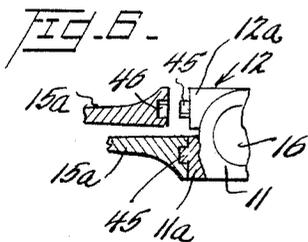
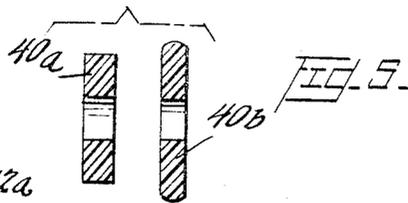
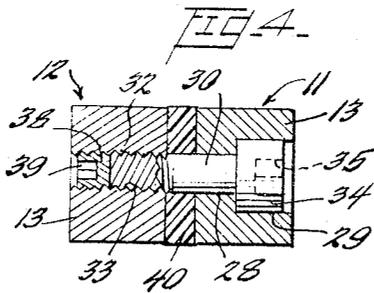
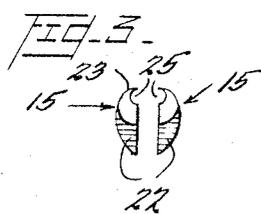
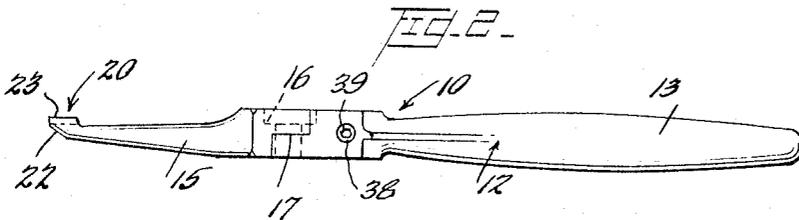
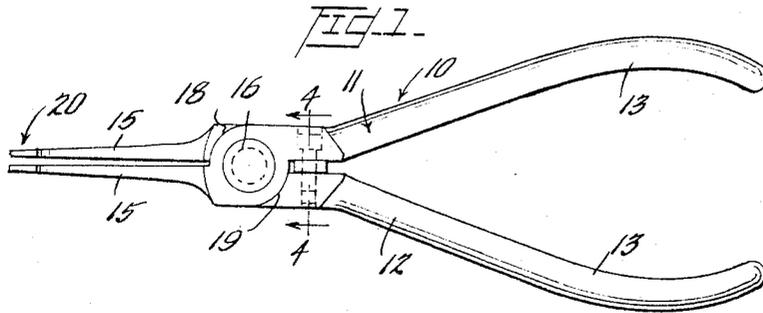


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PLIER-TYPE EXTRACTION TOOL HAVING A RESILIENT WASHER FOR
YIELDINGLY URGING THE JAWS APART
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PLIER-TYPE EXTRACTION TOOL HAVING A RESILIENT WASHER FOR YIELDINGLY URGING THE JAWS APART

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This invention relates to gripping and pulling instruments and has for its general object the provision of novel and improved instruments or tools of this type which are useful in probing into crowded installations such as electric wiring systems, and selectively gripping, bending, distorting, or pulling certain elements which would ordinarily be difficult to seize or manipulate.

In its preferred embodiments, the invention contemplates the provision of a hand-gripped tool of the generic configuration of a pair of pliers, but embodying slender cooperating jaw members having novel end configurations for specialized work, and also novel jaw controlling means adapted to resiliently resist the closing of the jaws, adjustably limit the opening thereof, and provide shock absorbing means for the protection and the precise positioning of the device in operation.

Other objects and features of novelty will be apparent from the following specification when read in connection with the accompanying drawings in which certain embodiments of the invention are illustrated by way of example.

In the drawings:

FIGURE 1 is a plan view of an extraction tool embodying the principles of the invention;

FIGURE 2 is a view in side elevation of the same;

FIGURE 3 is a front end view of the nose of the instrument;

FIGURE 4 is a view in transverse section taken on line 4-4 of FIGURE 1;

FIGURE 5 is a diagrammatic illustration showing in section the resilient shock absorbing washer in its relaxed or axially expanded condition, and in its compressed and radially spread condition as when the jaws of the tool are gripping a terminal element; and

FIGURE 6 is a fragmentary view partly in plan and partly in horizontal cross section showing an alternative construction in which the jaws are separately formed and secured to the body of the tool.

In switchboard and other electric and electronic circuitry, the wires, conductor posts, terminal clips, and other parts are assembled with such close clearances that it is extremely difficult to seize and manipulate elements within the maze of parts, in installing, disengaging, or removing elements, for example such as the terminal clips from conductor posts in the wiring of electronic programming boards.

The invention, as illustrated and described herein, is especially equipped to remove such terminal clips safely and easily, the slim tapering jaws of the tool providing maximum access and positive gripping, even with respect to the innermost conductors, without damage to the surrounding components.

In the drawings, the novel tool is designated by the general reference numeral 10 and comprises the mating oppositely disposed halves 11 and 12, each half comprising a curved gripping handle 13 and slender jaw members 15, the two half-members being pivotally connected by means of the pivot pin or disc 16.

Adjacent the pivot point, the contacting portions of the two members 11 and 12 are cut away or halved so as to overlap without greatly increasing the total thickness of the tool at such central point. This is clearly suggested at the points of severance at 17 in FIGURE

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2, and at 18 and 19 in FIGURE 1. This mode of pivoting is, of course, conventional in tools of this type and this specific feature alone does not comprise a part of the present invention.

Now the forward portion of the tool, as is easily apparent from FIGURE 1, is quite disproportionately abbreviated and attenuated as compared with the central portion and the gripping handles. This is done in order to provide the slender jaws 15 which may be inserted within a maze of wiring to selectively clamp or grip relatively inaccessible parts such as terminal clips, either for their application or removal in the circuitry. To better accomplish this purpose, the nose of the device indicated at 20, is shaped as best shown in FIGURES 2 and 3 of the drawings with each jaw 15 having a slightly upwardly curved end portion as at 22; and the slightly protruding level portion 23 of the nose is provided with an opening formed by two partly cylindrical grooves 25 formed in these projecting portions 23 of the jaws.

This construction provides the working portion of the jaws with means to securely grip terminal clips and either effect their bending and clamping around terminal posts, or removing the clips altogether from the installation. The provision of the clips in a slightly laterally offset portion 23 of the nose of the jaws aids in affording good visibility on one side of the tool down into the circuitry for locating and seizing the small parts to be adjusted or removed.

Now the normal extent of opening of the jaws in such a situation should be limited so as to enable the insertion of the jaws in somewhat closed condition as for example, as illustrated in FIGURE 1; and for the same reasons the jaws should be normally in a very slightly open position rather than fully closed, in which latter condition the handles would have to be spread manually. Also, the actual maximum degree of opening of the jaws should be limited for similar reasons of better handling.

For these purposes, novel arrangements have been provided at the base of the handle grip parts 13 near where the halves 11 and 12 of the tool are pivoted at 16. This arrangement is best shown in FIGURE 4 of the drawings.

It is understood that the formation of the halves 11 and 12 may be reversed without departing from the invention, but the specific details will be described in connection with the form illustrated, where the half 11 is shown on the right-hand side of FIGURE 4 and the half 12 is shown at the right-hand side of this figure. The part 11 is drilled as at 28 and also countersunk as at 29 for the reception of the headed pin 30.

The part 12 is drilled with a threaded opening there-through as indicated at 32, the left-hand end portion of the pin 30 being correspondingly threaded as at 33. The head 34 of the pin is provided with a wrench socket 35 for manipulation thereof.

Threaded into the remote end of the opening 32 in the part 12 is a set screw 38 having a socket 39 therein for the application of the wrench.

Surrounding the central portion of the pin 30 is a resilient washer 40 which is made of rubber-like material, preferably a relatively soft deformable but substantially incompressible plastic of any well known and suitable composition. The parts are shown in FIGURE 4 as they are in the condition of repose illustrated in FIGURE 1, the washer 40 exerting slight pressure to separate the handle portion 13 and consequently the jaw parts 15. It will be readily understood that this separating urge is counteracted by the abutment of the head 34 of the pin 30 against the shoulder 42 where the bores 28 and 29 adjoin.

Now, after the slightly open jaws 15 have penetrated the maze of circuitry and have surrounded the element to be operated upon, the handle grips 13 are squeezed by the operator to grip the element, and the washer 40 is deformed from its initial position as suggested at 40a in FIGURE 5 to a somewhat flatter condition suggested at 40b in that figure, wherein the radial or diametric dimension of the disc is increased in proportion as the thickness has been diminished. This, of course, provides a resilient or yielding limiting factor to the approach of the jaws 15 and affords a shock absorbing effect while at the same time not preventing the eventual coming together of the jaws 15 upon the element to be adjusted, distorted, or removed.

One important feature of the invention is the locking of the pin 30 in the desired adjusted position to regulate the maximum opening of the jaws. In setting this position, the pin 30 is threaded into the threaded opening 32 in the half 12 until the proper penetration is reached; then the set screw or plug 39 is threaded into the opposite end and due to its pressure against the end of the pin 30 and against the threads of the opening, serves as a locking device for the pin.

An alternative form of the invention is illustrated in FIGURE 6 of the drawings wherein the jaw elements 15a are separately formed and joined to the stub portions 12a and 11a of the halves 11 and 12 by means of the mortise and tenon joints comprised of the protuberance 45 and correspondingly shaped socket 46. This assures the proper interfitted relationship of the jaws and the final securement can be accomplished in any suitable manner as by a force fit or by soldering, welding, brazing, or the use of a very strong adhesive.

It is understood that various changes and modifications may be made in the embodiments illustrated and described herein without departing from the scope of the invention as determined by the following claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. An applying and extracting tool of the class described comprising similar cooperating crossed handle-and-jaw members pivoted together at their intermediate portions for simultaneous movement of the jaw portions of the members toward each other when the handle portions thereof are squeezed together, the distal end portions of the jaws being of much smaller transverse dimension than that of the intermediate and handle portions of the tool for ready penetration of small openings, said jaw end portions being offset slightly at one side only from the general axis of the pair of jaws and of the tool proper, and each of said end portions provided with a single longitudinally extending groove opening toward and facing the groove of the mating jaw portion, said grooves cooperating in forming a single substantially cylindrical contractible passageway for seizing a thin element to be handled, such as a wire terminal, the axis of said passageway being spaced slightly from and parallel with the general axis of the jaws and of the tool; resilient means for normally urging said jaws and said handle portions apart; and means for limiting the degree of separation of said jaws and handle portions.

2. The tool as set forth in claim 1 in which said end portions of said jaws are bevelled slightly toward the offset portions but the side edges of said offset portions being in substantially straight lines parallel to the general axis of the tool, and in which said grooves are approximately semi-cylindrical.

3. An applying and extracting tool adapted for the handling, applying, and removal of terminal clips in electrical circuitry, or the like, said tool comprising similar cooperating crossed handle-and-jaw members pivoted together at their intermediate portions for simultaneous movement of the jaw portions of the member toward each other when the handle portions thereof are squeezed together, said jaw portions being attenuated and maintained within close limits of spacial separation at all times to facilitate the penetration of a maze of circuitry; means for limiting the separation of said jaw and handle portions comprising a pin fixed in one of said corresponding portions, passing through an opening in the other adjacent corresponding portion, and having a head on the distal end thereof of larger diameter than said opening, whereby said head abuts the margin of the opening at the limit of opening movement of said portions; and means for yieldingly urging said portions apart to the limited degree permitted by said headed pin, said last named means comprising a resiliently deformable washer surrounding said pin and disposed between adjacent surfaces on two corresponding portions of said members so as to be pressed therebetween and yieldably distorted radially up to the point of firm gripping of the element to be handled.

4. The tool as set forth in claim 3 in which said opening is countersunk at its outward end to a depth approximately equal to the depth of the head of said pin.

5. The tool as set forth in claim 4 in which said pin is threaded into an opening in the first of said portions and the head of said pin is provided with a polygonal recess for the application of a key wrench.

6. The tool as set forth in claim 3 in which said first named portion in which said pin is fixed is provided with a threaded opening therethrough into which said pin is screwed; and locking means are provided for securing said pin therein.

7. The tool as set forth in claim 6 in which said locking means comprises a set screw screwed into the end of said threaded opening and adapted to be moved into forced abutment with the end of said pin.

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