Feb. 24, 1953 A. F. SHALLCROSS 2,629,275

PIVOTED HAND TOOL FOR BENDING HEAVY WIRES

Filed Aug. 18, 1949

Fig. 1

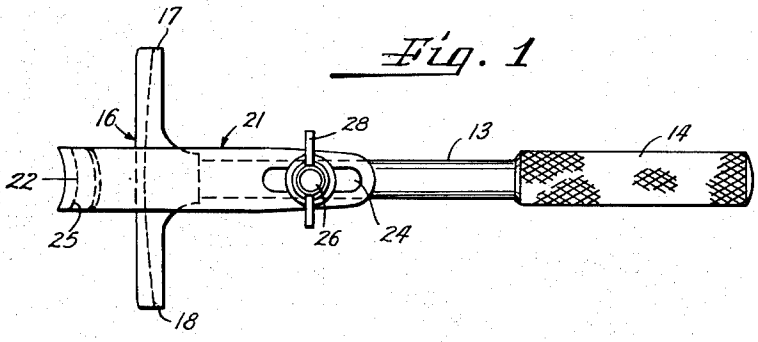


Fig. 2

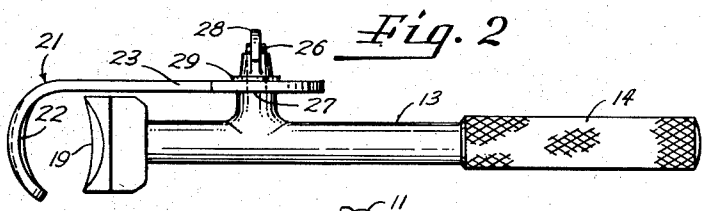


Fig. 3

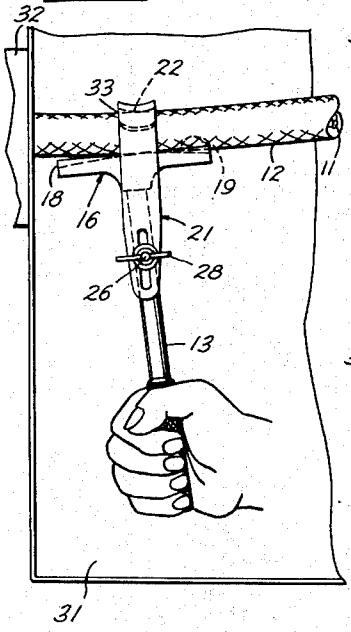


Fig. 4

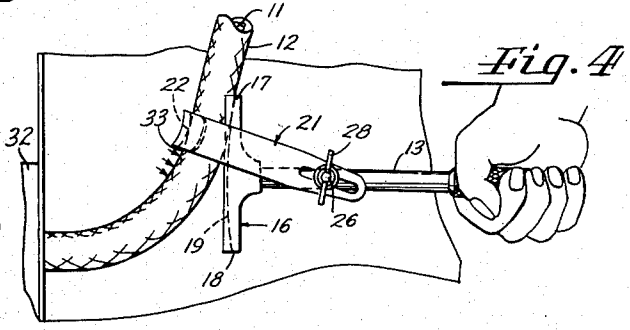
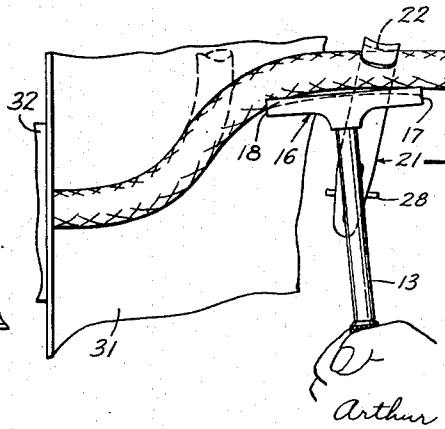


Fig. 5



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Patented Feb. 24, 1953

2,629,275

UNITED STATES PATENT OFFICE

2,629,275

PIVOTED HAND TOOL FOR BENDING HEAVY WIRES

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Application August 18, 1949, Serial No. 111,003

3 Claims. (Cl. 81—15)

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This invention relates to a tool for bending relatively large electrical conductors or wires.

Heretofore no satisfactory tool has been commercially available for bending relatively heavy electrical conductors. The installer of heavy conductors heretofore has had to use his ingenuity in bending the conductor to make connections in a control box or connection box. One of the most common methods of bending heavy conductors heretofore has been to utilize an adjustable jaw wrench or "monkey" wrench. The conductor is disposed between the jaws of the wrench and then a pressure is applied to the handle to bend the wire about one of the jaws to the desired configuration. This method of bending conductors has not proven satisfactory, particularly where insulated electrical conductors are involved. The sharp edges on the jaws of the wrench cut the insulation during the bending operation or damage the insulation so badly that its insulating properties are impaired, and considerable skill is required on the part of the operator to produce the required curvatures.

An object of this invention is the provision of a tool for bending relatively heavy insulated conductors wherein there is a minimum of damage to the insulation when the conductor is bent to a desired configuration.

Another object of the invention is the provision of a tool of the above character that is adjustable to accommodate different sizes of conductors, that is simple to construct, that may be utilized in a relatively small space, that is easy to manipulate, and that is relatively inexpensive to produce.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevational view of the tool for bending relatively large electrical conductors and embodying the present invention;

Fig. 2 is a plan view of the tool shown in Fig. 1;

Figs. 3, 4 and 5 show the manner in which the tool is used for bending a conductor to have an end portion of the conductor offset with respect to another portion of the conductor.

Referring now to the drawings, the tool is intended primarily for bending heavy electrical conductors such as shown at 11 having an outer layer of insulation 12. As best seen in Figs. 1 and 2, the tool includes an elongated handle 13. At one end the handle is formed with an

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enlarged portion 14 shaped to provide a convenient hand grip for gripping the tool. Where desired, the enlarged portion 14 may be knurled. A cross arm 16 is rigidly attached to the opposite end of the handle 13 with its end edges 17 and 18 disposed on opposite sides of the handle 13. A side of the cross arm, facing away from the handle 13, has a composite surface formed thereon having a generally concave configuration transversely of the cross arm (see Fig. 2) and a convex configuration lengthwise of the cross arm (see dotted line in Figure 1) defining an elongated fixed jaw 19 shaped to receive a portion of the conductor. A J-shaped member 21 is mounted on the handle 13 to have its curved portion in opposed relation to the stationary jaw 19 to define a clamping jaw 22 for engaging the side of the conductor opposite to that engaged by the stationary jaw. The width of the member 21 as best seen in Figure 1 is relatively narrow so that the clamping jaw 22 is relatively narrow as compared to the fixed jaw 19. Preferably the curved portion of the J-shaped member 21 is deformed to provide curved edge portions as shown in Figure 1. The stem 23 of the J-shaped member 21 is formed with an elongated slot 24 which is shaped to receive a threaded projection 26 extending outwardly from a shoulder 27 formed on the handle 13 intermediate the ends thereof. The slot 24 and projection 26 provide a construction wherein the clamping jaw 22 may be moved relative to the fixed jaw 19 in a direction longitudinally of the handle to accommodate different sizes of conductors. In the absence of an operating stress, which occurs during use of the tool, the clamping jaw is maintained in a desired adjusted position with respect to the fixed jaw by a wing nut 28, which engages a washer 29 abutting against one side of the stem 23 so that when the nut 28 is tightened it clamps the stem 23 between the shoulder 27 and the washer 29. However, the clamping force exerted by wing nut 28 is insufficient to prevent relative pivotal movement of the members 13 and 21 about the axis formed by threaded projection 26 during use of the tool to bend wire or the like, as will presently appear.

Figs. 3, 4 and 5 illustrate the manner in which the tool is employed in bending a heavy electrical insulated conductor. As shown in Fig. 3, the conductor 11 projects inwardly from one side of a control box 31 or the like, a portion only which is shown. For purposes of illustration it is assumed that the end of the conductor in the box

31 must be bent so that the extreme end is offset with respect to the portion of the conductor disposed in a conduit 32 leading to the box 31. To effect bending, the conductor is disposed between the clamping jaw and the fixed jaw, the clamping jaw 22 is adjusted so that the conductor is held snugly between the high points of the respective convex surfaces of the jaws, with the clamping jaw disposed centrally of the fixed jaw to position the respective high points of the convex jaws in directly opposed relation, and the wing nut is tightened to normally retain the parts in this position. Thereupon a pulling pressure is applied to the handle so that the hand of the operator is moved through 90° or from the position shown in Fig. 3 to the position shown in Fig. 4. As a result of this movement the conductor is caused to bend about a side edge 17 of the fixed jaw which in effect defines a fulcrum point for the tool. Movement of handle 13 to cause jaw edge 17 to bear against the conductor moves the high point of the convex fixed jaw 19 away from the conductor so that the conductor is not so snugly gripped by the jaws. The force exerted in bending the conductor is such that the J-shaped member 21 rotates about the threaded projection 26 as an axis so that the clamping jaw 22 slides along the conductor. Then the upward force on handle 13 is released and the handle returns toward a position to align the fixed jaw centrally with the clamping jaw in the new position of the latter. Thus, a single actuation and release of the tool during a bending operation has resulted in movement of the tool to a new position along the conductor. The successive positions of the side edge 33 of the clamping jaw after successive actuations of the tool during a bending operation are shown by the arrows in Fig. 4. Because of the relative movement of the jaws with respect to the conductor, the insulation 12 at any one point on the conductor is prevented from being stressed to such an extent that the insulation is damaged. At the conclusion of this bending operation the operator loosens the wing nut 28 to loosen the jaw 22 so that the tool can be moved farther out on the end of the conductor 11. When an edge of the end 18 of the fixed jaw engages the conductor at a desired point, depending on the position at which the second bend is to be made, the clamping jaw 22 is centered with the fixed jaw 19 as before and is adjusted so that the conductor is held between the respective jaws. The wing nut 28 is again tightened. A force is applied to the handle 13 to cause the extreme free end of the cable to bend around the edge 18 of the end of the fixed jaw, the point of engagement of the edge 18 with the conductor defining the fulcrum point about which the tool moves. The convex curvature of the jaw 19 is such that the insulation is prevented from being damaged during this bending operation. The clamping jaw 22 may move relative to the fixed jaw so that at the conclusion of the second bending operation it is disposed on one side of the axis of the handle as shown in Fig. 5. The rounded edge portions 25 of the clamping jaw prevent the jaw 22 from biting into the insulation of the conductor.

The tool disclosed herein for bending heavy electrical conductors is of relatively simple construction, has a minimum number of parts, and the parts may be readily assembled and adjusted for use with different sizes of cables. Where desired the handle and cross arm 16 may be formed as a single casting. In its operation the tool is positive in its action and provides a tool for bending heavy conductors in small spaces. Either end of the fixed jaw or either side of the clamping jaw may be used as a point at which the conductor may be bent. Consequently the tool may be readily used in very small spaces to effect the desired bend of electrical conductors.

I claim:

1. A wire bender comprising an elongated handle, a shoulder formed on said handle intermediate the ends of the latter, a threaded projection extending outwardly from said shoulder, an elongated cross arm rigidly attached to one end of said handle and having portions extending outwardly from opposite sides of the handle, said cross arm having a continuous face on the side away from the handle having a concave surface in a transverse direction and a continuous convex surface in a longitudinal direction to define an elongated fixed jaw for engaging one side of a conductor, a J-shaped member having a short continuous convexly curved portion overlying the fixed jaw in opposed relation therewith intermediate the ends thereof and engageable with the opposite side of a conductor and having its ends curving away from the convex surface of the fixed jaw, said opposed convex jaw surfaces defining a passageway for receiving the conductor which is narrowest at opposed points on said surfaces intermediate the ends thereof, said J-shaped member having a stem in side by side relation with the handle and said shoulder to support the clamping jaw in the above-described position, said stem having a slot shaped to receive said threaded projection, and adjustable abutment means engageable with the stem to secure it against the shoulder.

2. An implement for bending elongated articles comprising a handle, a fixed jaw rigid with the handle and having an elongated face extending transversely of the handle and recessed to engage a portion of the elongated article to be bent, said elongated face on the fixed jaw being formed with a continuous convex lengthwise surface, and a narrow clamping jaw in opposed relation to the fixed jaw, said clamping jaw defining a short continuous convex lengthwise surface in spaced opposed relation to the convex fixed jaw surface and recessed to engage an opposite portion of the elongated article, said opposed jaw faces defining a passageway for receiving the elongated article which is narrowest at a portion of the convex face on the fixed jaw intermediate the ends thereof, said clamping jaw being pivotally supported from said handle and being movable about its pivotal axis to move relative to the elongated article being bent in response to application of a force to the handle urging one end of the convex face on the fixed jaw into engagement with the elongated article for bending the latter and urging the portion of the convex face on the fixed jaw at said narrowest portion of the passageway between the fixed and clamping jaws away from engagement with the elongated article to permit sliding of the clamping jaw along the elongated article.

3. A wire bender comprising a handle, a fixed jaw rigid with said handle and having an elongated face shaped to engage a conductor, said face having a continuous convex configuration along its length, a narrow clamping jaw in opposed relation to said fixed jaw and formed with a short continuous convex face in spaced opposed relation to said convex face of the fixed jaw intermediate the ends thereof having its opposite

end portions curve away from the convex face of the fixed jaw, said opposed jaw faces defining a passageway for receiving the wire to be bent which is narrowest at opposed points on the opposed convex jaw faces intermediate the ends thereof, and means pivotally supporting said clamping jaw from said handle for movement along the wire when force is applied to the handle to bend the wire about one end edge of the fixed jaw.

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