

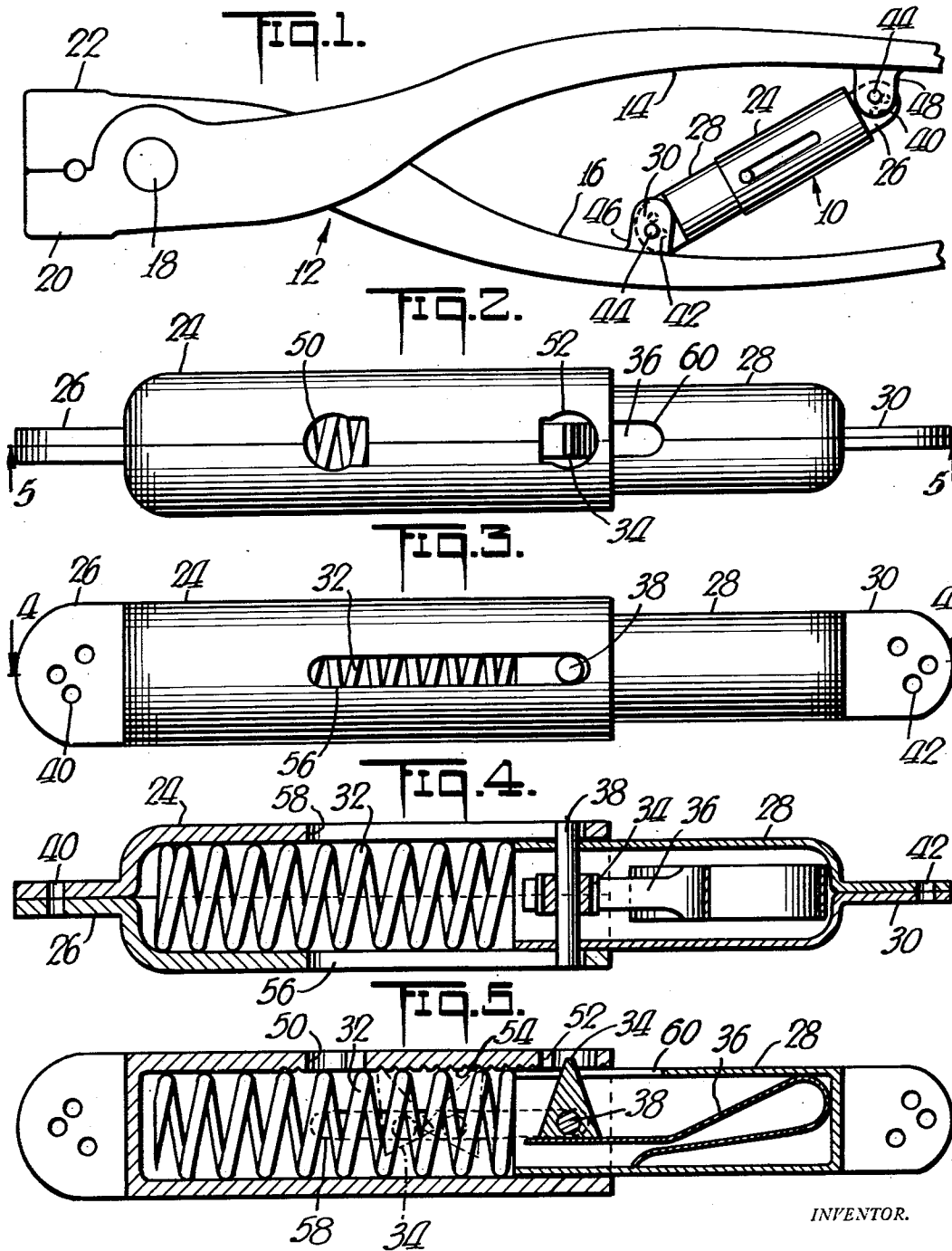
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TOOL WITH FULL STROKE COMPELLING TUBULAR RATCHET MECHANISM

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TOOL WITH FULL STROKE COMPELLING TUBULAR RATCHET MECHANISM

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My invention relates to a ratchet mechanism and more particularly to a ratchet-controlled compressing tool which requires a complete closing cycle of the compressing surfaces at which time the tool can be opened to release the work piece.

Such tools are used for example in the form of pliers for crimping electrical connectors to wires. A connection not properly crimped may fail electrically and mechanically. A ratchet mechanism therefore is provided to insure completion of the crimping operation.

The prior devices, I have found, employ an excessive number of parts, some of which are costly to produce and assemble. Moreover, they may be tampered with to avoid the restriction which they are designed to impose on the user.

Accordingly, objects of my invention are to provide a ratchet mechanism with a reduced number of parts, simple to manufacture and assemble; a ratchet mechanism which is relatively tamper-proof, and in which may be combined a jaw opening mechanism operable at the completion of each closing cycle.

These and other objects of my invention are accomplished and my new results achieved as will be apparent from the device described in the following specification, particularly pointed out in the claims, and illustrated in the accompanying drawing, in which:

Fig. 1 is a side elevation of a linear form of sliding ratchet mounted on a pair of pliers;

Fig. 2 is a top elevational view of the assembled tubular outer and inner slides;

Fig. 3 is a side elevation of the same;

Fig. 4 is a longitudinally sectioned view of the tubular ratchet unit taken in the plane 4-4 of Fig. 3;

Fig. 5 is a similar view taken in the plane 5-5 of Fig. 2.

The ratchet unit 10 of my invention is secured to a compression tool such as the pliers 12 having handles 14 and 16 pivoted at pin 18, and terminating in jaws 20 and 22, respectively. The ratchet unit comprises outer tube 24 flattened at one end to form plate 26, inner tube 28, flattened at plate 30, compression spring 32 positioned between the tubes, pawl 34, leaf spring 36, to actuate the pawl, pin 38 to support the pawl, the end plates 26 and 30 are each provided with a plurality of holes, indicated as 40 and 42, respectively, through one of which in each plate a pin 44 is inserted for engagement with apertured ears 46 and 48, extending from the plier handles 14 and 16, respectively.

Holes 50 and 52 are punched through the same sides of the large tube for freeing the pawl from the toothed rack 54 positioned on the inner surface of the larger tube between the holes. Guide slots 56 and 58 are punched in opposite sides of the large tube each at right angles to pawl holes 50 and 52. The pawl 34 is pivotally mounted to the inner tube by pin 38 and extends through a slot 60 formed in the inner tube to permit engagement with the rack 54. The pawl is maintained in a position perpendicular to the axis of the tube by leaf spring 36 caught between the pawl and the inner tube.

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When the handles of the tool are open, the pawl is in its neutral position and extends through hole 52. When the handles of the tool are closed by the operator, tube 28 begins to slide into tube 24 and the pawl is tensed in position and ratchets against the toothed rack thus preventing the handles from opening. The pawl 34 is pressed against the rack 54 by the spring 36. When the handles of the tool are fully closed the pawl snaps into a neutral position in hole 50 permitting the opening of the tool and assuring the operator a full stroke. When the closed handles are released the spring 32 forces the tubes apart. This causes the pawl to be withdrawn back over the toothed rack until the handles are fully opened. The tool cannot be re-closed until the pawl 34 snaps into hole 52. This ratcheting on the opening stroke prevents the insertion of work in the tool before the ratchet device is fully opened. The spring 36 is compressed during the closing stroke. It is this spring that serves to automatically open the handles after each installation stroke. The pin 38 which supports the pawl 34 and is fixed in tube 28, is free to slide in the slots 56 and 58. The slots provide a maximum stop on the stroke of the ratchet device and therefore prevent the handles of the tool from opening beyond a desired distance.

The toothed rack may be formed on the inside surface of tube 24 by forcing a mandrel (not shown) into the tube, containing a small hardened metal wheel which rotates inside the mandrel and forms the toothed rack.

The three holes punched in either end of the ratchet device serve as a method for adjusting the point at which the ratchet should release, thus permitting adjustment for tolerance in the manufacture of the tool and the ratchet device. By placing the pivot pin 44 in any one of the three holes during the final assembly the manufacturer can adjust the tool for proper performance.

From the foregoing, it is seen that the ratchet is of much simpler design than any other combination of spring and ratchets presently being used, consisting of only two punched and formed tubes preferably of steel from standard stocked sizes, a compression spring, a pawl, a pawl spring and a pin. These parts are suitable for large quantity production at low cost because of their application to punch press work. A good example of this is the ability to form the ratchet teeth with one punch press stroke.

In manufacture the ratchet is simple to assemble and install on the tool, requiring a minimum of critical adjustment. The ratchet is neat in appearance, being of compact design and having all its mechanical elements on the inside of the assembly so as to prevent tampering by an operator who may wish to change the performance of the tool.

The ratchet provides positive action which cannot be affected by the loosening of parts or the abuse expected under operation conditions. The ratchet can be adapted to any hand tool of the plier type.

I have thus described my invention, but I desire it understood that it is not confined to the particular forms or uses shown and described, the same being merely illustrative, and that the invention may be carried out in other ways without departing from the spirit of my invention, and, therefore, I claim broadly the right to employ all equivalent instrumentalities coming within the scope of the appended claims, and by means of which objects of my invention are attained and new results accomplished, as it is obvious that the particular embodiments herein shown and described are only some of the many that can be employed to attain these objects and accomplish these results.

I claim:

1. In a tool having a pair of jaws provided with working surfaces, a ratchet and pawl mechanism connected to said jaws for controlling the movement thereof, said

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ratchet and pawl mechanism comprising a rack member and a pawl member, said rack member having a linearly extending inner toothed surface, guides in said rack member for controlling the linear movement of the pawl member, said pawl member having a pawl and pivot support for said pawl mounted on said member, means for connecting each of the members to each of the jaws, said pawl camming past the toothed surface upon closing of the jaws and interlocking therewith when the jaws are partially opened, said rack member having an opening for releasing the pawl upon completion of the stroke for permitting the jaws to be opened.

2. In the tool of claim 1, wherein the pawl member is tubular in shape.

3. In the tool of claim 1, wherein the rack member is tubular in cross-section and the guides are formed by a linearly extending opening, said pawl member being provided with a projection positioned in said opening for limiting the movement of the pawl member.

4. In the tool of claim 1, wherein the pawl member is tubular and contains an opening through which the pawl extends, with the pivot support extending through the

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walls of said tubular pawl member and through the rack member, and said pawl member is provided with a pawl actuated spring positioned between the inner surface of the tubular pawl member and the pawl for maintaining the pawl in its median position.

5. In the tool of claim 1, wherein the rack member and the pawl member comprise outer and inner sleeves, and a compression spring contained within said outer sleeve for forcing the inner sleeve outwardly with respect to said outer sleeve.

References Cited in the file of this patent

UNITED STATES PATENTS

Re. 6,146	Corbett	Nov. 24, 1874
979,563	Robinson	Dec. 27, 1910
1,378,701	Lyle	May 17, 1921
1,863,754	Lissauer et al.	June 21, 1932
2,618,993	Carlson	Nov. 25, 1952

FOREIGN PATENTS

585,761	Great Britain	Feb. 24, 1947
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