April 6, 1954 J. KOSINSKI 2,674,027

IMPROVEMENT IN PORTABLE CIRCULAR SAWS FOR CUTTING ARMORED-CABLES

Filed Jan. 15, 1953

2 Sheets-Sheet 1

Fig. 2

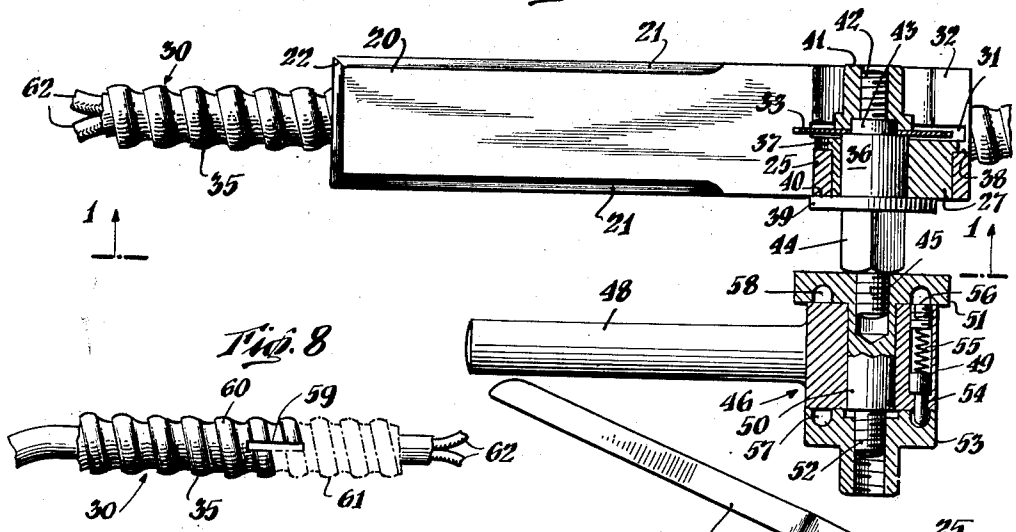


Fig. 8

Fig. 1

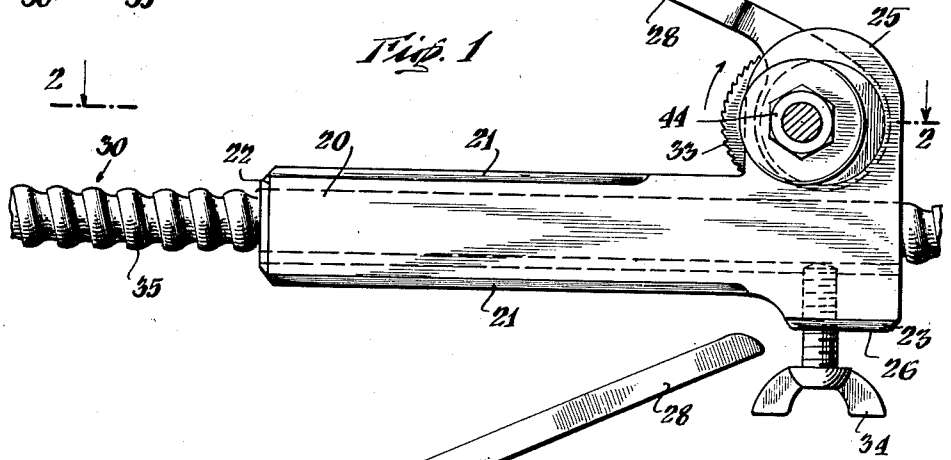
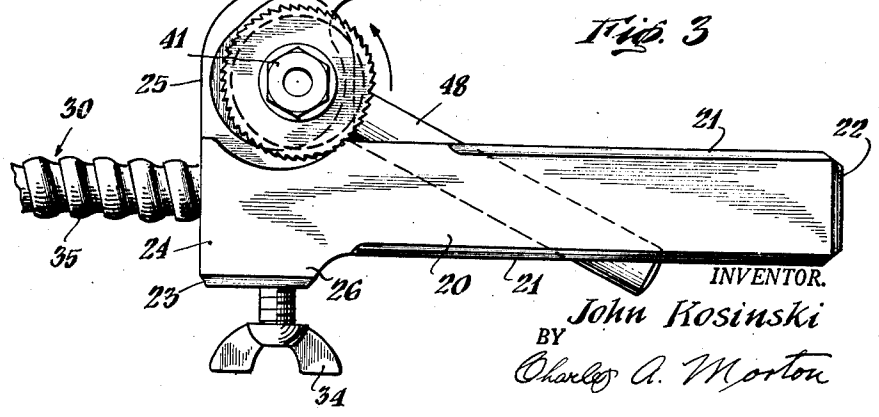


Fig. 3



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Fig. 4

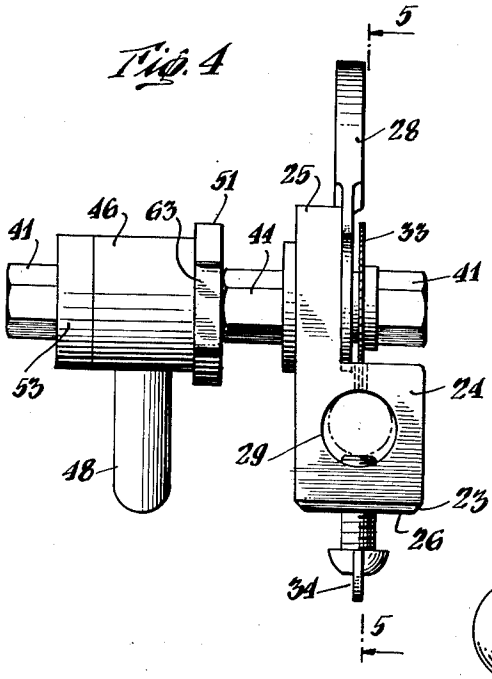


Fig. 7

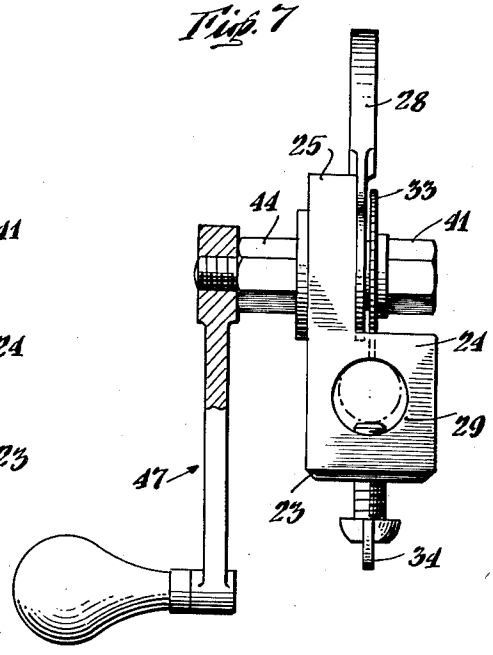


Fig. 5

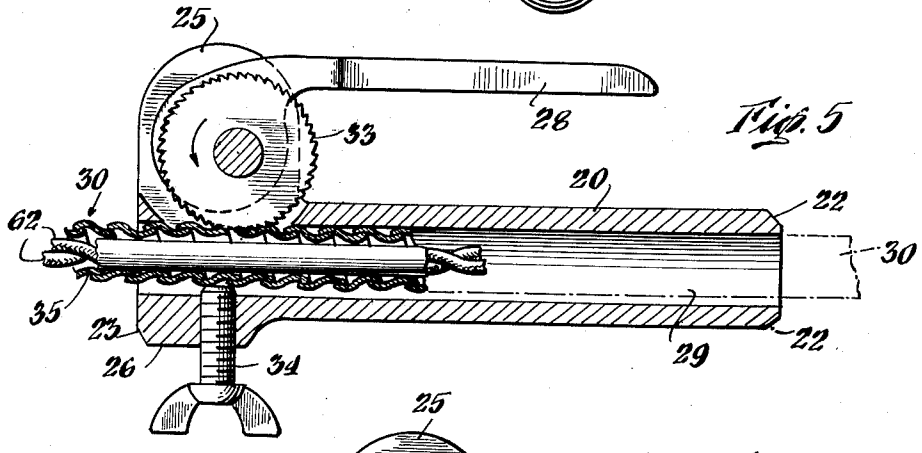
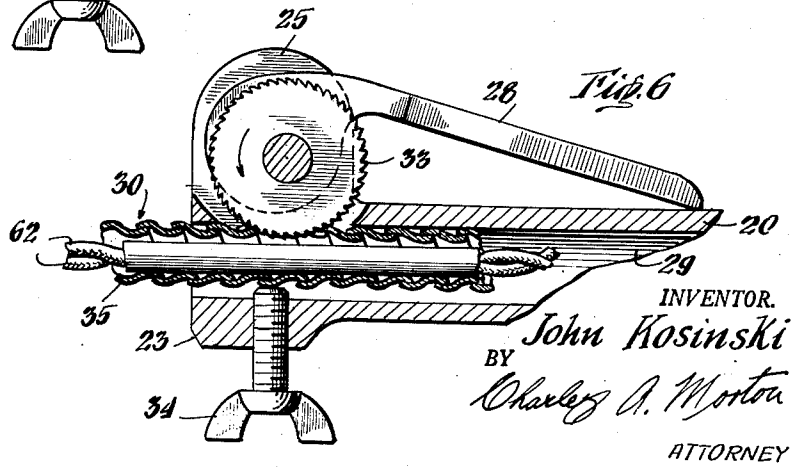


Fig. 6



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Patented Apr. 6, 1954

2,674,027

UNITED STATES PATENT OFFICE

2,674,027

IMPROVEMENT IN PORTABLE CIRCULAR SAWS FOR CUTTING ARMORED-CABLE

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Application January 15, 1953, Serial No. 331,456

5 Claims. (Cl. 29—69)

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This invention relates to improvements in portable armored cable cutting tools, and more particularly to a portable circular saw for cutting the helically wound metallic tape sheath of BX cable.

It is the practice for electricians to remove the metallic sheath of BX cable to expose the insulated conductors, by cutting through the metallic sheath with a hack saw. The BX cable is often supported upon the workman's knee while the metallic sheath is cut with the hack saw, and many workmen have been seriously injured because either the saw or the cable has slipped during the cutting of the metallic sheath. Moreover the hack saw often punctures the insulation which covers the conductor wires, thus breaking down the insulating properties of the BX cable, and, if not detected and corrected, exposing the conductor wires to the danger of a ground, a short circuit, and a high voltage breakdown. To correct the condition, the metallic sheath is sawed through beyond the puncture and the conductor wires are cut back, thus wasting time and material, and when the cut-back makes the BX cable too short, it must be pulled out and replaced by a new run of cable. Various attempts have been made to provide a cutting tool to replace the hack saw, but none of them have found acceptance among electricians.

The object of this invention is an improved manually operated portable cutting tool which is safe for electricians to use, and which can be manipulated to rapidly cut through the metallic sheath of armored cable without damaging either the cable conductors or the insulation which surrounds them during the cutting operation.

Another object is an improved manually operated portable cutting tool which utilizes a rotary saw to cut the metallic sheath of the armored cable and which both regulates and limits the depth of cut of said rotary cutter.

Another object is an improved manually operated portable cutting tool which can be converted from a ratchet-operated, to a crank-operated, tool, and back again, at will.

Another object is an improved manually operated portable cutting tool which cuts the metallic sheath of armored cables of various sizes to one uniform depth without injuring the conductors or their associated insulation.

Another object is an improved portable cutting tool which can be used at will either as a hand tool or as a bench tool.

Another object is an improved knockdown

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hand operated portable cutting tool of but a few simple parts which can be carried in a tool kit, which parts can rapidly be assembled into a rugged cutting tool for use either in the hand or as a bench tool, and which can be rapidly disassembled and packed away, when not in use.

Another object is a portable cutting tool wherein the cutter can be quickly removed and replaced by another cutter.

With these and other objects in view, the invention consists of a few simple rugged parts arranged in a new, novel and improved combination, the advantages whereof are more fully set forth and defined in the following specification and claims, and are illustrated in the accompanying drawings consisting of two sheets of eight figures, numbered Figs. 1 to 8, both inclusive, wherein:

Fig. 1 is a sectional view of a part of the tool, approximately actual size, taken along the line 1—1 of Fig. 2, looking in the direction of the arrows, and illustrating a length of BX cable clamped in position for cutting.

Fig. 2 is a top plan view of the tool, partly in cross section and approximating actual size, taken along the line 2—2 of Fig. 1, looking in the direction of the arrows, and illustrating a length of BX cable clamped in position for cutting, combined with one form of tool operating mechanism which is also shown partly in cross section.

Fig. 3 is a side elevation of the fully assembled tool as viewed from the opposite side of Fig. 1.

Fig. 4 is an end view of the head of the tool as viewed from the left of Fig. 3.

Fig. 5 is a vertical cross sectional view taken along the line 5—5 of Fig. 4, looking in the direction of the arrows, with a length of BX cable clamped in position for cutting.

Fig. 6 is a fragmentary cross sectional view showing a length of BX cable after the armor has been cut through.

Fig. 7 is an end view of a modified form of the tool wherein the ratchet-operated mechanism has been replaced by a crank handle; and

Fig. 8 is a detailed side elevation of a length of BX cable showing the armor after it has been cut by the cutting tool, the cut-off section of armor being shown in broken lines.

Like reference characters designate corresponding parts throughout the several figures of the drawing.

The elongated handle 20 (Fig. 1), is square in cross section (Fig. 4), with the corners of the tool bevelled off wherever possible as at 21, 21; 22, 22; and 23, 23 to avoid risk of injury to the

operator when using the tool and more particularly when the handle is used as a hand grip. The head-end 24 of the tool (Fig. 4), which is preferably integral with the handle 20 (Fig. 1), includes an upstanding flange or shoulder 25 and a thickened bottom wall 26. A hole is drilled through the shoulder 25 at right angles to the length of the handle 20, to provide a bearing wherein the stepped barrel cam 27 (Fig. 2), formed at one end of the lever arm 28 (Fig. 1), is journalled to turn when the lever arm 28 is moved from the position shown in Fig. 1, through the position shown in Fig. 5, to the position shown in Fig. 6.

A round hole extends lengthwise through the axis of the handle 20 from end to end thereof to form a central duct or passage 29 for containing a length of BX (armored) cable 30, and this duct 29, which is preferably cylindrical, is large enough to freely accommodate the several sizes of BX cable now in common use. An elongated slot 31 extends through the top wall 32 of the head end 24 and through the roof of the duct 29 and connects with the duct passage. The slot 31 is large enough to afford free passage for a disk cutter 33 or circular saw, and the top face of the head end 24 and the slot 31 may be concavely curved from top to bottom (compare Figs. 3, 5 and 6), to accommodate and receive the disk cutter or circular saw 33.

A hole extends through the bottom wall 26 of the head end 24 and connects with the passage of the duct 29 (Figs. 5 and 6), and this hole is threaded to receive a wing screw 34 which is adjustable relative to the passage in the duct 29 to engage the armored jacket 35 of the BX cable, thus clamping the BX cable against the arched roof of the duct 29 immediately beneath the elongated slot 31 to retain the armored jacket 35 of the BX cable in fixed position while the jacket 35 is cut through by the circular saw 33. The wing screw 34 is in substantial alignment with the transverse axis of the elongated slot 31 (see Fig. 4) and with the vertical axis of the stepped barrel 27 (compare Figs. 2 and 5), so that when the wing screw 34 engages the armored jacket 35 it centers the jacket 35 immediately beneath the elongated slot 31, in position to be cut by the circular saw 33.

The stepped barrel 27 of the lever arm 28 has a round hole passing through said barrel, and the said hole forms a bearing in which the flanged shaft 36 is radially offset with respect to the axis of rotation of the stepped barrel 27, so that when the cam lever arm 28 is moved from an upper, to a lower, position and back again (compare Figs. 1, 5, and 6), the barrel cam oscillates in its bearing to move the flanged shaft 36 towards, away from, and lengthwise relative to, the elongated slot 31 in the top wall 32 of the head end 24.

The annular flange 37 of the barrel cam 27 abuts against the inner side face 38 of the shoulder 25 to locate the barrel cam in operating position. The shaft 36 (Fig. 2) is provided with an annular flange 39 which abuts, and in part overlaps, the reduced end face of the barrel cam 27 and the outer face 40 of the shoulder 25 to locate the shaft 36 in operating position, so that when the bell nut 41 is drawn tight upon the threaded end 42 of the shaft 36 against the face of the disk cutter or circular saw 33, the barrel cam is so assembled in the shoulder 25 and the shaft 36 is so assembled in the barrel cam 27, that the barrel cam 27 is free to oscillate in the shoulder 25 and impart an up and down and lengthwise (eccentric) motion to the shaft 36 and to the circular saw 33 mounted upon the said shaft, relative to the elongated slot 31, and the eccentrically moving shaft 36 is free to rotate in the barrel cam 27 to drive the circular saw 33 and bring the teeth of the saw into the proper position (Fig. 5) to cut the armored jacket 35 of the BX cable 30.

A round hole is formed at the centre of the circular saw 33, and this hole is slightly larger in diameter than the diameter of the reduced ring 43 of the shaft 36. The hole in the circular saw 33 effects a sliding fit between the saw and the ring 43, and the circular saw 33 is firmly clamped between the face of the wall of the radial flange of the shaft 36 and the rim of the skirt of the bell nut 41, to lock the saw 33 to the shaft 36. The location of the radial flange or annular shoulder formed by the stepped-up end of the ring 43 is such as to insure that the inner face of the circular saw is spaced away from the end face of the barrel cam 27 and that the rim of the circular saw is spaced between the edge faces of the elongated slot 31, so that the saw will not bind either against the barrel cam 27 or against the side walls of the slot 31 (Fig. 1). There is sufficient clearance between the skirt of the bell nut 41 and the face of the ring 43 to prevent the ring from binding against the inner face of the skirt of the bell nut.

The shaft 36 extends beyond the flange 39 in a hexhead 44, and terminates in a reduced and male threaded stud 45. Thus after the barrel cam 27, shaft 36, and circular saw 33, have been assembled upon the shoulder 25, they may be lockably secured in operative position by tightening the bell nut 41 with a wrench against the hexhead 44.

The shaft may perhaps be most conveniently actuated by a ratchet lever mechanism 46 (Fig. 2), or it may be driven by a crank handle 47 (Fig. 7).

The ratchet mechanism 46 (Fig. 2), consists of a lever arm 48 terminating at one end in a hub 49 having a hole drilled through the centre of the hub to receive a stud 50, which carries an internally threaded collar 51 at one end, and a male threaded stud 52 at the other end. A milled bell nut 53 threadably engages the threaded stud 52 to secure the stud 50 to the lever arm 48.

The hub 49 is bored and counterbored crosswise in parallel spaced relation to its central axis to form a stepped hole which is female threaded at the mouth of the counterbore to slidably contain and retain the enlarged shoulder of a ball-nosed pin 54 whose ball-nose protrudes through the face of the hub 49 under control of a spring follower 55 interposed between the base of the shoulder of the pin 54 and the forward end of an Allen screw 56 which is threadably adjustable in the female thread of the counterbore to vary the pressure exerted upon the pin 54 by the spring follower 55. A series of radially disposed notches 57 are formed upon the inner face of the skirt of the bell nut 53, and the ball-nose of the pin 54 is designed to register in these notches 57 as the hub 49 rotates upon the stud 50.

The ratchet mechanism 46 is a separate sub-assembly. To form this sub-assembly the stud 50 is inserted in the hole in the hub 49, and the bell nut 53 is screwed upon the male thread 52 of the stud 50 to draw the parts together and engage the ball-nosed pin 54 in one of the notches 50.

To combine the ratchet mechanism 46 with the cable cutter, the internally threaded collar 51 is now screwed upon the male threaded end of shaft 36 to complete the assembly which is more clearly shown in Fig. 2 of the drawing.

The inner face of the collar 51 may also be provided with a series of notches 53, so that in forming the sub-assembly 46 the lever arm 43 may be mounted in reverse position upon the stud 50 without affecting the operation of the ratchet sub-assembly.

The tool is purposely designed to accommodate a circular saw of a size which is available upon the open market. The saw 33 may be made of high speed steel or of carbon steel which is cheaper.

The collar 51 is preferably flattened on opposite sides, as at 63 (Fig. 4), to permit use of a wrench when attaching the collar 51 to, or detaching it from, the threaded end 45 of the flanged shaft 36.

The toothed disk cutter 33 cuts a straight saw cut 59 (Fig. 8), in and across one helix of the armored jacket 35 of the BX cable 30, thus detaching the end portion 61 (shown in broken lines) of the armored jacket 35 from the retained portion 60. The end portion 61 is twisted slightly to disengage it, and is then slipped off the end of the BX cable 30 to expose the cable conductors 62, 62 which may then be prepared for connection to a lighting or other electrical distribution system in the usual way.

Operation

The BX cable is inserted in the duct 29 of the elongated handle 20, and the wing screw 34 is screwed inwards to force the cable 30 against the roof of the duct 29 and clamp it in the position substantially as shown in Figs. 4, 5 and 6.

The tool may be used as a hand tool, in which case the elongated handle 20, which forms a hand grip, is grasped in the hand, and thumb or finger pressure is applied to cam lever arm 28 to turn and lower the stepped barrel 27 and the toothed disk cutter 33 until the teeth of the toothed disk cutter are in contact with the armored jacket 35 of the BX cable 30. The lever arm 43 (Fig. 3) is now rocked intermittently back and forth through a convenient angle of travel, under control of the ratchet mechanism 46, to drive the toothed disk cutter through the same angle of travel but step by step and counter-clockwise (Figs. 3 and 5), to allow the teeth of the disk cutter 33 to cut through and across the armored jacket 35 to form and extend the saw cut 59.

As the lever arm 28 approaches the elongated handle 20, it passes from the position shown in Fig. 3, through the position shown in Fig. 5, towards the position shown in Fig. 6. When the lever arm 28 engages the face of the elongated handle 20, see Fig. 6, it arrests further turning movement of the stepped barrel 27 and of the flanged shaft 36 which carries the toothed disk cutter 33. As the flanged shaft 36 turns clockwise under control of cam lever arm 28, the toothed disk cutter 33 moves both downwards and outwards (towards the left of Figs. 5 and 6), to lengthen the elongated saw cut 59. The downward movement of the disk cutter which is supported upon the reduced shaft 43 of flanged shaft 36 carried in the stepped barrel 27, is limited by the cam lever arm 28 as shown in Fig. 6, so that the teeth of the disk cutter 33 only cut through the armored jacket 35 of the BX cable 30, but the teeth of the disk cutter 33 never travel deep enough to cut or injure the insulation which encloses each of the twin conductors 62, 62, thus preventing any injury either to the twin conductors or to the insulation which surrounds them. The saw cut 59 extends the full length or width of at least one helix of the corrugated ribbon which forms the armored jacket 35, to separate the severed portion 61, from the portion 60, and the severed portion 61, shown in broken lines, may then by twisted axially and shifted lengthwise away from the portion 60, and slipped off the free end of the twin conductors 62, 62 to expose them ready for use.

To use the tool as a bench tool instead of as a hand tool, the tool is either fastened down as to the top of a bench, in any desired manner, as by means of U bolts, or it may be clamped between the jaws of a vise.

The crank handle (Fig. 7), may be substituted for the ratchet lever mechanism 46 of Fig. 2, if desired, especially when the device is used as a bench tool. For operation as a hand tool the ratchet mechanism is more readily manipulated by one operator, and is therefore better suited for hand operation.

The duct 29 is large enough to freely receive BX cables of various sizes, but since the armored jackets of the various sizes of BX cable, which jackets are of substantially the same gauge or thickness, are always forced against the roof of the passage 29, and since the extent of the descent of the disk cutter 33 carried by the flanged shaft 36 is always limited by the cam lever arm 28 in its stop position (Fig. 6), the teeth of the disk cutter can not cut below a predetermined depth or level which is always above the level normally occupied by the conductors 62, 62.

The head end of the handle 20 is cut away (Fig. 3), to form an arc-shaped recess corresponding to the general curvature of the circular saw 33, so that, by merely removing the bell nut 41, the circular saw 33 can be quickly removed and replaced.

When not in use the tool may be dismantled by removing the handle and ratchet assembly 46 and 43, and the tool stowed in the tool kit. The handle assembly 20 (Fig. 2) can be dismantled by loosening the bell nut 41, and the ratchet assembly can be dismantled by loosening the collar 51 in the bell nut 53 (Fig. 2).

The parts are few, rugged and simple to assemble and to dismantle, and lend themselves to easy mass production, thus lowering both cost of manufacture and of assembly, of the complete tool.

Other modifications and variations of my armored-cable cutting tool, within the scope of the appended claims, will be obvious to those skilled in the art.

What is claimed is:

1. In a cable cutting tool and in combination an elongated handle for providing a hand-grip, said handle having a hole extending lengthwise from end to end thereof to constitute a duct large enough to freely accommodate a length of BX cable, one end of said handle being the head end thereof, an upstanding shoulder formed at said head end and laterally offset from the longitudinal axis of the duct, an elongated slot extending through the top wall of the handle into the duct at the head end, said slot being in alignment with the longitudinal axis of the duct, said shoulder having a hole therethrough forming a

bearing extending at right angles to the length of the duct, a barrel cam journalled in said bearing, a lever arm attached to said barrel cam to oscillate it, a hole extending eccentrically through said barrel cam and forming a bearing, a shaft journalled in said bearing, a circular saw mounted on said shaft in alignment with the elongated slot in the top wall of the handle, said lever arm being movable towards and away from said handle to oscillate said cam and thus bring said circular saw into position to cut the armored jacket of the BX cable, and means to rotate the shaft and circular saw to cut a saw cut in the armored cable.

2. In a cable cutting tool and in combination an elongated handle for forming a hand-grip, said handle having a hole extending lengthwise from end to end to constitute a duct large enough to freely accommodate a length of BX cable, one end of said handle being the head end thereof, an upstanding shoulder formed at one side of said head end, an elongated slot extending through the top of the handle into the roof of the duct at the head end, said slot being substantially in alignment with the long axis of the duct, a barrel cam, said shoulder having a hole formed therethrough, said barrel cam being journalled in said shoulder-hole, a lever arm attached to said barrel cam operable to oscillate said barrel cam, a shaft eccentrically journalled to rotate in said barrel cam, a circular saw mounted in said shaft and rotatable in unison therewith in alignment with the elongated slot in the top of the handle, said lever arm being movable towards and away from said handle to oscillate said cam and thus bring said circular saw into position to cut the armored jacket of the BX cable, and means to clamp the armored jacket of the BX cable against the roof of the duct preparatory to operating the saw.

3. In a cable cutting tool and in combination an elongated handle for providing a hand-grip, said handle having a hole extending lengthwise thereof from end to end to form a duct large enough to freely accommodate the end of a length of BX cable, one end of said handle being the head end thereof, an upstanding shoulder formed at said head end and laterally offset relative to the long axis of the duct, an elongated slot extending through the top of the handle and the roof of the duct at the head end substantially in alignment with the long axis of the duct, said shoulder having an opening therethrough extending at right angles to the length of the handle, a barrel cam, a lever handle therefor, said barrel cam being mounted to oscillate in said shoulder opening under control of said lever handle, a shaft journalled to rotate in said barrel cam eccentrically thereto, a disc cutter mounted on said shaft in alignment with the elongated slot, and said lever arm being operable to oscillate said barrel cam and bring said cutter into position to cut the armored jacket of a BX cable extending through the head end of the duct.

4. In a hand-tool for cutting the armored jacket of a BX cable and in combination, a hand-grip having a head-end, an opening in said head-end large enough in cross-section to hold one end of a piece of BX cable, a slot extending through the wall of said head-end into said opening, said slot being disposed parallel to the longitudinal axis of said head-end opening, a cylindrical body mounted upon said head-end and free to oscillate about an axis intersecting the longitudinal axis of said head-end opening, a hole extending through, and positioned eccentric to the axis of oscillation of, said cylindrical body, to form an eccentric bearing, a circular saw mounted to rotate about said eccentric bearing in cooperative registry with said slot, a ratchet-controlled lever for rotating said circular saw, and means for oscillating said cylindrical body to move said bearing eccentrically thereby lowering the saw disk into, and advancing it along, said slot, in a direction to cut through the armored jacket of an end of BX cable held in said head-end opening.

5. In a hand-tool for cutting the armored jacket of a BX cable and in combination, a handle forming a hand-grip and having a head-end, an opening in said head-end, said opening being large enough in cross-section to hold one end of a piece of BX cable, means for securing a piece of BX cable in said opening, a slot extending through the wall of the head-end into said opening, said slot being disposed in parallel to the longitudinal axis of the armored jacket of a piece of BX cable secured in said head-end opening, a member supported upon said head-end and free to oscillate thereon in spaced relation to said slot, the axis of oscillation of said member intersecting the longitudinal axis of the armored jacket of a piece of BX cable secured in said head-end opening, a hole formed in said member, a circular saw rotatably supported in said hole in cooperative registry with said slot, means for rotating the circular saw, and means for imparting movement to said oscillatable member to progressively move said rotating saw downwardly into, and forwardly along, said slot, to saw an elongated saw-cut through the armored jacket of a piece of BX cable secured in said head-end opening without injuring the insulated conductors of said BX cable.

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