylindrical fixed shank fabricated of electrically non-conductive material, a casing connected to the upper end of said shank for rotary movement, said shank having a reduced portion adjacent the lower end thereof, a horizontally disposed member disposed adjacent the lower end of said shank and having an upright socket on one end receivably engaged by said shank reduced portion, a boss dependingly carried on the other end of said support member, there being a vertically disposed bore extending through said boss, said bore having the ends thereof of greater diameter than the mid-part of said bore, a shaft having a diameter substantially the same as said bore mid-part connected to said boss for rotary, sliding, and wobbling movement in said bore, a second socket carried on the upper end of said shaft, a crank operatively connected to the lower end of said shaft, a vertically disposed rotatable shank having the portion adjacent the lower end receivably engaged in said second socket, a universal joint disposed adjacent the upper end of said rotatable shank, and one end connected to the upper end of said rotatable shank, a stub shaft projecting from the other end of said joint and having the portion adjacent the free end thereof rotatably mounted in said casing, a first miter gear carried on the portion of said stub shaft within said casing, a driven shaft having the portion adjacent one end projecting into said casing at a right angle with respect to said stub shaft, a second miter gear carried on said driven shaft adjacent the portion meshingly engaged with said first gear, and a socket wrench carried on the other end of said driven shaft.

3. A tool comprising an upright cylindrical fixed shank fabricated of electrically non-conductive material, a casing rotatably carried on the upper end of said shank, said shank having a reduced portion adjacent the lower end thereof, a horizontally disposed support member disposed adjacent the lower end of said shank and having an upright socket on one end receivably engaged by said shank reduced portion, a boss dependingly carried on the other end of said support member, there being a vertically disposed smooth-walled bore extending through said boss, said boss tapering smoothly from a reduced diameter mid-part to the ends thereof, a shaft having a diameter substantially the same as said bore mid-part connected to said boss for rotary, sliding, and wobbling movement in said bore, a second socket carried on the upper end of said shaft, a crank operatively connected to the lower end of said shaft, a vertically disposed rotatable shank having the portion adjacent the lower end receivably engaged in said second socket, a universal joint disposed adjacent the upper end of said rotatable shank, and one end connected to the upper end of said joint and having the portion adjacent the free end thereof rotatably mounted in said casing, a first miter gear carried on the portion of said stub shaft within said casing, a driven shaft having the portion adjacent one end projecting into said casing at a right angle with respect to said stub shaft, a second miter gear carried on said driven shaft portion meshingly engaged with said first gear, a socket wrench carried on the other end of said driven shaft, and a magnet seated in the socket of said socket wrench.

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