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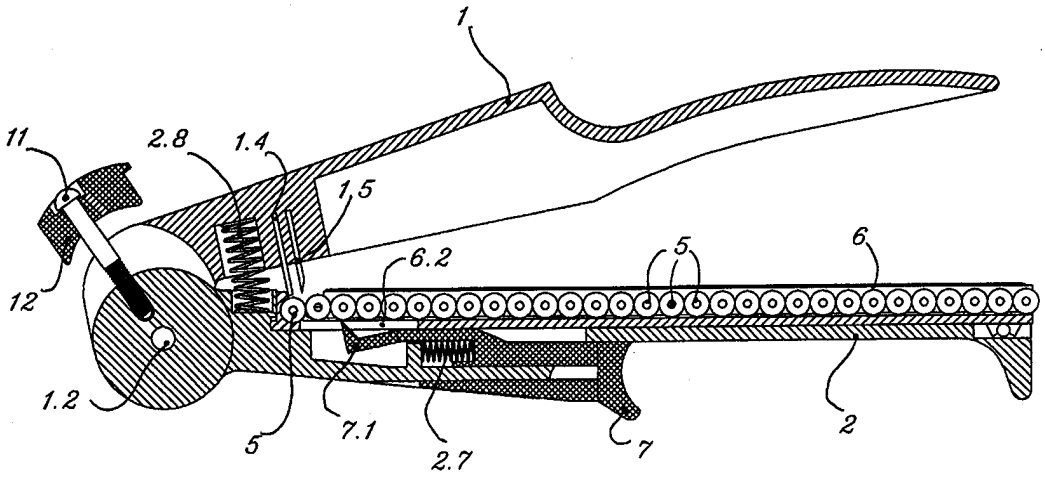
(54) Title: PLIERS FOR ELECTRIC TERMINALS PROVIDED WITH SLIDE AND CONTINUOUS FEEDER WITH HANDLE LOCK–RELEASE DEVICE



(57) Abstract

The invention concerns new crimping pliers for terminals with tubular end, quite confortable and easy to use, comprising two handles, two blades, a seat, for terminal feeders and a terminal feeding device. The lower end wall of the feeder is provided with an opening suitable for the insertion of the tooth of a slide, the operation of which causes the advance of the terminal band towards the crimping seat. A lock–released element provided near the rotation point of the two handles permits the locking of the two joined handles, their relative rotation for the normal crimping operation or their opening for the replacement of the feeder or maintenance operations. A support for a terminal coil can also be applied in order to ensure longer operating times.

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DESCRIPTION

PLIERS FOR ELECTRIC TERMINALS PROVIDED WITH SLIDE AND CONTINUOUS FEEDER WITH HANDLE LOCK-RELEASE DEVICE

The present invention concerns the sector of wiring harnesses and in particular it concerns terminals and the tools for fastening terminals to the ends of electric wires.

A terminal, whose characteristics will depend on the use for which it is destined, can be applied to the end of an electric wire by means of an appropriate system and tool.

Several types of terminals for electric wires are currently available, the most common of which are the terminals consisting of a small metal tube with a larger edge made of insulating plastic material. The terminal is inserted on the electric wire end and fixed to said wire through pressure by means of special pliers.

This operation is called crimping.

At present crimping pliers consist of simple pliers, the gripping ends of which are adapted so that they can hold and clamp a terminal with tubular end.

To crimp a terminal to the end of a wire it is necessary to hold the pliers with one hand, take a new terminal from the appropriate container, insert it in the pliers seat and slightly close the pliers so that the terminal is locked, insert the stripped end of the wire in the terminal and close the pliers in order to deform the terminal, create the connection with the wire and thus fasten it.

The known types of crimping pliers, as they are designed and implemented, present a series of drawbacks.

It is necessary to look for the terminal suitable for the wire to be crimped in the terminal container; it is necessary to exert a correct pressure on the terminal with the pliers, in such a way as to hold the terminal itself without crushing or deforming it before inserting the wire, in order not to make it unusable; if the wire has not been stripped, it is necessary to lay down the crimping pliers, strip the wire and repeat the insertion of the terminal in the pliers tip; too many manual operations are necessary, which require much time and adequate manual ability.

It is important to consider that terminal bands are known, which comprise several terminals placed side by side and joined by means of very small quantities of plastic material constituting the insulated edge of the terminals.

The object of the present invention are new crimping pliers for terminals with tubular end, which eliminate all the above mentioned drawbacks and are extremely user-friendly.

The main components of the new crimping pliers comprise two handles, two blades, a seat for terminal feeders, a terminal feeding device.

The two handles are two generically linear elements, hinged at one end and suitable for being grasped like a nutcracker.

The ends of the two handles that are hinged to each other are shaped so that they permit a limited opening of the two handles and make the grasping of the new pliers comfortable. A special elastic element keeps the two handles open, so that they need not be opened manually and the new pliers are always ready for use.

One of the two handles has U-shaped section, with the concave side facing the opposite handle. The groove formed by the U-shaped section houses the terminal feeder.

The other handle of the new pliers is provided, near its hinged end, with the two blades for the crimping and separation of the terminals. Said two blades are parallel, are not aligned with each other and are perpendicular to the rotation plane of the two handles. Each one of the two blades has a specific and different function.

The edge of the blade that is nearer to the handle rotation point is not sharp, but flat, knurled or indented and has the function to deform the terminal to be crimped.

The edge of the second blade, which is farther from the handle rotation point, is sharp and has the function to separate the crimped terminal from the other terminals contained in the feeder.

The feeder of terminals with tubular end consists of a container in which a band of terminals with tubular end is housed.

One of the walls of the terminal is open and is shaped in such a way as to receive and hold one terminal only, even if this is connected with the other terminals of the band.

Said open wall of the feeder is open either on its top and on the sides corresponding to the ends of the terminal.

Said open wall constitutes, in fact, the terminal crimping seat. For this purpose the handle with U-shaped section is provided, in correspondence with the blades of the other handle, with a housing for the open side-crimping seat of the feeder.

The inner walls of the feeder are shaped so that they can house the terminals with precision and guide each terminal and/or the entire terminal band towards the open side-crimping seat of the feeder.

The lower end side of the feeder is provided with a linear opening parallel to the terminal band advance direction.

A slide equipped with a tooth that can be comfortably operated with a finger is positioned on the handle having U-shaped section. The slide tooth passes through the handle and the lower wall of the feeder until getting engaged between two consecutive terminals. The operation of the slide causes the advance of the terminal band towards the crimping seat.

It is possible to replace the feeder described above with a support for a terminal coil to be applied to the free end of the handle with U-shaped section, in such a way as to ensure longer operating time.

The use of the new crimping pliers is extremely simple and quick:

- a feeder of appropriate terminals is inserted in the handle, so that the crimping seat of the feeder is positioned under the crimping blades;

- the slide is operated so that a terminal with tubular end is brought to the crimping seat;

- the stripped wire is inserted in the terminal with tubular end positioned in the crimping seat;

- the handles of the new pliers are brought near each other and tightened until the crimping blade correctly deforms the terminal, fastening it to the wire and until the cutting blade has separated the just crimped terminal from the terminal band contained in the feeder;

- the handles are released and the wire crimped to the terminal is extracted, leaving the new crimping pliers ready for the following crimping operation.

The two handles are provided, near their rotation point, with a three-position, lock-release element that prevents, limits or permits the reciprocal rotation of the two handles.

In the first position the lock-release element keeps the two handles completely close to each other, thus totally preventing their rotation. In this position the new crimping pliers are closed and at rest.

In the second position the lock-release element permits a limited rotation of the two handles from a position in which they are completely close to each other to a suitably angular position, in such a way as to permit the advance of the terminal band, the insertion of the wire to be crimped and the crimping of the terminal on the wire end. This position is the normal operating position of the new crimping pliers.

In the third position the lock-release element permits a wide rotation of the two handles from a position in which they are completely close to each other to a wide angular position. This position corresponds to the recharge or maintenance position of the new pliers; in fact, in this position it is possible to insert or remove the terminal feeder in/from its U-shaped seat in one of the two handles or, in any case, to reach the crimping seat and the space between the two handles in order to carry out the proper maintenance, cleaning and similar operations.

The attached drawing illustrates a practical application among many of the invention in question.

Figure 1 shows the separate parts that make up the new crimping pliers, while Figure 2 shows the assembled pliers.

The two handles (1 and 2) are joined at their ends by means of a pin (1.2) that acts as rotation fulcrum.

The upper handle (1) is provided with one "Z" shaped blade (1.45), with two paralel sides (1.4) and (1.5), or with two blades (1.4 and 1.5) near the rotation point (1.2) of the two handles (1, 2). The edge of the blade (1.4) that is nearer to the handle rotation point (1.2) is not sharp, but flat, knurled or indented in such a way as to deform the terminal with tubular end (5).

The lower edge of the blade (1.5), which is farther from the handle rotation point (1.2), is sharp and has the function to separate the crimped terminal (5) from the other terminals.

The lower handle (2) has U-shaped section, so that it can house the feeder (6) in which the terminals with tubular end (5) are contained.

The part (6.1) of the feeder (6) that is positioned nearest to the rotation point (1.2) and in correspondence with the blades (1.4, 1.5) of the upper handle (1) is open on its upper side and shaped in such a way as to correctly hold the terminal to be crimped (5).

On the lower handle (2) a slide (7) is provided, which is equipped with an elastic tooth (7.1) that pushes the terminals (5) of the feeder (6) towards the crimping position (part 6.1 of the feeder). For this purpose the lower surface of the feeder (6) is provided with an opening (6.2) that allows the tooth (7.1) of the slide (7) to get into the feeder itself and operate as required.

A pin (11) is inserted on the lower handle (2), and precisely on the rotation area of the two handles (1, 2), on the side opposite the

crimping seat (6.1), said pin being inclined towards the upper handle (1).

An arched and asymmetric lock-release element (12) slides on said pin (11) and its position or rotation determines the locking, the position of use or the position of insertion-removal of the terminal feeder (6).

The various positions of the lock-release element (12) are illustrated in Figures 4a, 4b, 4c, in which:

Figure 4a shows the lock position, in which the lock-release element (12) is near the rotation point (1.2) with its longer part facing the crimping seat (6.1);

Figure 4b shows the position of use of the crimping pliers, in which the lock-release element (12) is near the rotation point (1.2) with its longer part facing the direction opposite the crimping seat (6.1);

Figure 4c shows the change position, in which the lock-release element (12) is far from the hinge point (1.2), in such a way as to permit the insertion or removal of the feeder (6).

Two appropriate springs (2.8, 2.7) keep the pliers handles (1, 2) open and push the slide (7) backwards.

Figure 3 shows an example of implementation of the new pliers provided with a support (9) for the coil (10) of continuous bands of terminals (5).

The above are the basic outlines of the invention, on the basis of which the technician will be able to provide for implementation; any modification which may be necessary upon implementation shall be based on the same innovative concept and must therefore be regarded as completely protected by the present invention.

With reference to the above description and the attached drawings, the following claims are put forth.

CLAIMS

1. Crimping pliers for terminals with tubular end arranged in continuous bands, comprising two reciprocally hinged handles, characterized in that one of the handles is provided with one "Z" shaped blade or with two parallel blades, not aligned with each other, one of which has a flat and/or knurled and/or indented edge and is suitable for deforming the terminal, while the other blade, which is further from the handle rotation point has a sharp edge suitable for separating the crimped terminal from the other terminals of the band that are still to be crimped.

2. Crimping pliers according to claim 1, characterized in that its lower handle is provided with a slide equipped with a tooth suitable for pushing each terminal to be crimped towards the point in which the blades crimp the terminal to the wire.

3. Crimping pliers according to claims 1, 2, characterized in that it is provided with a feeder for terminals with tubular end, open towards the blades on its upper side and shaped so that it can hold a terminal in correct position and with a lower opening for the insertion of the tooth of the lower slide.

4. Crimping pliers according to claims 1, 2, 3, characterized in that the handle that houses the terminal feeder is provided with a support for a coil of terminals arranged in a continuous band.

5. Crimping pliers according to claims 1, 2, 3, 4, characterized in that it is provided with a lock-release element with three positions, wherein the first position keeps the handles together and does not permit the use of the pliers, the second position permits a relative rotation between the two handles and corresponds to the normal

position of use of the pliers and the third position permits the complete angular opening of the two handles and corresponds to the position of insertion and/or removal of the terminal feeder.

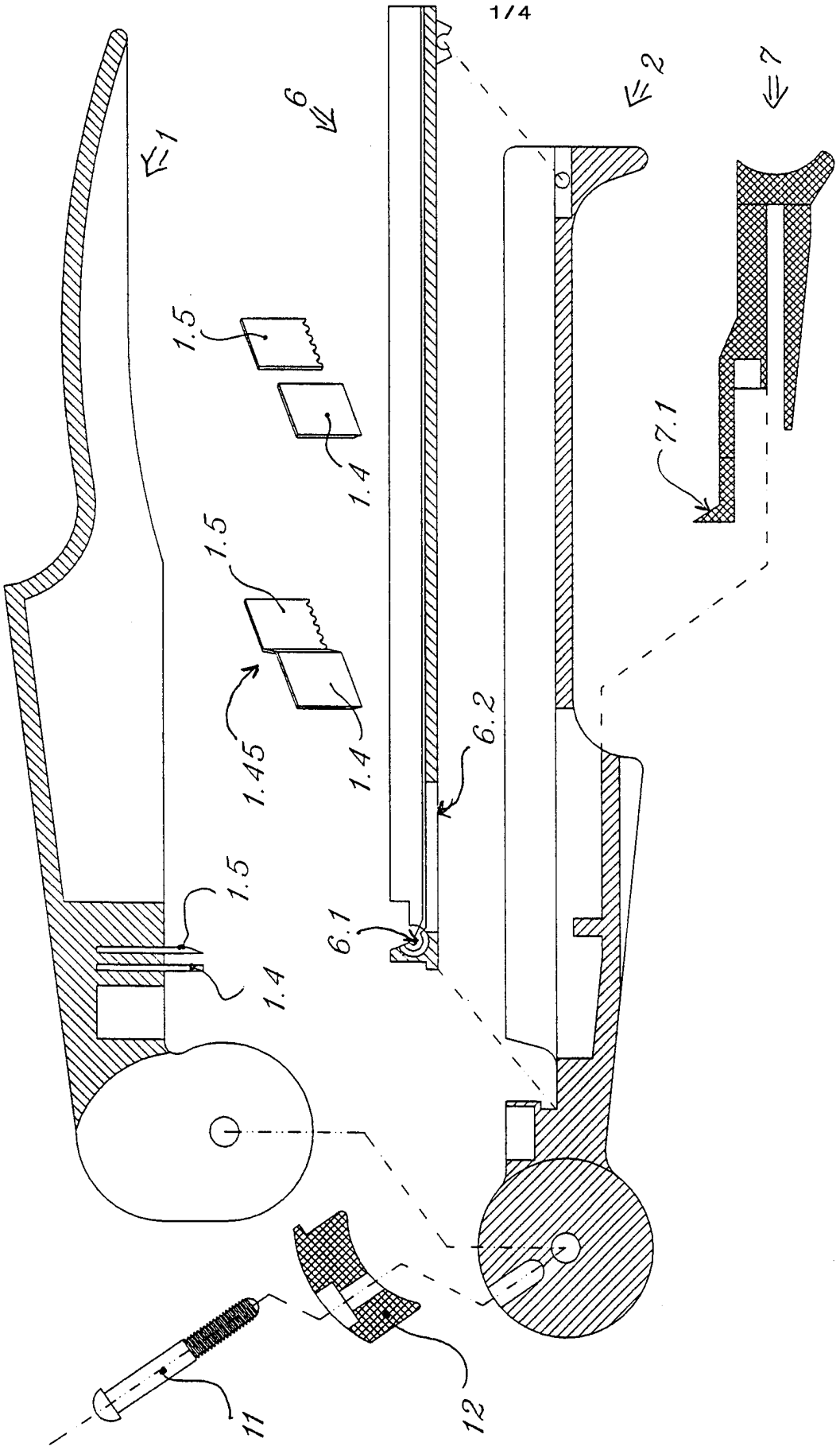

Figure 1

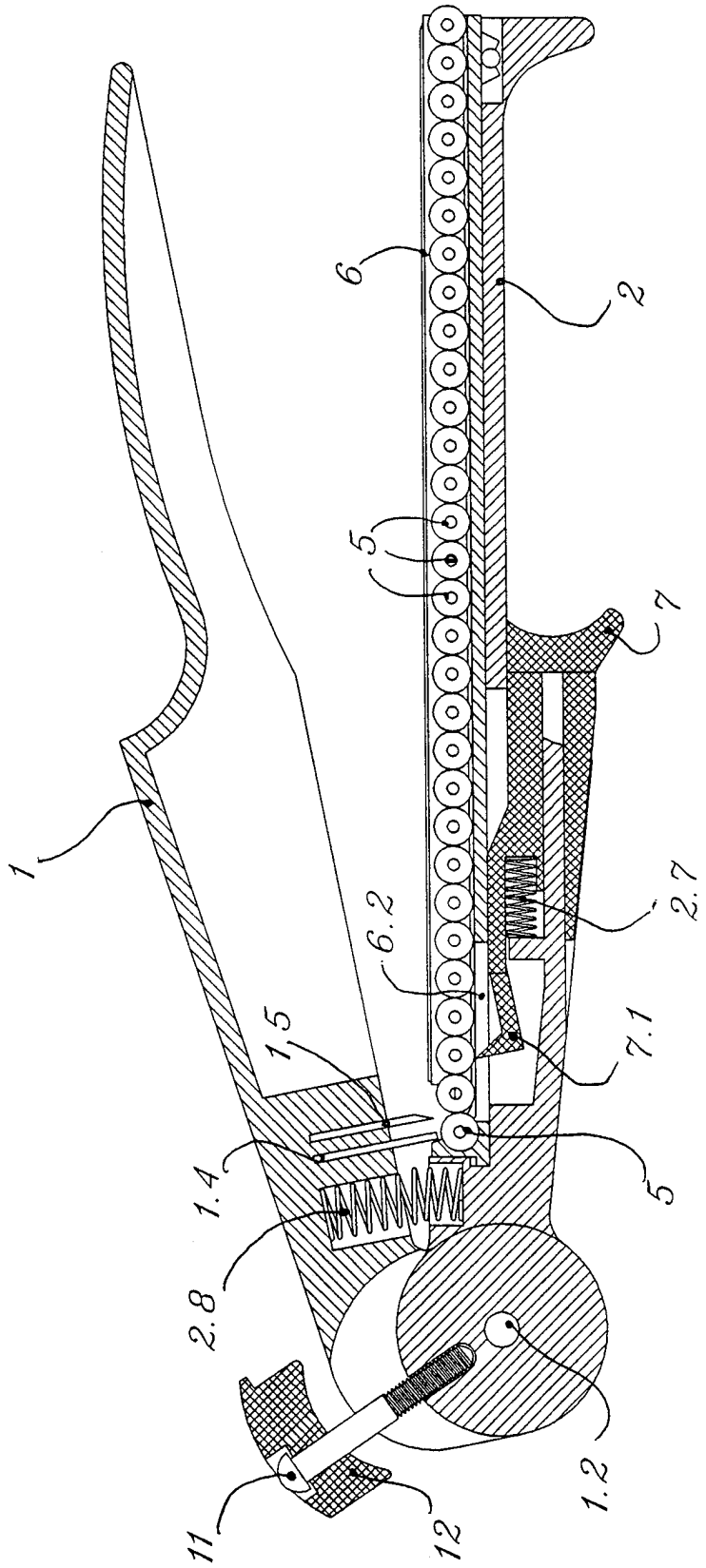

Figure 2

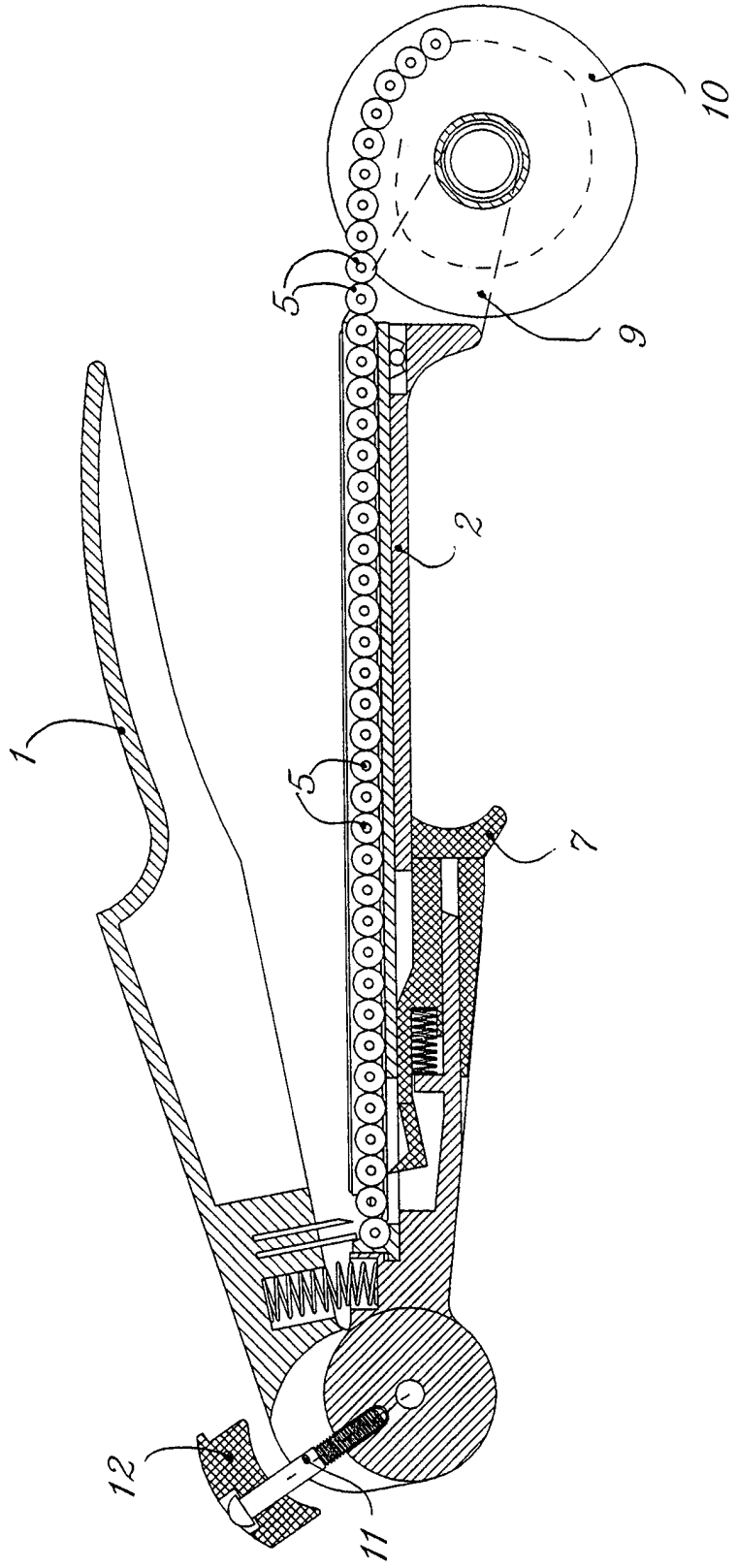

Figure 3

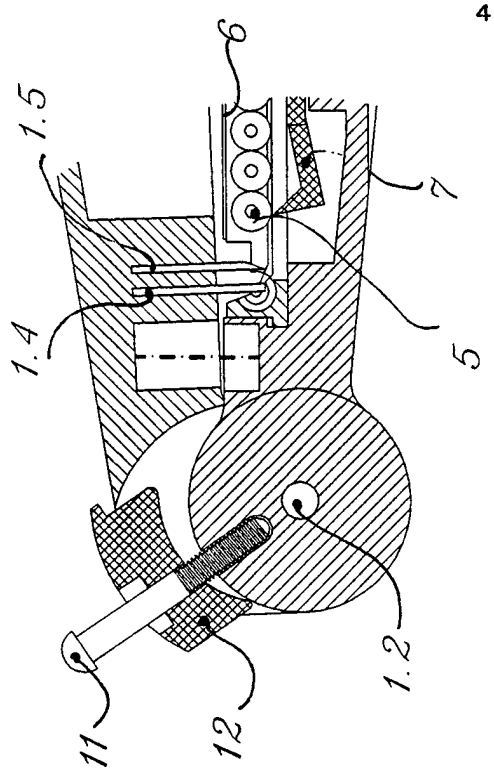

Figure 4a

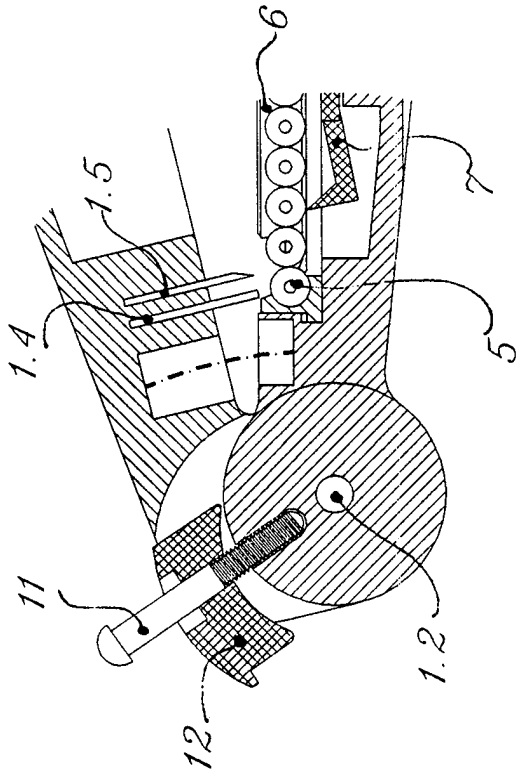

Figure 4b

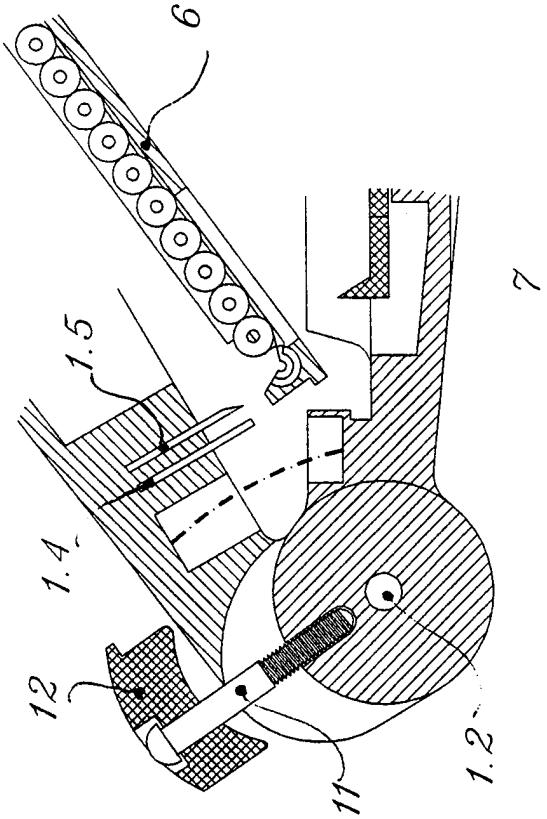

Figure 4c

INTERNATIONAL SEARCH REPORT

Inte ɔnal Application No
PCT/IT 98/00045

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H01R43/045

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2 812 676 A (BROWN, W.C.) 12 November 1957 see the whole document	1
A	US 2 777 345 A (REIDER, G.S.) 15 January 1957 see the whole document	1,2
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A	WO 91 14300 A (ZOLLER & FROEHLICH) 19 September 1991 see the whole document	1,4,5
A	DE 41 36 302 C (WEIDMÜLLER INTERFACE GMBH & CO) 11 March 1993	

☐ Further documents are listed in the continuation of box C.

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