Aug. 15, 1944. H. C. REIMER 2,355,820

ARTICLE HANDLING APPARATUS

Filed Jan. 27, 1943 3 Sheets-Sheet 1

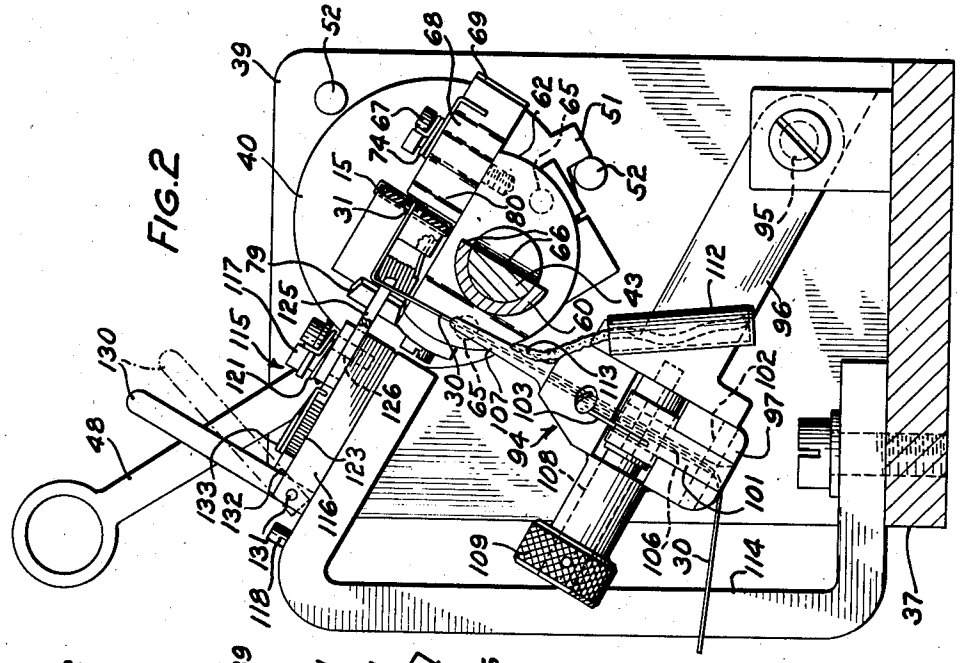


FIG. 2

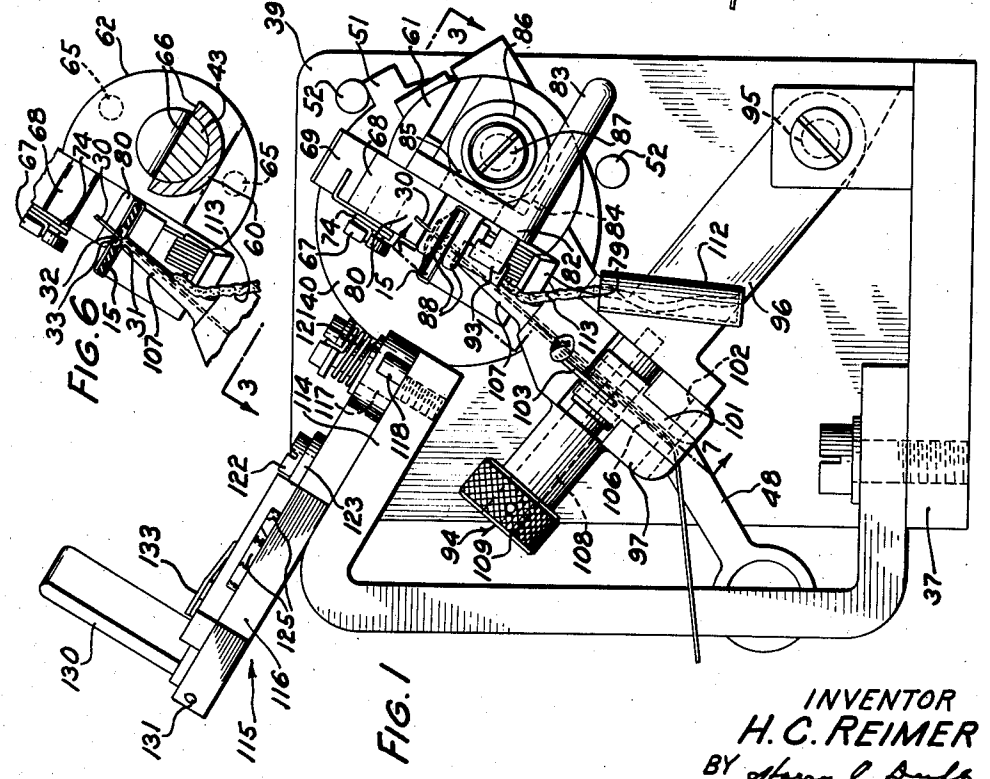


FIG. 6

FIG. 1

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ARTICLE HANDLING APPARATUS

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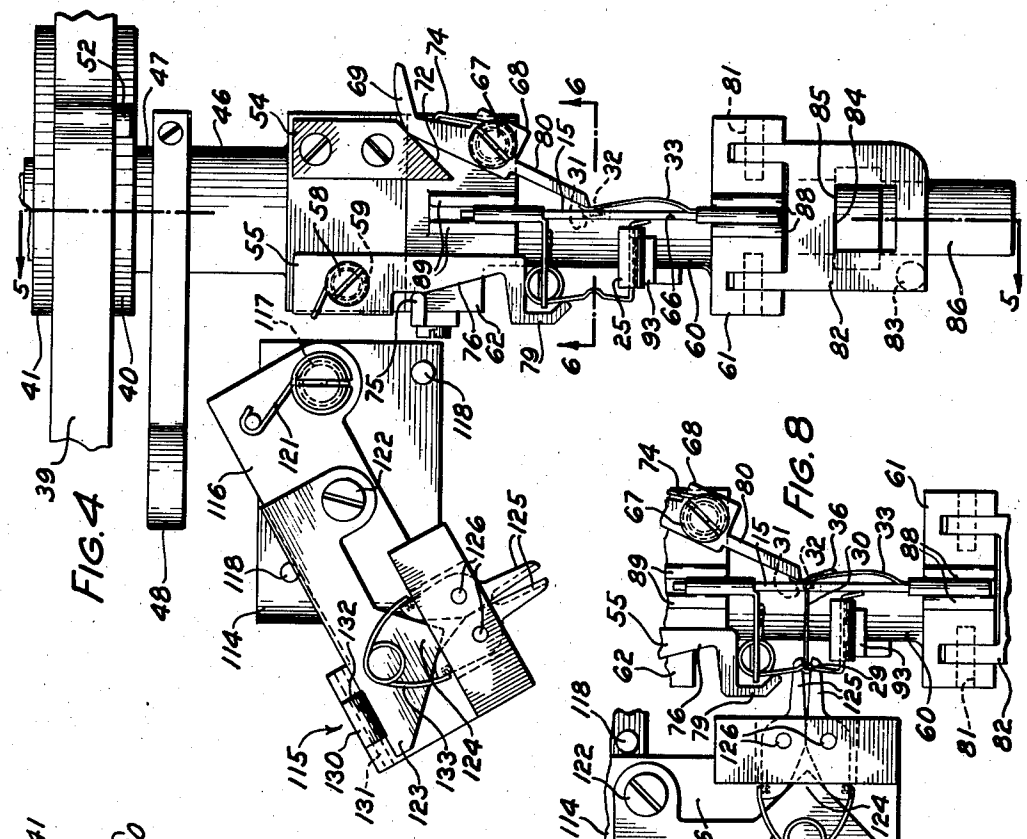


FIG. 4

FIG. 8

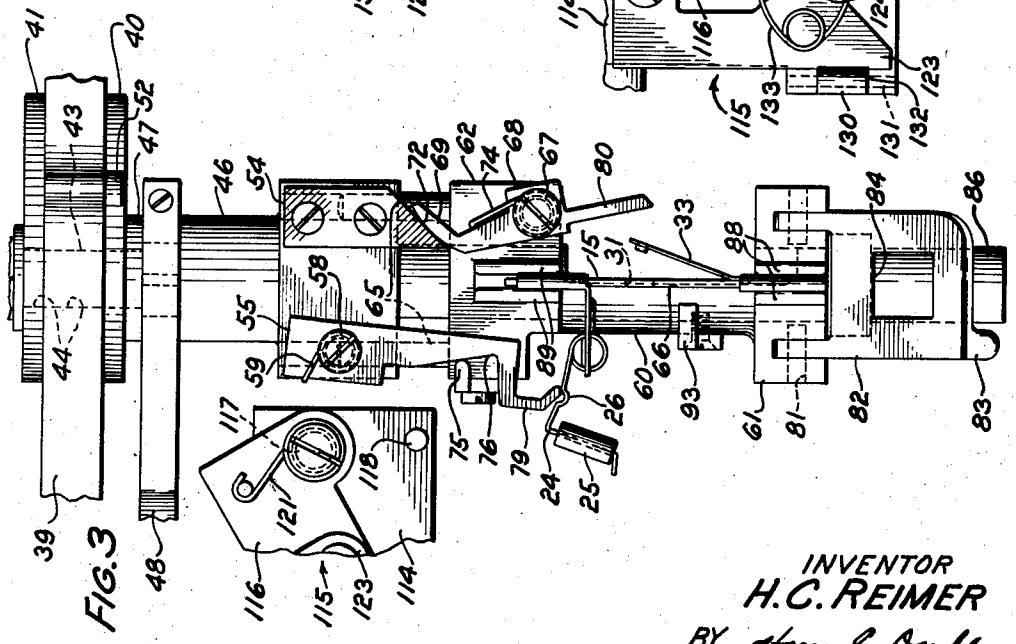


FIG. 3

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ARTICLE HANDLING APPARATUS

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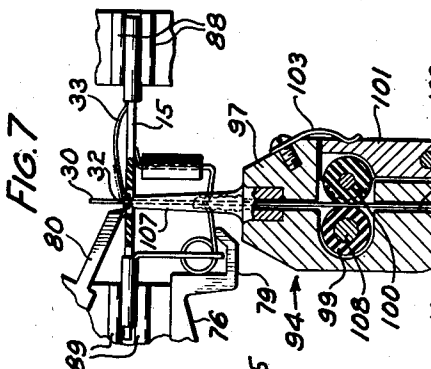


FIG. 7

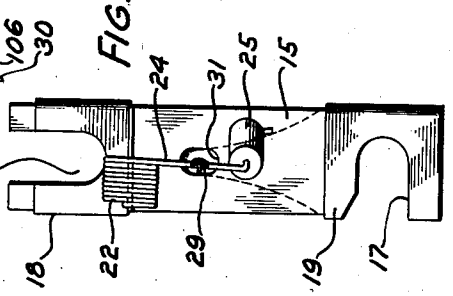


FIG. 11

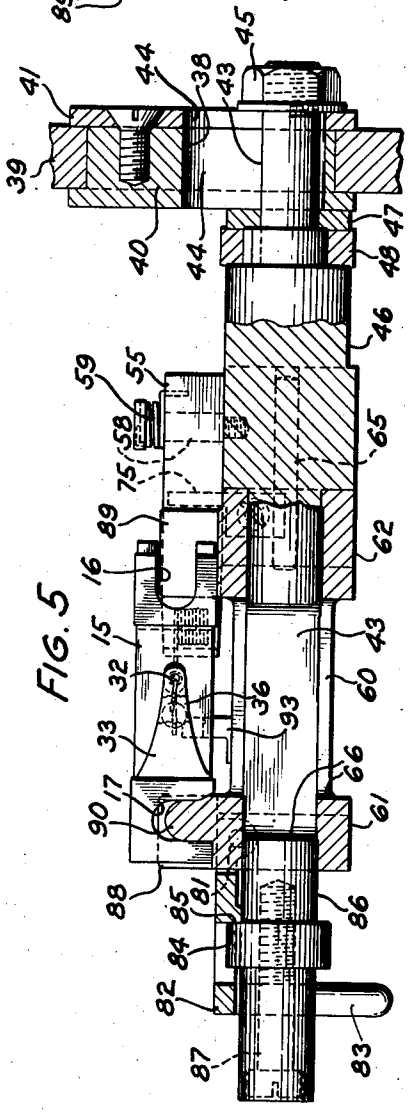


FIG. 5

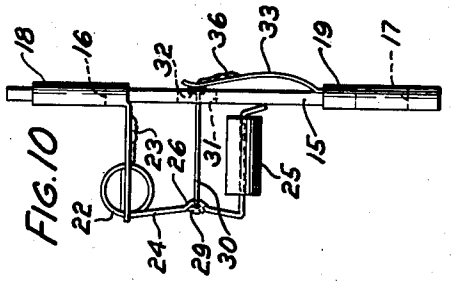


FIG. 10

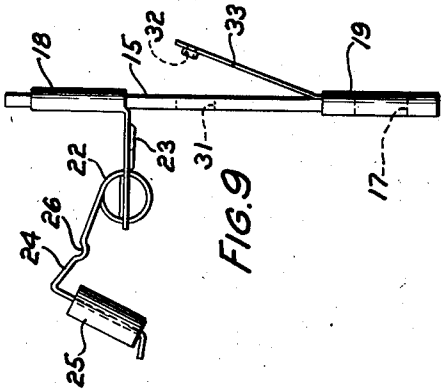


FIG. 9

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UNITED STATES PATENT OFFICE

2,355,820

ARTICLE HANDLING APPARATUS

Herman C. Reimer, Oak Park, Ill., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

Application January 27, 1943, Serial No. 473,714

7 Claims. (Cl. 113—59)

This invention relates to article handling apparatus and particularly to an apparatus for handling delicately constructed articles during their assemblage.

The features of this invention are particularly applicable to the handling and assembling of alarm type fuses used in telephone circuits. Such fuses are small and delicate in construction and include spaced resilient terminal members which are interconnected while under tension by a length of fuse wire of very fine gauge, for example, a nickel chromium wire .0018" in diameter, which is soldered to the terminal members. Heretofore, the resilient terminal members had to be held in position under tension manually and while so held, the fuse wire was manually soldered thereto and thereafter severed. These operations were difficult for an operator to perform and required extensive training of an operator in order to produce economically satisfactory assemblages of uniform quality.

An object of the invention is to provide a practicable apparatus for efficiently and economically handling delicately constructed articles during their assemblage.

In attaining this object, there is provided, in one embodiment of the invention as applied to the handling and assembling of the above referred to alarm type fuse, an apparatus having reciprocable and rotary means for receiving and holding the partially assembled fuse, a reciprocatory movement thereof in one direction automatically tensioning the spaced resilient members ready for the fine gauge fuse wire to be soldered thereto, and rotary movements thereof in opposite directions so positioning the members that the fuse wire may be readily soldered to the members. Means is also provided for feeding and threading an end of a fuse wire of indefinite length to the members in position for soldering thereto. After soldering the fuse wire to the members, shearing elements on the apparatus are operable to cut off the fuse wire close to the point last soldered.

Other objects and advantages of this invention will more clearly appear from the following detailed description, taken in conjunction with the accompanying drawings, in which

Fig. 1 is an end elevation of an article handling apparatus embodying the features of this invention as applied to the assembling of alarm type fuses for telephone circuits;

Fig. 2 is an end elevation, partly in section, but with the operating parts in positions other than those shown in Fig. 1;

Fig 3 is a fragmentary plan view taken in the plane of the line 3—3 of Fig. 1, the operating parts being shown in their initial position and a partially assembled fuse mounted on the apparatus;

Fig. 4 is a fragmentary plan view, similar to Fig. 3, the apparatus having been operated to tension the resilient members of the fuse;

Fig. 5 is a fragmentary vertical section taken on the line 5—5 of Fig. 4;

Fig. 6 is a fragmentary vertical section taken on the line 6—6 of Fig. 4, the fuse having been rotated and the fuse wire feeding and threading means operated to the position shown in Fig. 1;

Fig. 7 is a fragmentary vertical section taken on the line 7—7 of Fig. 1 showing in detail the fuse wire feeding and threading means;

Fig. 8 is a fragmentary plan view similar to Fig. 4, showing the fuse wire shearing means moved into position for clipping the fuse wire, the soldering operations having been coupled;

Fig. 9 is a greatly enlarged end elevation of a partially assembled fuse;

Fig. 10 is a similar view of a fuse upon complete assemblage and after removal from the apparatus of this invention; and

Fig. 11 is a side view of the completed fuse of Fig. 10, as viewed from the left hand side thereof.

The apparatus embodying the features of the invention may be employed with particular advantage, although not limited thereto, for handling during assemblage operations alarm type fuses which are used in telephone circuits. As shown in enlarged scale in Figs. 9, 10 and 11, such fuses may comprise a support or base 15 of thin insulating material having notches 16 and 17 at opposite ends for receiving terminal posts (not shown) upon which the fuse is mounted while in use. Upon opposite ends of the base 15 are attached, by clinching, notched conducting terminals 18 and 19. Mounted on a right angle arm of the terminal 18 is a coiled brass torsion spring 22 having one end soldered at 23 to the terminal arm and an opposite L-shaped end 24 supporting a colored indicator or signal member 25. The arm 24 is provided with a U-shape formation 26, to which is soldered at 29 (Figs. 10 and 11) one end of a very fine fuse wire 30, which is threaded at its opposite end through an oblong aperture 31 in the base 15 and also through an aperture 32 in the outer end of a nickel silver contact spring 33 engaging and supported by the terminal 19, the latter end of the wire being bent against the spring 33 and soldered thereto, as indicated at 36. In Fig. 9, the fuse wire 30 has not been assembled with and attached to the

springs 22 and 33 and, therefore, the springs are not under tension, while in Figs. 10 and 11 the springs are maintained under tension by the interconnecting fuse wire. Upon the fuse wire 30 fusing and separating, while in use, due to an overload in the telephone circuit, the springs 22 and 33 fly outwardly, the spring 33 closing a signal circuit to indicate that the telephone circuit is out of order and the member 25 on the spring 22, by its position, serving to locate the particular fuse to be replaced.

The fuse handling and assembling apparatus, referring to Figs. 1 to 9, inclusive, comprises an L-shaped bed plate or support 37, which may be mounted on a work bench or table. Journalled in an opening 38 in a vertical rear arm 39 of the support 37 (Fig. 5) is a rotary shouldered member 40, which is secured in position by an attached plate 41. Secured to the member 40 and plate 41 is a shouldered irregularly cross-sectioned forwardly extending shaft 43. The rear reduced end of the shaft 43 is screw-threaded and extends through radial slots 44 in the member 40 and plate 41 and is eccentrically clamped to the latter by a nut 45 and an enlargement 46 of the shaft, the space between the member 40 and shaft enlargement being taken up by a collar 47 and a handle 48 clamped to the shaft. The handle 48 provides means whereby an operator may rotate the member 40 and plate 41 supporting the shaft 43 upon the arm 39 of the support 37. A lug 51 (Figs. 1 and 2) on the member 40 engaging stop pins 52 on the support arm 39 limits the movement of the shaft 43 to 90° in the operation of the apparatus. The eccentric mounting of the shaft 43, upon which the fuse to be handled is supported, makes it possible for the fuse to be rotated about its own longitudinal axis. The manner of mounting and supporting the fuse on the shaft will be described shortly.

Fixed to an upper flat face of the shaft enlargement 46 is a cam member 54 (Figs. 3 and 4) and spaced therefrom is a cam member 55 pivoted at 58 to the face, a torsion spring 59 serving to normally rotate the cam member 55 in a clockwise direction (Figs. 3 and 4). Reciprocably carried on and rotatably secured to the shaft 43 forward of its enlargement 46 is a member 60 having headed opposite ends 61 and 62, the upper faces of the ends being flat and in the plane of the flat face of the shaft enlargement 46 (Fig. 5). Secured to the head 62 at opposite sides of the shaft 43 are pins 65 (Figs. 2 and 3) which are reciprocable in apertures in the shaft enlargement 46, thus causing the member 60 to rotate with the shaft but permitting its reciprocation thereon. The member 60 and the shaft 43 are notched, as indicated at 66 (Figs. 2, 3 and 5) for a suitable distance between the headed ends 61 and 62 and laterally to a point coincident with the longitudinal axis of the shaft. The notch 66 is for the purpose of providing clearance to conveniently manipulate a soldering iron during assemblage of the fuse, to be described hereinafter. Pivoted at 67 to the flat face of the head 62 is a member 68 having an arm 69 at its rear end arranged to engage and ride upon a cam face 72 on the fixed cam member 54. A torsion spring 74 serves to normally rotate the member 68 in a counter-clockwise direction (Fig. 3). Fixed to the left face of the head 62, as viewed in Fig. 3, is a member 75 arranged to engage and ride upon a cam face 76 of the pivotal cam member 55. At their forward ends, the pivotal members 55 and 68 are provided with arms 79 and 80, respectively, which are caused to move inwardly toward each other during a rearward movement of the member 60 on the shaft 43, due to the arm 69 of the pivotal member 68 and the member 75 riding up the cam faces 72 and 76 of the fixed and pivotal members 54 and 55, respectively (Figs. 3 and 4). Pivoted at 81 (Figs. 3, 4 and 5) to the head 61 of the member 60 is an angular shaped latch member 82, having a handle 83. A latch face 84 of the member 82 is arranged to latch against a right hand face of an annular shoulder 85 formed on a sleeve 86 secured by a screw 87 to the shaft 43, as shown in Figs. 3, 4 and 5, when the reciprocable member 60 is moved rearward from the position shown in Fig. 3 to that shown in Fig. 4. This is effected by grasping the latch member 82 and the handle 83 thereof and simultaneously pressing it forward and downward. To release the latch member 82, it is rocked clockwise about its pivot 81 and by drawing forward, the attached parts are returned to their initial position (Fig. 3).

Formed on the heads 61 and 62 of the reciprocable member 60 are sets of spaced fuse positioning lugs 88 and 89, between which the fuse is mounted (Figs. 3, 4 and 5) for laterally positioning the fuse on the member 60, the lugs 88 having arranged between them a lug 90 (Fig. 5), which is entered in the notch 17 of the fuse base 15, thus predeterminedly positioning the fuse longitudinally on the member 60. As shown in Fig. 3, wherein the fuse is shown in its initial position on the apparatus, an outer angular end of the arm 79 of the pivotal member 55 is engaged in the U-shaped formation 26 of the spring arm 24. As the member 60 is moved rearward on the shaft 43, to the position shown in Fig. 4, the springs 22 and 33 are tensioned by the inward movement of the arms 79 and 80 of the pivotal members 55 and 68 effected by the members 75 and 54, respectively, in the manner previously described. In order to guide the relatively long spring arm 24, which carries the indicator member 25 into correct lateral position against the fuse base 15 (Fig. 11), a guide member 93 attached to the member 60 is arranged in the path of the indicator member 25 and if the latter and its supporting arm 24 is out of position, the member 93 cams it into correct position relative to the fuse base.

To feed and thread the fine gauge fuse wire 30 into position for soldering to the springs 22 and 33, means indicated in general at 94 is pivotally mounted at 95 on the support 37. The feeding and threading means 94 comprises a pivotal arm 96 supporting at its free end a head 97 (Fig. 7), in which are journalled a pair of rubber feed rolls 99 and 100. The roll 100 is carried on an arm 101 pivoted at 102 on the head and urged in a counter-clockwise direction by a leaf spring 103 to frictionally engage the roll carried thereby with the fuse wire 30 threaded between the rolls. The fuse wire 30 is led from a suitable supply (not shown) and threaded through an aperture 106 in the head and between the rolls 99 and 100 and thence through a nozzle 107 secured to the upper end of the head 97. To effect rotation of the roll 99, a shaft 108 supporting the roll extends from the head 97 and carries a hand wheel 109, which, upon such rotation as will rotate the wheel 99 counter-clockwise (Fig. 7), will cause the fuse wire 30 to be fed from the nozzle 107. For the purpose of applying a liquid flux to the U-shaped formation 26 of the brass spring arm 24, at which

point one end of the fuse wire 30 is soldered, the arm 96 of the fuse wire threading and feeding means 94 carries a flux container 112 from which extends a wick 113, so arranged that during the operation of feeding and threading the fuse wire 30 into position, it wipes across the formation 26 of the spring arm 24, thus cleaning the spring for the subsequent soldering operation.

Mounted upon a standard 114 fixed to the base plate 37 are means, indicated in general at 115, operable to clip off the fuse wire 30 after it is soldered to the formation 26 of the spring arm 24. The fuse wire clipping means comprises a support 116 pivoted at 117 to the standard 114 and having a limited movement between stop pins 118 carried by the standard 114. A torsion spring 121 is arranged about the pivot 117 to normally move the pivotal support 116 in a clockwise direction and maintain it against the stop pin 118, as shown in Fig. 4. Pivoted at 122 to the upper face of the support 116 is a lever 123, having at its free end a wedge-shaped extension 124, operatively engaging a pair of shearing blades 125 pivoted at 126 to the support 116. An operating handle 130, pivoted at 131 on the support 116, engages the lever 123 at a point 132 and upon rocking the handle clockwise (Fig. 2) from its full line position to the dotted line position, the blades 125 are rocked in opposite directions about their pivots 126, thus moving their free outer spaced ends together and shearing the fuse wire 30 therebetween. A suitably arranged torsion spring 133 engaging the inner ends of the blade 125 serves to normally maintain the blades, lever 123 and handle 130 in their inoperative position (Fig. 4).

In the use of the apparatus above described, the partially assembled fuse (Fig. 9) is mounted on the reciprocable and rotatable member 60 in the manner previously described while the member is in the angular position shown in Fig. 2, at which time the fuse wire feeding and threading means 94 and the fuse wire clipping means 115 are in their normal retracted positions, best shown in Figs. 2 and 4. A plan view of the member 60 and associated parts of the apparatus with the fuse mounted thereon is shown in Fig. 3. To tension and position the fuse springs 22 and 23 ready for assembling and soldering the fuse wire 30 thereto, the member 60 is moved inward on the shaft 43 by grasping the handle 83 of the latch member 82 and pressing it inward and downward and, in the manner previously described, the spring engaging arms 79 and 80 are moved inwardly with the springs 22 and 33 to the positions shown in Fig. 4. At the termination of this movement of the member 60, the springs 23 and 33 are tensioned and the member 82 is latched by the faces 84 and 85, the parts now being positioned, as shown in Fig. 4. The handle 48 with the attached parts, including the member 60 supporting the fuse, is now rocked from the position shown in Fig. 2 to that shown in Fig. 1, its movement being limited by the lug 51 engaging the upper stop pin 52.

The fuse wire feeding and threading means 94 with a short length of wire 30 projecting from the nozzle 107 is then rocked upwardly about its pivot 95 and the free end of the wire is threaded through the aligned fuse base aperture 31 and the aperture 32 in the outer end of the tensioned fuse spring 33, as clearly shown in Figs. 1, 6 and 7. During this movement of the means 94, flux is applied to the formation 26 on the spring arm 24 by the wick 113. While the means 94 is held in its upper position, the length of wire 30 extending from the spring 33 is manually bent downwardly to abut the spring. In this position, the bent wire portion is soldered to the spring, as indicated at 36 (Fig. 10), by manual manipulation of a soldering iron (not shown), the wire portion extending longitudinally of the spring. Thereafter, the wire feeding and threading means 94 is lowered to the position shown in Fig. 2, the wire being drawn or fed therethrough as it moves downwardly. The handle 48 is then rocked to its upper position (Fig. 2), its movement being limited by the lug 51 engaging the lower stop pin 52. This rotates the fuse back to its initial position and the fuse wire 30 extending between the nozzle 107 and the spring 33 is drawn or wrapped over the U-shaped formation 26 of the arm 24 of the spring 22. While thus positioned, the fuse wire 30 is soldered at the point 29 (Fig. 10) by manual manipulation of a soldering iron. The wire clipping means 115 is now rocked counter-clockwise about its pivot 117 from its inoperative position (Figs. 1 and 4) to its operative position and as the wire 30 immediately below the soldered point 29 is entered between the free outer spaced ends of the shearing blades 125, the operating handle 130 is moved from its full line position to its dotted line position, as shown in Figs. 2 and 8, in the manner previously described, to shear the fuse wire. Upon releasing the wire clipping means 115, it returns to its inoperative position through the action of the torsion springs 121 and 133. To remove the completed fuse with the tensioned springs 22 and 33 interconnected by the fuse wire 30 from the apparatus, its supporting member 60 is first unlatched by rocking the latch member 82 clockwise about its pivot 81 (Fig. 5), which causes it to slide outward on the shaft 43 due to the action of the torsion springs 59 and 74 returning the spring tensioning arms 79 and 80 to their normal positions (Fig. 3). The completed fuse may now be lifted freely from the apparatus, the various means of which are again in their initial positions, and another partially assembled fuse placed on the member 60 and the operations repeated.

From the foregoing description, it will be apparent that a practicable apparatus is provided whereby delicately constructed articles, such as alarm type fuses of the type described, may be economically handled during assembling operations to produce articles of uniform quality.

It will be understood that the embodiment herein described is merely illustrative of the invention and one application thereof and that modifications can be made and it is capable of other applications.

What is claimed is:

1. In an apparatus for handling articles having oppositely arranged resilient elements to be tensioned and while so tensioned to be interconnected by a link element, a support, a rotary member journalled thereon, a reciprocable member slidable upon and rotatable with said member for holding an article, cooperating stationary and movable sets of oppositely arranged members carried on said support and said reciprocable member effective upon a movement of said reciprocable member in one direction to tension the elements of the article, and means for retaining said reciprocable member in position upon predetermined movement thereof in said one direction.

2. An apparatus for assembling articles comprising means mounted for longitudinal and rotary movements for supporting an article having a resilient member to be tensioned, means including a pivotal member carried on said support and engaging the resilient member operable in response to longitudinal movement of said support for tensioning said member, and means for feeding a holding element for said tensioned member, said support being rotatable to position said article to receive the holding element to facilitate attaching the holding element to said tensioned member.

3. An apparatus for assembling articles comprising a rotatable support, means on said support for holding an article having a part to be tensioned and movable longitudinally on said support, cooperating cam means carried on said rotatable support and longitudinally movable holding means responsive to longitudinal movement of said holding means for tensioning said part, and means for feeding a holding element to said tensioned part in one angular position of the rotatable support to facilitate attaching said holding element to said part.

4. In an apparatus for handling articles having resilient members to be tensioned and interconnected while under tension by a wire link, a support, a rotary member journalled thereon, a reciprocable member slidable upon and rotatable with said member for holding an article, cooperating stationary and movable sets of elements carried on said rotary and reciprocable members effective upon a movement of said reciprocable member in one direction to engage and tension the resilient members of the article, cooperating latch means on said rotary and reciprocable members effective to retain said reciprocable member after a predetermined movement thereof in said one direction, and means on said support for feeding one end of a length of wire to a position for attachment to one of said resilient members of the article upon said rotary member being moved to one position and upon movement thereof to another position to cause the wire to engage the other resilient member of the article at its point of attachment thereto.

5. In an apparatus for handling articles having oppositely arranged resilient members to be tensioned and interconnected while under tension by a wire link, a support, a rotary member journalled thereon, a reciprocable member slidable upon and rotatable with said member for holding an article, cooperating stationary and pivotal sets of oppositely arranged cam members carried on said rotary and reciprocable members effective upon a movement of said reciprocable member in one direction to engage and tension the resilient members of the article, a latch member pivotally carried on said reciprocable member arranged to latchably engage a shouldered face on said rotary member to retain said reciprocable member after a predetermined movement thereof in said one direction, and movable means on said support arranged in one position to feed one end of a length of wire to a position for attachment to one of said resilient members of the article upon said rotary member being moved to one position and upon movement of said rotary member to another position to cause the wire to engage the other resilient member of the article at its point of attachment thereto.

6. In an apparatus for handling and assembling alarm type electrical circuit fuses having oppositely arranged contact and indicator springs to be tensioned and interconnected while under tension by a fuse wire link soldered to the springs, a support, a rotary member journalled thereon, a reciprocable member slidable upon and rotatable with said member for holding a fuse, cooperating stationary and movable sets of oppositely arranged members carried on said rotary and reciprocable members effective upon a movement of said reciprocable member in one direction to engage and tension fuse springs, means for retaining said reciprocable member in position upon predetermined movement thereof in said one direction, and pivotal means on said support movable into position for feeding one end of a length of fuse wire to a position for soldering to one of the springs of the fuse upon said rotary member being moved to one position and upon movement thereof to another position to cause the fuse wire to engage the other spring of the article at its point of soldering thereto.

7. In an apparatus for handling articles having oppositely arranged resilient members to be tensioned and interconnected while under tension by a wire link soldered to the members, a support, a rotary member journalled thereon, a reciprocable member slidable upon and rotatable with said rotary member for holding an article, cooperating stationary and movable sets of oppositely arranged elements carried on said support and rotary member effective upon a movement of said reciprocable member in one direction to engage and tension resilient members of the article, means for retaining said reciprocable member in position upon predetermined movement thereof in said one direction, means movably mounted on said support for feeding one end of a length of wire to a position for attachment to one of said resilient members of the article upon said rotary member being moved to one position and upon movement thereof to another position to cause the wire to engage the other resilient member of the article at its point of attachment thereto, flux carrying means on said wire feeding means for applying flux to said other resilient member of the article at its wire attaching point during the movement of said feeding means for feeding the wire to the other of said resilient members of the article, and pivotal wire shearing elements mounted on said support for bodily movement into position for shearing the lengths of wire from the portion interconnecting the resilient members of the article.

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