

June 4, 1946.

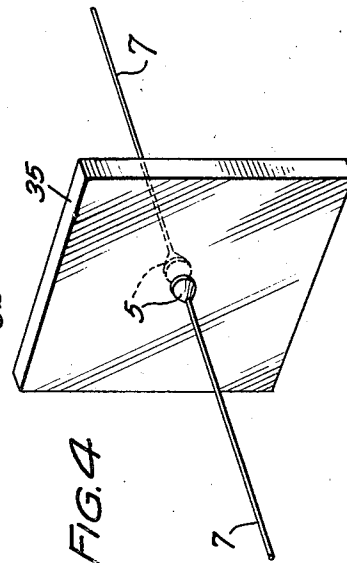
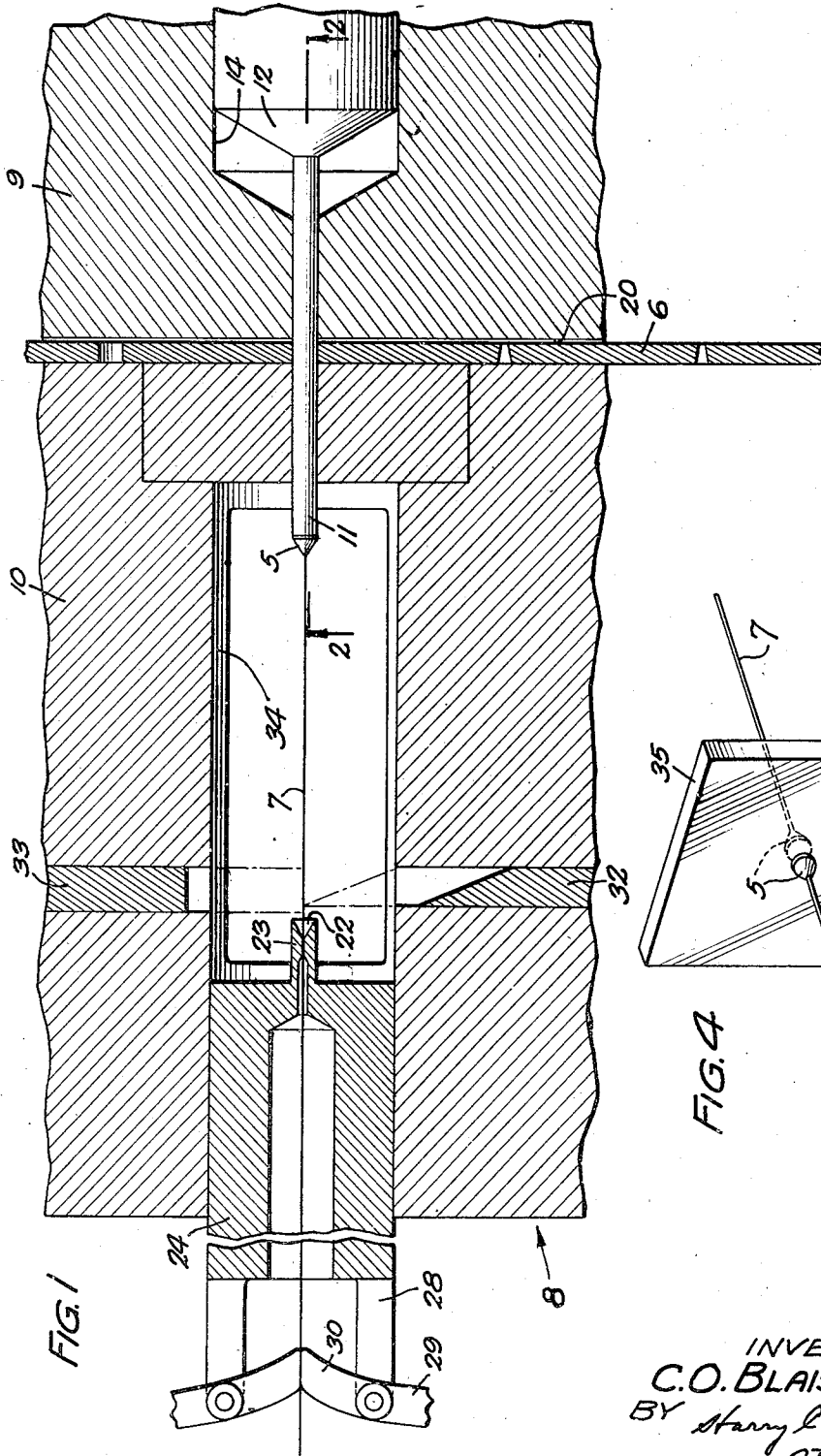
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2,401,329

WIRE HEADING APPARATUS

Filed Dec. 12, 1942

2 Sheets-Sheet 1



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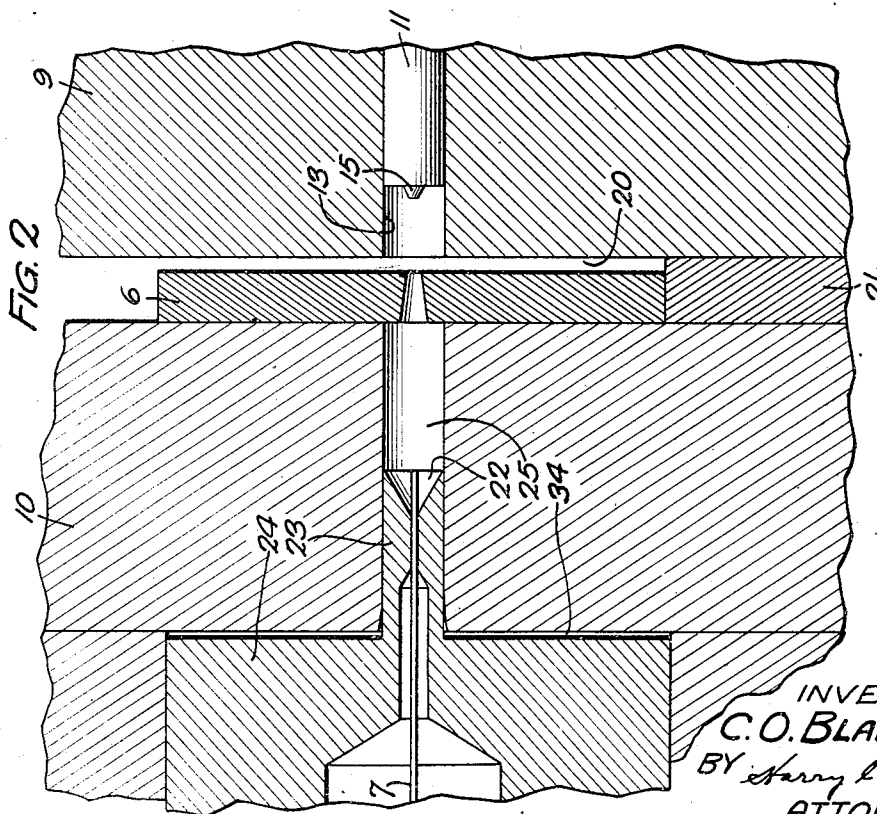
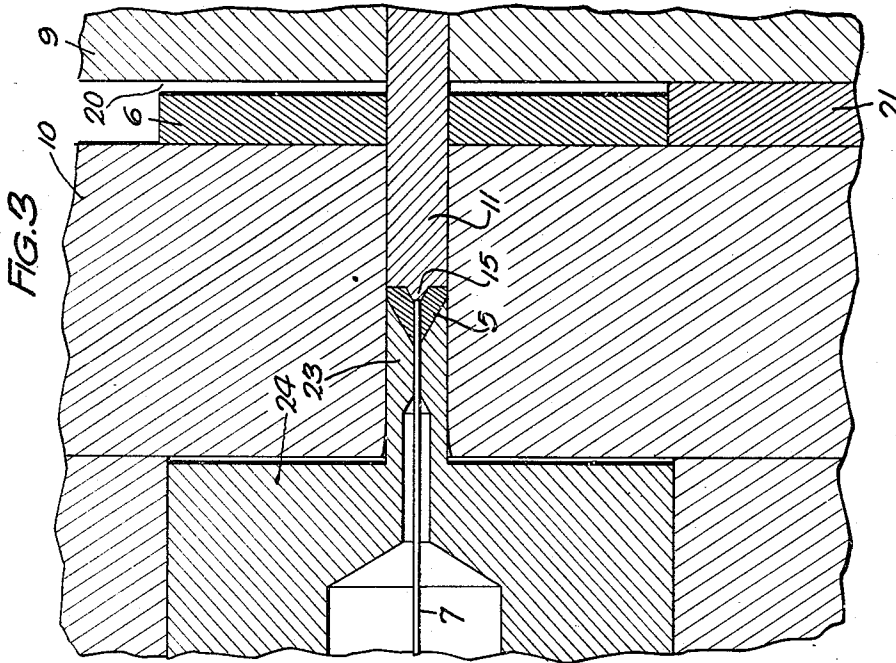
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WIRE HEADING APPARATUS

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WIRE HEADING APPARATUS

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4 Claims. (Cl. 29—34)

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This invention relates to an apparatus for working an article, and more particularly to an apparatus for attaching a head to a lead wire.

In the manufacture of certain types of quartz frequency control crystals, it is desirable to attach a lead wire to either side of the crystal. The wire is sometimes attached by applying a small amount of solder to the tip of the wire and then placing the tip in contact with a plated and spotted crystal, applying sufficient heat to the solder to fuse it to the wire and to the crystal. Because with small crystals a wire of extremely small diameter is necessarily used, some difficulty may be encountered in obtaining a secure bond between the solder and the lead wire.

Objects of the present invention are to provide an effective and efficient apparatus for attaching a head to a wire.

In accordance with one embodiment of this invention, an apparatus may be provided for attaching a head to a wire comprising a punch and die mechanism in which an annularly shaped pellet is punched from a preperforated tape and clinched about a wire by compressing the pellet against a cone shaped recess from the apex of which the wire extends, the recess being formed in a movable die member. The die member is then withdrawn and the punch moves forward to eject the headed wire from the die, a knife being actuated then to sever the wire from the wire supply.

Other objects and advantages of the present invention will be apparent from the following detailed description taken in conjunction with the drawings, wherein:

Fig. 1 is a sectional plan view of a heading apparatus constructed in accordance with this invention;

Fig. 2 is an enlarged, sectional view along the line 2—2 of Fig. 1 showing the punch in starting position;

Fig. 3 is a sectional view similar to Fig. 2 showing the punch in intermediate position, and

Fig. 4 is an enlarged perspective view of a crystal provided with lead wires formed in accordance with this invention.

During handling of the crystals and subsequent use, the bond between the crystals and the lead wires is often subjected to considerable stress and unless the solder adheres securely to the lead wire, sometimes the wires are pulled off the crystal. While this could be prevented in some cases by increasing the amount of solder, in many cases it is imperative to keep the amount of solder at a minimum because of the damping

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effect of the solder and the consequent reduction in the efficiency of the crystal. The problem increases in severity as the size of the crystal and of the lead wire is reduced. It will be apparent that a small diameter lead wire, such as .005", presents a very small circumferential area, and consequently gives but slight attachment advantage to the solder. However, by preparing a lead wire in accordance with the present invention, it is possible to greatly reduce the amount of solder required since it is only necessary to apply sufficient solder to the crystal contacting side of the headed wire to provide a fusible bond between the spotted crystal and the head of the lead wire.

Referring now to the drawings and particularly to Fig. 1, an apparatus for punching an annularly shaped pellet 5 from a preperforated tape 6, and for clinching or compressing it about a wire 7 is there shown comprising a fixed sectional die 8 having right and left hand sections 9 and 10, respectively. A punch 11 attached to a ram 12 is positioned in an aperture 13 which extends part way through the right hand die section as shown in Fig. 1 to a ram chamber 14. In order to center the perforations of the tape 6 with respect to the punch 11, the punch, as shown in Fig. 2, is provided with a small cone-shaped projection 15 having a flattened apex. It will be noted that each perforation in the tape is slightly tapered, it being slightly larger at the left side than at the right. This facilitates centering the lead wire with respect to the pellet 5 as the pellet is positioned on the extended portion of the lead wire, prior to clinching the pellet about the wire. The diameter of the perforation is, of course, determined by the diameter of the lead wire, the perforation being made slightly greater in diameter than the lead wire to permit the pellet to be positioned easily about the wire.

In the operation of this apparatus, the perforated tape is fed into slot 20 formed by the right and left die sections 9 and 10, and rests on a die member 21 positioned therebetween. The feeding means (not shown) operates intermittently and may comprise any suitable mechanism, such as an eccentrically mounted feed dog operated in synchronism with the punch, which will automatically feed a perforation of the tape into position in front of the punch.

At the start of a cycle of operation, the various moving parts of the apparatus occupy the position illustrated in Fig. 2. The ram driving means is then actuated to move the punch 11 forward and to engage the cone shaped projec-

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tion 15 thereon with a perforation on the tape. Continued forward motion of the punch 11 causes it to punch an annularly shaped pellet from the tape and to position this pellet on the portion of the wire 7 extending through the apex of a recess 22 formed in the end of a reduced portion 23 of a movable die member 24, through the center of which the wire is fed, the reduced portion 23 of the movable die member 24, as may be seen in Figs. 2 and 3, being movable into a chamber 25 formed in the left die section 10. The punch 11 forces the pellet against the walls of the recess 22 causing the pellet to clinch the wire and to assume a cone shape, as shown in Fig. 3. The various parts of the apparatus are then in the position shown in Fig. 3.

Means (not shown) are then actuated to withdraw the movable die member 24 from the chamber 25. Because of the pressure exerted on the pellet by the punch 11, the pellet will adhere to the end of the punch and to the walls of the chamber 25, and, thus, as the die member 24 is withdrawn, the pellet remains stationary.

It will be noted that a wire feeding mechanism of a hitch or snubber type is mounted on a pair of bracket arms 28 and comprises a pair of pivotally mounted arms 29 which are so positioned as to cause cooperating jaws 30, associated therewith, to contact the wire 7 when the movable die member moves to the right. When the movable die member moves to the left, the arms tend to pivot inwardly and, thus, to move the jaws apart releasing the wire. It will be understood, of course, that automatic means may be provided for moving the jaws apart if desired.

When the reduced portion 23 of the movable die member has been withdrawn a distance equivalent to the desired length of the lead wire, the ram 12 is again actuated to move the punch 11 forward carrying with it the pellet and wire to which the pellet is attached. The punch and movable die member 24 move at the same rate of speed and stop when the reduced portion 23 of the movable die member has been withdrawn a sufficient distance to permit a knife 32 and a block 33 cooperating therewith to be moved in position, as shown by the dotted lines in Fig. 1, to cut the wire.

The pellet 5 adhering to the end of the punch 11 will then have been extended into a chamber 34 formed in the die section 10 and extending from the top to the bottom thereof. After the wire has been severed, an ejecting means, such as an air blast, may be actuated to remove the pellet from the end of the punch, a suitable receptacle being positioned beneath the chamber 34.

A headed wire so formed may then be soldered to a crystal 35, as shown in Fig. 4, by placing a small amount of solder at the base of the pellet 5 and then applying sufficient heat to fuse it to the crystal surface which is preferably previously spotted and plated.

While but one embodiment of this invention has been shown and described, it will be understood that many changes and modifications may

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be made therein without departing from the spirit or scope of the present invention.

What is claimed is:

1. A wire heading apparatus comprising a reciprocally mounted punch, a cooperating movable die member having a tapered recess formed therein through which a strand is threaded, means for holding this strand in the movable die and for feeding the strand toward the punch when the die is moved, means for positioning a perforated tape with its aperture in alignment with said punch, and means for actuating the punch to shear a perforated pellet therefrom and move the same into said recess to compress the pellet around the strand to form a head thereon.

2. A wire heading apparatus comprising a reciprocally mounted punch, said punch having a shearing end including a conical projection, a cooperating movable die member having a tapered recess formed therein through which a strand is threaded, means for holding the strand in the movable die and for feeding the strand toward the punch when the die is moved, means for positioning a perforated tape with its aperture in alignment with said punch, and means for actuating the punch to cause its aforesaid projection to engage an aperture in the perforated tape and said shearing end to shear a perforated pellet therefrom and move the same into said recess to compress the pellet around the strand to form a head thereon.

3. A wire heading apparatus comprising a reciprocally mounted punch, a stationary die cooperating at one side with said punch, a cooperating die movable into the other side of said stationary die and forming with said stationary die a recess through which a strand is threaded, means for holding this strand in the movable die and for feeding the strand toward the punch when the die is moved, means for positioning a perforated tape with its aperture in alignment with said punch, and means for actuating the punch to shear a perforated pellet therefrom and move the same into said recess to compress the pellet around the strand to form a head thereon.

4. A wire heading apparatus comprising a reciprocally mounted punch, said punch having a shearing end including a conical projection, a stationary die cooperating at one side with said punch, a cooperating die movable into the other side of said stationary die and forming with said stationary die a recess through which a strand is threaded, means for holding the strand in the movable die and for feeding the strand toward the punch when the die is moved, means for positioning a perforated tape with its aperture in alignment with said punch, and means for actuating the punch to cause its aforesaid projection to engage an aperture in the perforated tape and said shearing end to shear a perforated pellet therefrom and move the same into said recess to compress the pellet around the strand to form a head thereon.

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