July 19, 1949. W. D. NORGARD 2,476,680

PORTABLE ELECTRIC GLASS TUBE CUTTER

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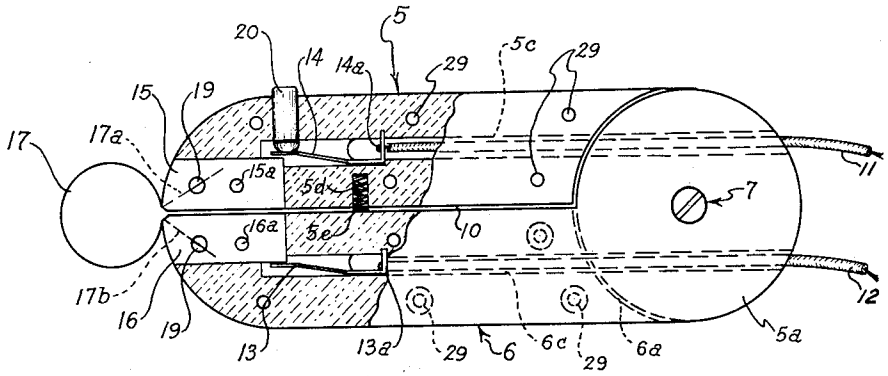


FIG. — 1

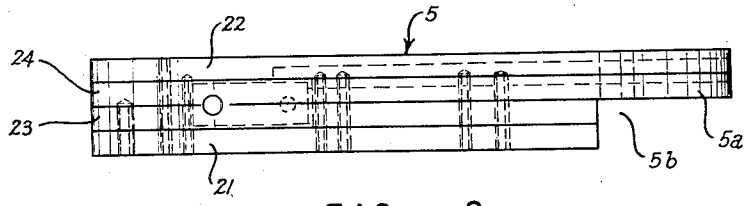


FIG. — 2

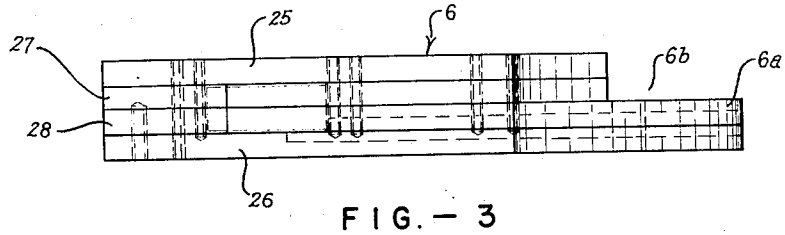


FIG. — 3

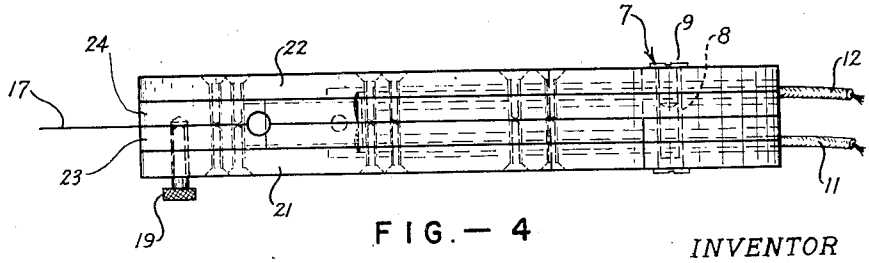


FIG. — 4

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PORTABLE ELECTRIC GLASS TUBE CUTTER

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10 Claims. (Cl. 49—50)

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The present invention relates to a portable electric glass tube cutter. It has to do particularly, although not exclusively, with a glass tube cutter which is adapted for use in a neon sign shop for cutting various diameters and grades of glass tubing, particularly in the manufacture of neon signs or hot and cold cathode decorative lighting tubes. It is used in connection with a control box consisting of a transformer controlled by a variable resistor provided with a numbered dial, or a control box consisting of a transformer with a series of identified voltage taps. When the cutter is to be used in a neon shop, a table will accompany the control box so that any unskilled workman or amateur can use it. For example, if a cut is to be made in a 15 mm. soft glass tube, a chart which is provided will tell where the operator should set the control rheostat, or which tap to use, after which by using the cutter with the current flowing through the loop for seven seconds, which may be determined by actual timing or by counting to twenty (20) both the heat and the time will be correct for severing the tube.

Heretofore, many attempts have been made to accurately and efficiently cut or sever glass tubing, but it was found that satisfactory results could not be obtained unless the tubing were scored previously. Mechanical cutters have been employed, but these have also been found to be lacking in one way or another and have not given entirely satisfactory results. Scoring and then breaking by hand has been more or less the accepted practice heretofore.

One of the objects of the present invention is to provide an improved portable electric tube cutter for glass tubes in which an accurate and clean cut may be obtained without the necessity of first scoring the tube.

Another object of the invention is to provide an improved glass tube cutter of the foregoing character in which a heating loop formed from Nichrome wire which does not cross but is directly in line all around the tube and in which the loop remains partially open during the cutting operation, is employed.

A further object of the present invention is to provide an improved portable cutter which is capable of being operated by one hand and which may also be, if desired, mounted upon a stand and with its electrical current controlled by a footswitch so as to leave both hands of the operator free with which to hold the ends of the tube being cut or severed.

Another object of the present invention is to provide an improved portable tube cutter of the foregoing character, in which the cutter, without being disconnected from its source of electrical energy, can be carried to the work, thus avoiding the necessity of bringing the work to the cutter.

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Another object of the present invention is to provide an improved tube cutter as referred to above which, by virtue of its particular construction, is capable of maintaining the heating wire loop tight with relation to the glass tube which it is embracing as the wire expands due to heat created by the electric current passing through the loop.

A further object of the present invention is to provide an improved portable glass tube cutter including an electrically heated wire loop which contacts the tube, in which the body portion of the improved cutter is in the form of a two-part compressible handle in which the parts of the handle are pivotally connected together at their ends opposite the tube-engaging wire loop, thus permitting contraction of the loop onto the surface of the tube to be cut while at the same time permitting the switch to be actuated to cause the current to flow through the loop.

Another object of the present invention is to provide an improved portable cutter of the foregoing nature which is of relatively simple and inexpensive construction, being capable of being produced by assembly line methods and at a high rate of production.

The foregoing and other objects and advantages of the present invention will appear from the following description and appended claims when considered in connection with the accompanying drawing forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

In said drawings:

Fig. 1 is a top plan view, partly broken away and partly in section of one embodiment of the present invention.

Fig. 2 is an edge view or side elevation of one of the handle members of the device of Fig. 1.

Fig. 3 is a view similar to Fig. 2 of the other handle member of the device of Fig. 1; and

Fig. 4 is a side elevational view of the assembled device of Fig. 1.

Before explaining in detail the present invention, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawing, since the invention is capable of other embodiments and of being practiced or carried out in various ways. It is to be understood also that the phraseology or terminology employed herein is for the purpose of description and not of limitation, and it is not intended to limit the invention herein claimed beyond the requirements of the prior art.

The improved portable electric glass tube cutter of the present invention is shown in its entirety in Figs. 1 and 4. The body of the device com-

prises, as shown, a pair of handle members 5 and 6 which have enlarged substantially round portions 5a and 6a at one end thereof. These enlarged end portions are reduced in thickness at 5b and 6b and interfit or are nested as clearly indicated in Fig. 1. The two members are held together for swinging movement about a pivot 7 which, as shown in Fig. 4, comprises an internally threaded sleeve or socket member 8 which receives a cap screw 9 to hold the handle parts together in movable relationship. As seen in Fig. 1, when the arms 5 and 6 are squeezed together or compressed by the hand of the operator, a relatively narrow space 10 remains between the members. As shown, handle member 5 is provided with a socket 5d which receives and supports a compression spring 5e. The outer end or exposed end of this spring contacts the adjacent face of handle member 6 and thus tends to normally keep the handle members slightly spaced apart to provide a gap which is approximately twice the width of the space indicated at 16 in the drawing.

Handle member 5 is provided with a longitudinal bore or passageway 5c to receive an electrical conductor 11. Member 6 is provided with a similar longitudinally extending bore or passageway 6c to receive a similar conductor 12.

In passageway 6c, adjacent the forward end of the member 6, there is located a fixed spring contact member 13 which is fixed in any suitable manner at 13a to the end of conductor 12. In the bore or passageway 5c of member 5 also adjacent its forward or free end, there is provided a movable spring contact member 14 which is fixed, in any suitable manner at 14a, to conductor 11.

As clearly seen in Fig. 1, the forward end of member 5 is socketed or cut out to receive and support a removable, preferably brass insert member 15, which is held in place by a screw 15a. Member 6 is similarly recessed or cut out to receive a similar preferably brass insert member 16 which is held in place by a screw or the like 16a. Insert member 15 is provided with a relatively minute bore or drilled angularly disposed socket (not shown). Insert member 16 is likewise provided with an angularly disposed bore or socket (not shown). These bores or angularly disposed sockets in insert members 15 and 16 are adapted to receive the end portions of a heating wire loop shown as a whole at 17, the end portion 17a of said wire engaging the bore in insert 15 and the similar end portion 17b of the loop engaging the bore in insert 16. The end portions are held in their respective bores by means of thumb screws 19 which secure the ends of the loop both mechanically and electrically. It is to be understood that the loop 17 may be of any diameter desired for the particular purpose of fitting the size of glass tube to be cut by the device. The loop is preferably formed from a piece of nichrome wire, although other metal or alloy may be employed which is capable of withstanding heat to which it is subjected when current passes through it.

It will be noted that the forward end of spring contact member 13 engages the insert member 16 at all times, whereas the forward end of movable spring contact member 14 is spaced from and thus normally out of engagement with its adjacent insert member 15. Handle member 5 is socketed to receive a reciprocable switch button or plug member 20 which is preferably formed from plastic or some other non-metallic or non-conducting material, whose inner end engages the free end of the movable contact member 14, as clearly seen in Fig. 1. It will be understood that by pressing inwardly on switch button 20, movable contact 14 may be brought into engagement with insert 15 to complete the electrical circuit through conductors 11, 12 and heating wire loop 17.

As best seen in Figs. 2, 3 and 4 of the drawings, each of the handle members is preferably formed from a series of layers or laminations of some suitable plastic material. If desired, the bottom and top layers or laminations 21 and 22, respectively, of handle member 5 may be formed from a synthetic resin obtained by the condensation of formaldehyde with phenols such, for example, as Bakelite, whereas the inner layers or laminations 23 and 24 of handle member 5 may be formed from plastic based on polymerized methyl methacrylate resin such, for example, as Lucite or other non-conducting material. The same is true of the handle member 6, wherein the top and bottom layers or laminations 25 and 26, respectively, may be formed from Bakelite, whereas the inner layers or laminations 27 and 28 may be formed from Lucite, or other similar non-conducting material. These laminations or layers are preferably held together in any suitable manner as by means of counter-sunk screws, shown generally at 29 in Fig. 1. It is to be understood, however, that, if desired, the handle members 5 and 6 need not necessarily be of laminated construction so long as they are formed from some suitable plastic or other non-conducting material and provided with sockets, recesses, or other spaces for receiving the various elements referred to above and shown in Fig. 1 of the drawings. Moreover, all of the layers or laminations seen in Figs. 1, 3 and 4 may be formed from the same kind of material, such as some suitable plastic, the materials mentioned above being merely illustrative of certain kinds of material that are well suited for the purpose.

As stated above, when the tube cutter of the present invention is employed in a neon shop, it is connected by means of its conductors 11 and 12 to a control box consisting of a transformer controlled by a variable resistor having a numbered dial, or a control box consisting of a transformer with a series of identified taps and a chart which explains the amount of time to allow the heating loop 17 to be energized for the particular size or diameter of tubing for which it is being used to cut. In use of the device, a loop, such as loop 17, of proper size is inserted in the bores of the inserts 15 and 16, the size of the loop depending upon the diameter of tubing to be cut. The thumb screws 19 are then tightened down to mechanically and electrically bind the ends 17a and 17b of the loop to the insert members. These thumb screws are preferably tightened down by hand, it being undesirable to use pliers on them. The cutter is now connected with the control box and to the proper binding post, depending upon the diameter tube to be cut. The left hand of the operator now grasps the cutter with the switch button 20 at the top side and with his thumb in position adjacent said button. The loop 17 is now slipped over the glass tube to the point where it is to be cut. The handle members 5 and 6 are grasped or squeezed together to cause the loop to bind tightly upon the glass tubing. The thumb of the left hand is now rocked or moved forward, pressing the switch button 20 inwardly to close the contact between the members 14 and 15 (see Fig. 1). The button is held down for the proper length of time, depending upon the diameter of the tube being cut, until the proper time has been reached. The pressure

is then released on the button but the handle members are retained under pressure of the hand to keep the heating loop 17 in tight engagement on the tube. With the right hand, the operator wipes the tightened wire loop and the glass where the loop is located with a piece of damp cotton. The tubing will now crack off where the loop was located to provide a clean cut at the point desired.

It is to be understood that the size of the loop employed depends upon the size of the tubing to be cut. It is also to be understood that the length of time that the switch button is held down allowing current to flow to and through the loop 17 is dependent upon the size of the tube to be cut, the thickness of the tube walls, and the material from which the tube is made. With each one of the portable tube cutters of the present invention, there is furnished a chart which informs the operator the exact amount of time which is required to perform an accurate and clean cutting operation on tubing of various kinds and diameters. It is entirely unnecessary to score the tubing in advance.

Having thus described the invention, what is claimed is:

1. A portable electric glass tube cutter comprising a handle of laminated insulating material, said handle comprising a pair of similar numbers each having an enlarged end portion and pivotally connected together adjacent said enlarged end portions, a compression spring carried by one of said members and in contact with the adjacent face of the other member for maintaining the free end portions of the members normally out of contact, metallic insert members carried by the free end portions of the arm members and being drilled and receiving and supporting the end portions of a glass-cutting wire loop, releasable means for frictionally engaging said end portions to hold the wire loop in position with relation to the handle members, electrical conductors leading into the handle members, a fixed spring contact member interconnecting the end of one of the conductors and one of the metallic insert members, a second movable spring contact member connecting the end of the other conductor and disposed adjacent to but normally spaced from the other metallic insert members, and a button formed from insulating material provided in a bore formed in one of the handle members and having its inner end normally in contact with the movable spring contact member, said button providing means for shifting the movable spring contact member into engagement with the adjacent metallic insert member to close the circuit from the conductors through the wire tube-engaging loop.

2. Structure according to claim 1, wherein each of the handle members is composed of several layers of material, the outer layers being preferably a synthetic resin and the inner layers plastic.

3. Structure according to claim 1, wherein the insert members are formed from brass, and wherein said handle members are formed from some suitable insulating material.

4. A portable electric glass tube cutter comprising a handle formed from insulating material, said handle including a pair of members having substantially round enlarged portions at one of their ends, said enlarged portions being interfitted and pivotally connected together to permit the handle portions to be moved toward and away from one another about the pivot point, spring means disposed between the handle members for normally maintaining said members spaced apart, metallic insert members mounted in the free ends of the handle members, a partially open wire loop having its end portions removably mounted in said insert members, a fixed contact engaging one of said inserts, a movable contact engageable at predetermined times with the other of said inserts, electrical conductors extending into the handle members and secured to said contacts, and a switch button projecting outwardly from one of said handle members for moving the movable contact member into engagement with the adjacent insert to close the electrical circuit from the conductors through the wire loop.

5. Structure according to claim 4, wherein the handle members are formed from laminations of plastic.

6. Structure according to claim 4, wherein releasable binding means is provided for removably maintaining the loop in engagement with the insert members.

7. Structure according to claim 4, wherein the spring means for maintaining the handle members normally in spaced relation is housed within a socket formed in one of said handle members.

8. A portable device for electrically cutting glass tubing, comprising a handle formed from insulating material, said handle comprising a pair of members pivotally mounted together at an end thereof, metallic inserts located within the free end portions of the handle members, a heating wire having its end portions removably supported in said inserts, means for clamping the end portions of the wire in the inserts, a spring contact member engaging one of the inserts, a movable spring contact member engageable with the other of said inserts, conductors extending through the handle members and electrically connected to the spring contact members, and a button formed from insulating material having its inner end engaging the movable contact member and capable of moving said contact into engagement with the adjacent insert whereby to complete the electric circuit from the conductors through the heating wire.

9. Structure according to claim 8, wherein a compression spring is disposed between the handle members to maintain said members normally in spaced relationship yet permitting the members to be moved toward one another to reduce the size of the wire loop by gripping said handle members.

10. Structure according to claim 8, wherein the heating wire is in the form of a partially open loop for embracing a tube to be cut.

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331,411	Great Britain	July 3, 1930

Certificate of Correction

Patent No. 2,476,680 July 19, 1949

WYMAN D. NORGARD

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 5, line 49, for the word "members" read *member*;

and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 17th day of January, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.

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