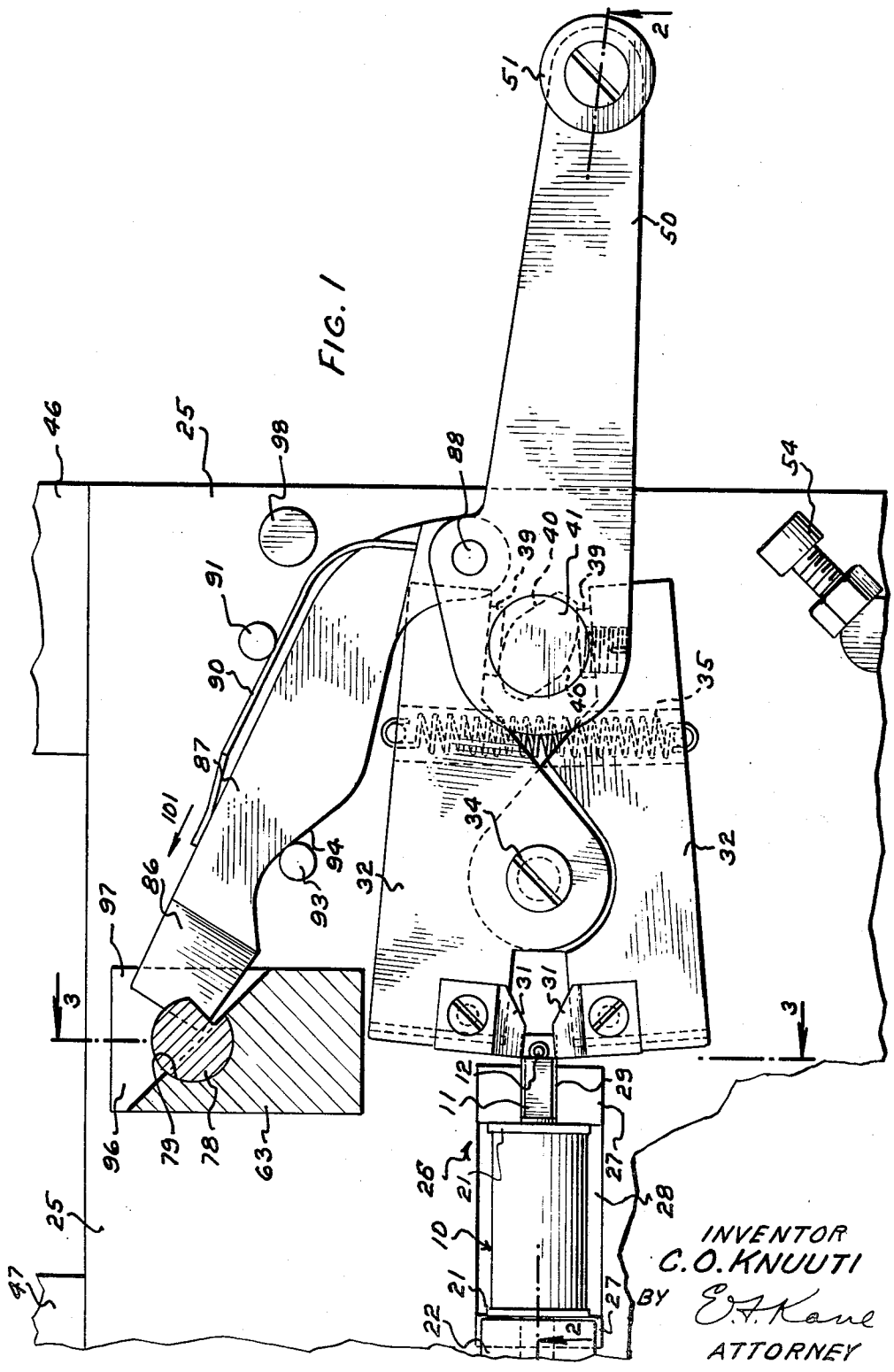
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RIVET-STUD REMOVING MECHANISM

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FIG. 1



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RIVET-STUD REMOVING MECHANISM

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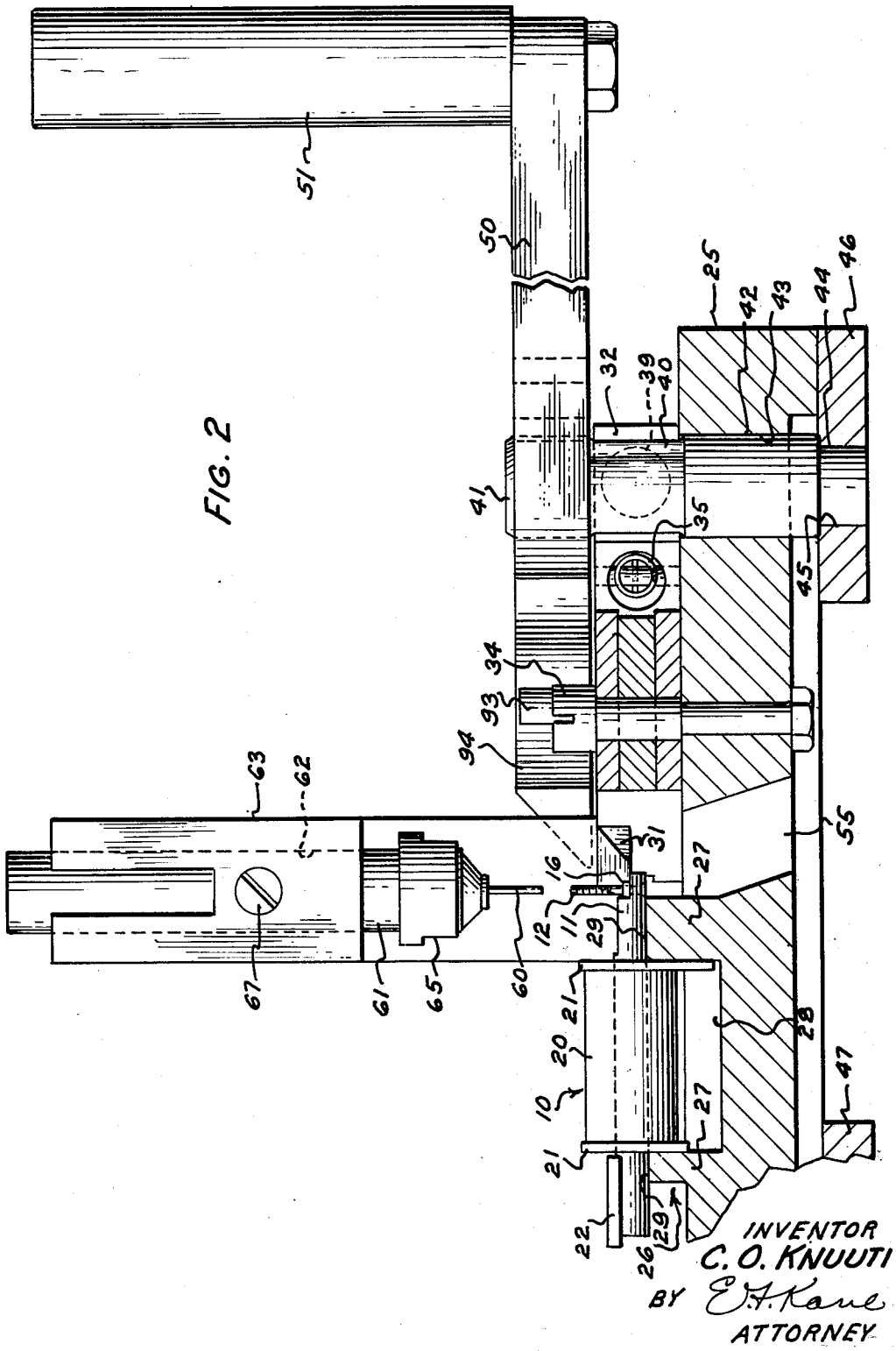


FIG. 2

INVENTOR
C. O. KNUUTI
BY E. F. Kane
ATTORNEY

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FIG. 3

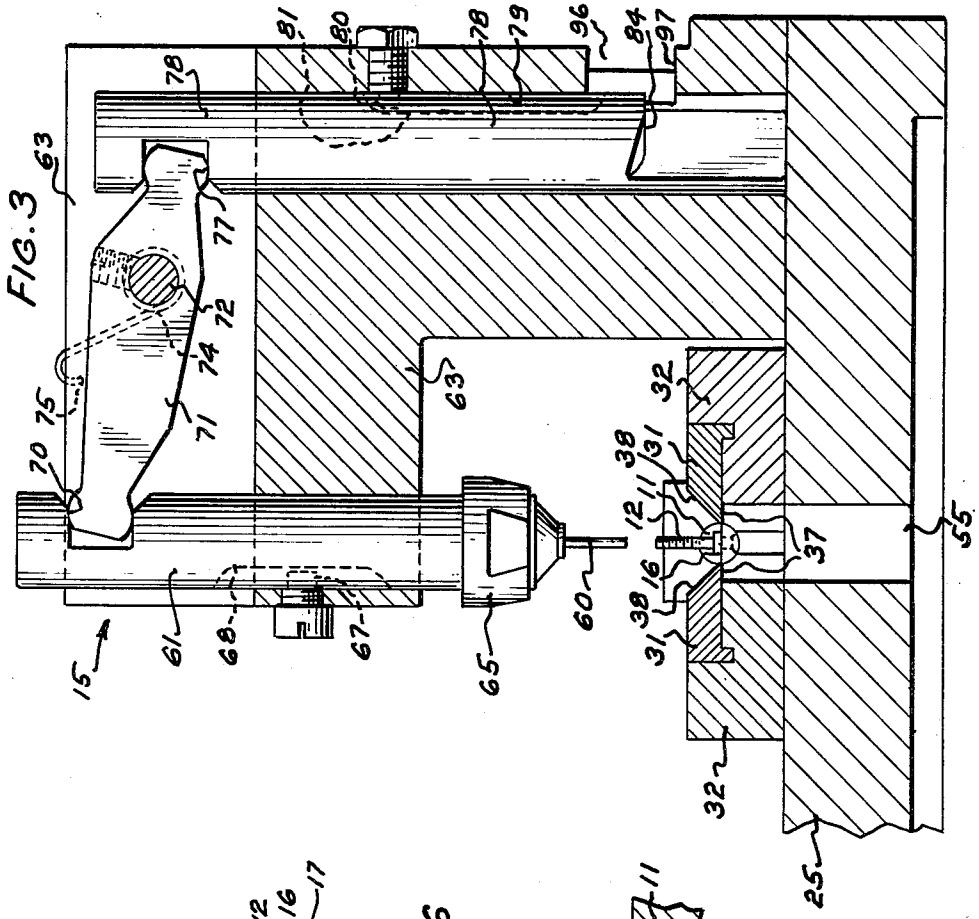


FIG. 4

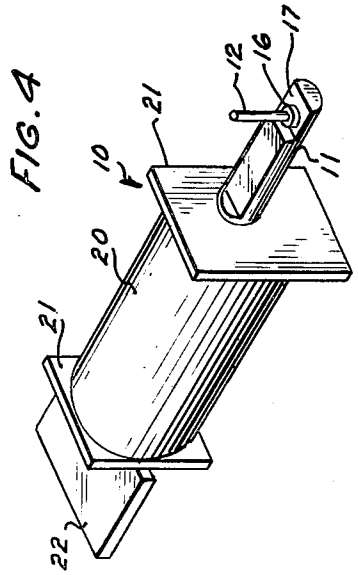


FIG. 6

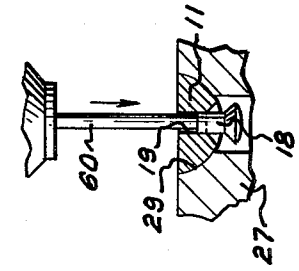
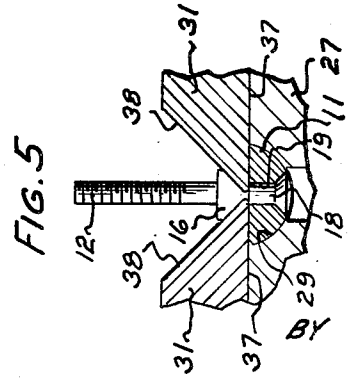


FIG. 5



INVENTOR
C. O. KNUUTI
BY E. F. Kane
ATTORNEY

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UNITED STATES PATENT OFFICE

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RIVET-STUD REMOVING MECHANISM

Charles O. Knuuti, Downers Grove, Ill., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

Application July 14, 1950, Serial No. 173,786

7 Claims. (Cl. 29—33)

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This invention relates to a device for removing an element riveted to a member and more particularly to a device for shearing the projecting portion of a stud riveted to a relay and then pressing the riveted portion therefrom.

In the manufacture of automatic telephone equipment in which large numbers of relays are employed, it occasionally happens in assembling the equipment that parts of the relays such as the spool heads or coils are damaged and have to be replaced. In replacing these damaged parts of the assembled relays of a particular type having a stud riveted to one end of the core of the relay, it is necessary to remove the stud in order to repair the relay and this stud removing operation heretofore had been manually performed in two separate operation by first shearing off the projecting portion of the stud and subsequently pressing the riveted portion from the core.

It is an object of the present invention to provide a device for effectively and efficiently removing from articles, elements which had been riveted thereto.

Another object of the invention is the provision of a device for shearing the projecting portion of an element riveted to an article and pressing the riveted portion therefrom.

In accordance with one embodiment of the invention, there is provided a base member having a seat for supporting the relay in a predetermined position with the stud riveted thereto disposed between the normally opened cutting jaws of a pair of cutting members pivotally mounted on the base and beneath and in axial alignment with a plunger mounted for axial movement relative to the stud. A manually oscillatable lever having a cam engageable with the cutting members serves, in response to the movement of the lever in one direction, to move the cutting jaws together to sever the projecting portion of the stud from the core of the relay and the plunger which is yieldably retained in its upper position is actuated in respose to the reverse movement of the operating lever to press the riveted portion of the stud from the core of the relay.

Other objects and advantages of the invention will become apparent by reference to the following detailed description thereof when considered in conjunction with the accompanying drawings illustrating a preferred embodiment in which,

Fig. 1 is a plan sectional view of the device showing a relay in position therein;

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Fig. 2 is a vertical longitudinal sectional view of the device taken on the line 2—2 of Fig. 1;

Fig. 3 is a vertical transverse sectional view of the device taken on the line 3—3 of Fig. 1;

Fig. 4 is a view in perspective of the relay of the type having a stud which may be removed with the present device;

Fig. 5 is an enlarged fragmentary detailed view showing a portion of the cutting jaws severing the projecting portion of the stud from the core of the relay and,

Fig. 6 is an enlarged fragmentary detailed view of the core of the relay and showing the plunger in the act of pressing the riveted portion of the stud from the core.

Referring to the drawings, Fig. 4, there is shown an article in the form of a relay 10 which has a core 11 to one end of which is riveted a stud 12 for holding parts thereon (not shown) of a relay assembly. The stud 12, which may readily be removed in the apparatus 15 illustrated in Figs. 1 to 3, has a shoulder 16 which engages a flat face 17 of the core 11 and has its lower portion 18 engaging in an aperture 19 in the core and with the lower end of the portion 18 upset or riveted to secure the stud 12 to the core. The core 11 as indicated in Fig. 4 of the relay has telescopingly mounted thereon a coil 20, spool heads 21, and has welded thereto at the opposite end a plate 22. When it is necessary to replace a damaged part of the relay, such as the spool head 21, it is also necessary to remove the stud 12 in order to apply a new part thereon.

The device 15 for removing the stud 12 comprises a base plate 25 having an article holder 26 consisting of a pair of raised supports 27—27 spaced apart to provide a recess 28 therebetween for receiving the coil and spool head portion of the relay 10. Grooves 29 in the supports 27 from a seat for receiving the core 11 therein to support the relay 10 in a predetermined position, the plate 22 engaging the upper surface of one of the supports 27 to position the stud 12 vertically and prevent the oscillation or rocking movement of the relay.

With the relay seated in the holder 26 as indicated in Figs. 1 and 2, the stud 12 is positioned vertically between a pair of cutters 31—31 on one end of a pair of cutting levers 32 pivotally mounted for oscillating movement about a pin 34 secured to the base 25. A compression spring 35 stresses the members 32 for oscillation in one direction about the pin 34 to yieldably maintain the cutters 31 in an open position. As shown in

Figs. 3 and 5, the cutters 31 have sharp cutting edges formed between horizontal faces 37 aligned and engageable with the surface 17 of the core 11 and angularly disposed faces 38. At their other ends, the levers 32 are provided with hardened wear members 39—39 engageable with the opposed cam surfaces 40—40 of a cam member 41.

The member 41 has a cylindrical surface 42 journalled in a bearing aperture 43 in the base plate 25 and has a reduced cylindrical portion 44 rotatably mounted in an aperture 45 in a bar 46. The bar 46 and a similar member 47 are fixed to the base 25 and serve as brackets for securing the device 15 to a suitable bench or table. To the upper end of the member 41 is fixed an actuating lever 50 having a handle 51 at its free end, by means of which the cam member 41 may be oscillated to rock the levers 32 and move the cutters 31 toward each other. Thus by oscillating the lever 50 in a forward or clockwise direction as viewed in Fig. 1, the cams 40 cause the levers 32 to rock about the pin 34 and move the cutters 31 toward each other to engage the stud 12 and sever the exposed portion thereof as indicated in Fig. 5. A stop 54 mounted on the base 25 arrests the movement of the actuating lever 50 in a clockwise direction and prevents the edges of the cutters 31—31 from dulling each other. The severed portion of the stud 12 falls through an aperture or discharge chute 55 in the base 25.

With the relay 10 positioned in the holder 26 of the device, the stud 12 is axially aligned with and below a reduced end portion 60 of a plunger 61 mounted for vertical movement in a bore 62 of a frame member 63 formed integral with or otherwise secured to the base 25. The plunger end 60 comprises a wire or rod fastened to the plunger 61 by a gripping device 65. A stationary pin 67 engaging a slot 68 in the plunger 61 prevents its rotation and the plunger 61 at its upper end is provided with a recess 70 into which one end of a lever 71 is positioned. The lever 71 is secured to a shaft 72 which is journalled for rocking movement in the frame member 63 and has secured thereto one end of a torsion spring 74, the other end of which is inserted in a recess 75 in the frame member 63. The spring member 74 serves to yieldably retain the plunger 61 in a normal elevated or retracted position. The other end of the lever 71 engages in a recess 77 in the upper end of the rod or plunger 78 mounted for vertical movement in a bore 79 in the frame member 63 and retained against rotation by a pin 80 engaging in a groove 81. Near its lower end the rod 78 is provided with a shoulder or cam surface 84 which is engageable by a cooperating cam surface 86 formed on the end of an arm or cam element 87.

At its other end the arm 87 is pivotally connected to the actuating lever at 88 and a leaf spring 90 fixed to the arm 87 and engaging a pin 91 fixed to the base 25 serves to urge the arm 87 in a counterclockwise direction against a stationary pin 93 also fixed to the base 25. The pin 93 engages a curved cam surface 94 formed on the arm 87, which cam surface is arranged to cam the arm 87 in a counterclockwise direction as viewed in Fig. 1 about the pivot 88 and cause the disengagement of the arm 87 from the shoulder 84 at a predetermined position in the movement of the arm. The forward end of the arm 87 on which the inclined cam surface 86 is formed is movable in a recess 96 formed in the frame member 63 and the lower surface of the arm 87 engages and is supported by the lower surface 97 of the recess. A stop 98 on the base 25 limits the movement of the lever 50 in a counterclockwise direction. The parts are so arranged that in response to a counterclockwise movement of the actuating lever 50, the arm 87 is caused to advance in the general direction of the arrow 101 (Fig. 1) and causes the inclined cam surface 86 to engage the shoulder 84 of the rod 78 and impart a vertical movement thereto, which movement of the rod 78 imparts a rocking movement to the lever 71 which in turn moves the plunger 61 downwardly. As the plunger 61 is moved downwardly, the end of the rod 60 is driven through the aperture 19 in the core 11 and engages the riveted portion 18 of the stud 12 as indicated in Fig. 6 and forces it out of the recess 19 in the core 11. As the arm 87 is advancing, the cam surface 94 serves to cam the arm laterally so that upon completion of the ejection of the riveted portion 18 of the stud 12 from the core 11, and just prior to the engagement of the lever 50 with the stop 98, the arm 87 is disengaged from the shoulder 84 of the rod 78 to release the pressure applied to the plunger 60 and permit the spring 74 to return the plunger to its normal upper position.

The normal or neutral position of the device is as indicated in Fig. 1 with the operating lever 50 substantially mid-way between its operative positions in engagement with the stops 54 or 98. The cam surfaces 40 of the cam member 41 and the other parts are arranged relative to each other so that when the operating lever 50 is moved in a clockwise direction the jaws 21 are caused to move toward each other to sever the exposed portion of the stud 12 while the arm 87 moves from the rod 78, and the plunger 60 remains in its upward position. During the reverse movement of the lever 50 from its operative position in engagement with the stop 54 to its neutral position shown in Fig. 1, the parts are returned to their normal position indicated in Fig. 1, and upon continued movement in a counterclockwise direction into its other operative position in engagement with the stop 98 the cam 86 on the arm 87 imparts through the rod 78 and lever 71 a downward movement to the plunger 61 to effect the removal of the lower portion 18 of the stud from the core 11 while little or no movement is imparted to the cutters 31. Upon movement of the operating lever 50 from its operative position in engagement with the stop 98 to its normal position, the parts are again restored to their normal neutral position as indicated in Fig. 1.

In the operation of removing the stud 12 from the relay 10, the relay is inserted in the holder of the device 15 as indicated in Figs. 1 and 2, after which the operator may engage the handle 51 and move the lever 50 in a forward or clockwise direction into engagement with the stop 54 to rock the levers 32 and cause the cutting blades 31 thereon to engage and sever the exposed upwardly projecting portion of the stud 12, which may then pass downwardly through the discharge aperture 55, and immediately thereafter the operator may move the lever in a rearward or counterclockwise direction into engagement with a stop 98 and effect the return of the cutters 31 to their open position and the actuation of the plunger 60 downwardly to move the end 60 thereof through the aperture 19 in the core 11 to drive the riveted end portion 18 of the stud 12 therefrom. Immediately after the lower portion 18 of the stud has been removed from the core 11,

the arm 87 is disengaged from the shoulder 84 of the rod 78 and the plunger 60 is raised to its normal upper position. The actuating lever 50 may then be returned to its neutral position shown in Fig. 1 and the relay 10 removed from the device.

It will thus be seen that with this device, the removal of the stud 12 from a relay 10 is a rather simple operation which requires a relatively small amount of time and is accomplished, after the relay has been properly seated in the device, by merely moving a single lever first in one direction and then in a reverse direction.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. A device for removing from an article a part riveted to the article in an aperture thereof and having a portion projecting from the article comprising a base, a holder on said base for supporting said article in a predetermined position with said part and said aperture disposed along a predetermined axis, a pair of cutting levers pivotally mounted on the base and having cutting edges disposed on opposite sides of said predetermined axis and movable to and from open and closed positions, a reciprocable plunger mounted for movement along said predetermined axis and having an end portion movable into the aperture of an article positioned in said holder, and means including an actuating lever movable in opposite directions for actuating said cutting levers to closed position for severing the projecting portion of said part from an article positioned in said holder in response to actuation of said actuating lever in one direction and for actuating said plunger to eject the riveted portion of said part from said article in response to actuation of said actuating lever in the opposite direction.

2. A device for removing from an article an element which had been secured in an aperture in the article with a portion thereof extending from the article comprising a pair of cutters mounted for movement toward and away from each other, to and from closed and open position, means for moving said cutters to open position in spaced relation to each other, an ejecting member mounted for movement in a predetermined path between said cutters when said cutters are in open position, a holder for supporting said article in a predetermined position with the element between said cutters and the aperture in the article in the path of movement of said ejecting member, an actuating lever movable in opposite directions, means operatively connected to said lever for actuating said cutters to closed position to sever the portion of the element extending from said article in response to movement of said lever in one direction, and means operatively connected to said lever for moving said ejector through said predetermined path and into the aperture in said article to eject the portion of said element in said aperture in response to movement of said lever in the opposite direction.

3. A device for removing from an article a part riveted to the article in an aperture thereof and having a portion projecting from the article comprising a base, means on said base for supporting said article in a predetermined position with the part and the aperture disposed along a predetermined axis, a pair of cutting members mounted on said base and having cutting edges disposed on opposite sides of said predetermined axis movable to and from open and closed positions, a reciprocable plunger mounted for movement along said predetermined axis and having an end portion movable into the aperture of an article positioned in said supporting means, an actuating lever movable in opposite directions, a cam member fixed to said actuating lever for moving said cutting members to closed position to sever the projecting portion of said part in response to movement of said actuating lever in one direction, and means including a cam element connected to said actuating lever for moving said plunger into the aperture of said article to drive the riveted portion of the part therefrom in response to the movement in the opposite direction of said actuating member.

4. A device for removing from an article a part riveted to the article in an aperture thereof and having a portion projecting from the article comprising a base, means on said base for supporting said article in a predetermined position with the part and the aperture disposed along a predetermined axis, a pair of cutting members pivotally mounted intermediate their ends on said base and having cutting edges disposed on opposite sides of said predetermined axis and movable to and from open and closed positions, a reciprocable plunger mounted for movement to and from retracted and advanced positions along said predetermined axis and having an end portion movable into the aperture of an article positioned in said supporting means, an actuating member movable in opposite directions, a cam member fixed to said actuating member for moving said cutting members to closed position to sever the projecting portion of said part in response to movement of said actuating member in one direction, means for moving said cutting members to open position in response to movement of said actuating lever in the opposite direction, means including a cam element pivotally connected to said actuating lever for moving said plunger from its retracted position to its advanced position in response to the movement of said actuating lever in the opposite direction to drive the riveted portion of the part from said article, means for disengaging said cam element from said means for moving said plunger at a predetermined point in the movement of said operating lever in said opposite direction, and means for moving said plunger to its retracted position.

5. A device for removing from an article a part riveted to the article in an aperture thereof and having a portion projecting from the article comprising a base, a pair of cutting levers pivotally mounted intermediate their ends on said base and having cooperating cutting edges at one end thereof movable toward and away from each other for severing the projecting portion of a part positioned therebetween, a holder on said base for supporting an article with the projecting portion of the part positioned between the cutting edges and disposed along a predetermined axis, a cam member engageable with the opposite ends of said cutting levers, an actuating lever connected to said cam member for actuating said cam member to effect the movement of said cutting edges toward each other to sever the projecting portion of said part

positioned between the cutting edges in response to movement in one direction of said actuating lever, a plunger mounted for movement along said predetermined axis and having a portion movable into the aperture of an article positioned in said holder, linkage including a member operatively connected to said plunger for actuating said plunger in response to the movement of said member, and a cam element connected to said actuating lever for moving said member and actuating said plunger to eject the riveted portion of the part from the article in response to movement of said actuating lever in the reverse direction.

6. A device for removing from an article a part riveted to the article in an aperture thereof and having a portion of the part projecting from the article comprising a base, means on said base for supporting said article in a predetermined position with the part and the aperture disposed along a predetermined axis, a pair of cutting jaws pivotally mounted intermediate their ends on said base and having cutting edges at one end thereof disposed on opposite sides of said predetermined axis and movable to and from open and closed positions, a reciprocable plunger having an end portion movable along said predetermined axis to and from retracted position spaced from an article in said supporting means and an advanced position in the aperture of an article in said supporting means, an oscillatable cam member mounted on said base having cam portions engageable with the opposite ends of said cutting jaws for actuating said jaws in response to oscillation of said cam member, an actuating lever connected to said cam member for oscillating said cam member, said cam portions being arranged to actuate said cutting jaws to closed position in response to the movement of said actuating lever in one direction to sever the projecting portion of a part from an article disposed in said supporting means, resilient means for moving said cutting jaws to open position, a member, means operatively connecting said member to said plunger to impart movement to said plunger in response to movement of said member, a cam element pivotally connected to said actuating lever and movable through a predetermined path to engage and actuate said member in response to the movement in a reverse direction of said actuating lever to effect the movement of said plunger to its advanced position to eject the riveted portion of said part from said article, means for guiding said cam element through said predetermined path into engagement with said member to actuate said member and to cause disengagement of said cam element from said member at a predetermined point in its advance movement, and resilient means for moving said plunger to its retracted position.

7. A device for removing a riveted stud from the core of a relay comprising a base, a pair of levers pivoted on said base and having a pair of normally separated cutting jaws at one end thereof, a plunger, means mounting said plunger for movement along an axis extending between said cutting jaws, a holder on said base to support a relay core with a stud thereon between said cutting jaws and in the path of movement of said plunger, an oscillatable lever having cam means for actuating said levers to sever the projecting portion of said stud in response to movement of said lever in one direction, and means including a member connected to said lever operable to actuate said plunger to push the riveted portion of said stud from said core in response to movement of said lever in the opposite direction.

CHARLES O. KNUUTI.

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