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(54) A DEVICE FOR AUTOMATIC LABELLING OF THE ENDS OF ELECTRIC CABLES

(57) The invention concerns a device for the automatic labelling of the ends of electric cables by means of a particular label, composed of tubes (5).

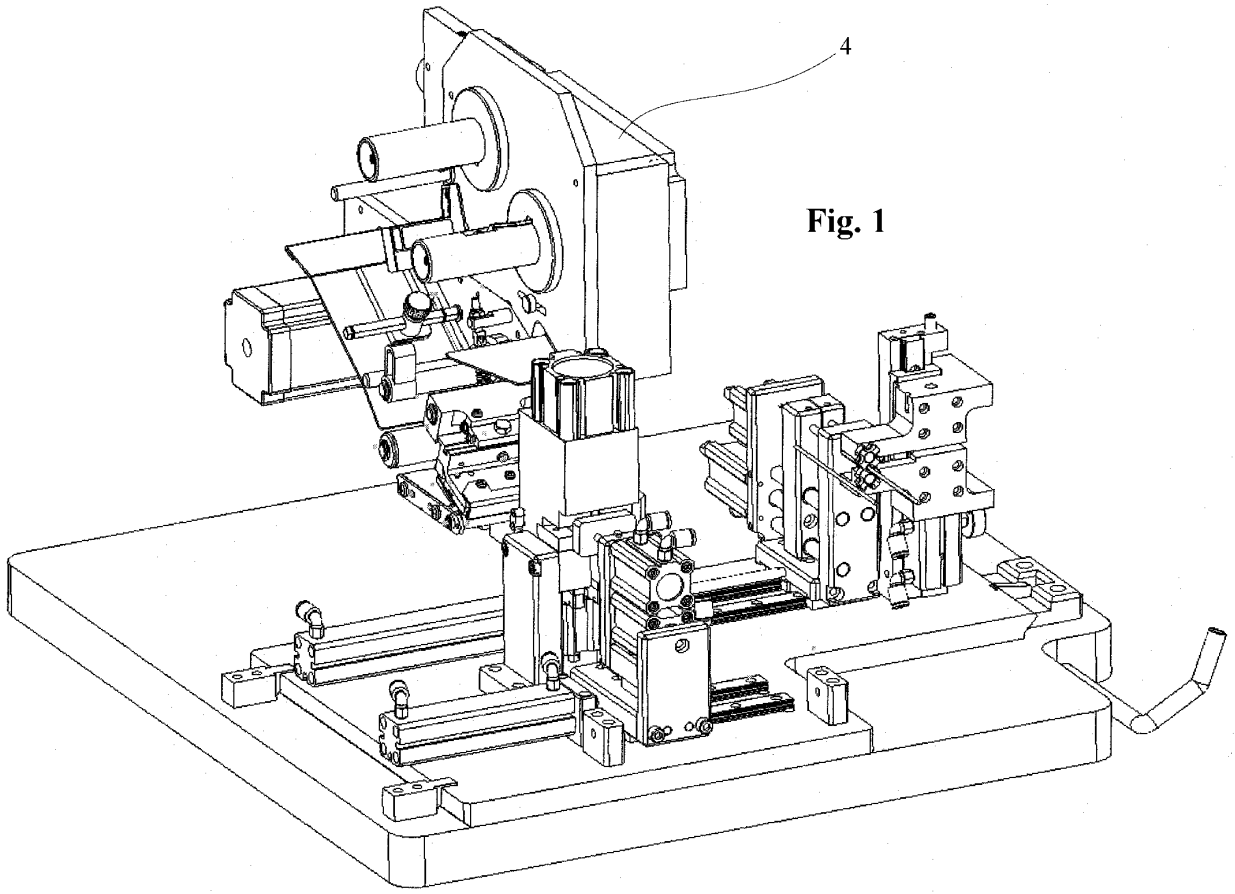

Fig. 1

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Description

Field of the invention

[0001] The subject of the present invention relates to a device for the automation of the labelling of the ends of electrical cables and the corresponding label.

Prior art

[0002] Many forms of labels are known for the labelling of the free ends of electrical cables.

[0003] Quite often these labels are juxtaposed after their wiring, embracing and closing in an irreversible manner near the end of the cable to be marked.

[0004] Very often these labels are composed of two elements, a first element for fixing to the cable and a second identification element joined to the first element.

[0005] The first element is generally a tube, open or closed longitudinally, capable of holding firmly, within its pocket said second identification element that can simply be a strip of paper or other printed media with the identification information.

[0006] The need for identification in the wiring industry, with all its vast applications, is becoming ever more pressing and pervasive. Therefore manufacturers are being urged to provide ever new methods of labelling with demands for low costs, high performance and ever better performing specific results.

[0007] In particular, there is an attempt to turn every single manual operation into automated mechanised operations and to obtain such automation with production speeds on supports that keep the information on the support itself unchanged for years without fading or disappearing.

[0008] It is clear that the universal performance that is being sought is extremely difficult to attain because of the very general nature of all the possible cases.

[0009] It must be taken into account that the sections of the electric cables are very diverse, for example, from a few tenths of a sq.mm to few dozen sq.mm.

[0010] Even the permissible lengths and labelling requirements can vary. With such obvious widespread ranges that are required, responding with acceptable accuracy is extremely unlikely, and in any case can only be attained by making compromises that badly affect productivity.

[0011] It should also be kept in mind that some of the existing labelling requirements apply to both the support and the information related to it.

[0012] In practice this has to do with avoiding as far as possible the use of a second element, and ensuring that the same tube can be printed with sufficient precision.

[0013] In fact, if for labelling tubes for cables with a section ranging from a few tenths to a few dozen sq.mm, handling is acceptable both with regard to the management of the printing as well as regarding the subsequent connection to the end, for small measurements the difficulties are insurmountable.

[0014] Since the precision required by printing on a small tube cannot be attained, you have to proceed in the standard way; a tube opened longitudinally to which is joined a second tape or paper printed in the usual way; or else a tube with a pocket inside which said printed tape or paper element is put.

[0015] In fact, the handling of a small tube is highly complex and assuming that we can also print properly, it is quite clear that after having cut its required measurement the small piece cannot be handled effectively.

[0016] So we can expect a challenging manual insertion manoeuvre on the end of the cable to be identified.

Objects of the invention

[0017] To overcome one or more of the above drawbacks, a label and a device that is the object of the present invention is made available. A further object is to make available a label that can easily identify the ends of an electric cable with a wide range of various cross-sections.

[0018] A different object of the present invention is to make available a label that can be printed accurately.

[0019] An important object of the present invention is to make available a label that can be handled automatically.

[0020] A further object of the present invention is to make available a device which can automatically handle said labels.

[0021] Another object of the present invention is to make available a device for handling said labels that is effectively productive.

[0022] A different object of the present invention is to make available a device for the handling of said labels which is simple and effective.

Explanation of the invention

[0023] The primary object is attained by a label as set out and characterised according to the characteristics claimed in the claims below.

[0024] A further primary object is achieved by a device for the treatment of said labels as set out and characterised according to the characteristics claimed in the claims below.

[0025] In particular, the label is composed of at least one pair of matched tubes, spaced apart from each other and connected longitudinally by a connecting plate, where said tubes are flattened in accordance with the position of the connection plate.

[0026] Advantageous features of the invention Advantageously, said tubes are close to at least one crushing fold of a restriction of the section.

[0027] Conveniently, said small pipes have at least one side crushed flat enough so that it can be printed as a flat element by a printer.

[0028] Advantageously, said small pipes are made in a continuous strip and collected in rolls, where each label

is composed of at least a tube cut to size from the strip roll, and with the connection plate removed.

[0029] Conveniently, at least two tubes have identical dimensions. Advantageously, the device for handling the continuous strip for obtaining the tubes which constitute the identification labels of the ends of the electrical cables is composed of:

- at least one printer for printing the strip on at least one flat side of a tube;
- at least one feeder, which can match the hardware of the printer, for the measured supply of the printed strip;
- at least a tube centring device for holding the strip;
- at least one longitudinal cutting unit for the removal of a connection plate of the tubes;
- by at least one transverse cutting unit for the cutting to size of the tubes in labels (if necessary, said longitudinal and transversal cutting units are composed of a specially configured single punch);
- and if necessary at least one unit for moving the centring device for the shifting the height and/or position and bring the centre of said labels in alignment with the subsequent stations;
- at least one widening device for said labels, again composed of crushed tubes, consisting of a pin that is able to enter the section of said labels, making them assume a circular section configuration and moving, shifting them away, the relative centring devices;
- at least one group of extractors, for the interchange of said labels from the pins to tubes for cables, to insert and release said label on the end of the cables to be tagged;

Brief description of the drawings

[0030] The technical features of the invention, according to the aforesaid aims, can clearly be seen in the content of the claims below, and its advantages will become more readily apparent in the detailed description that follows, made with reference to the accompanying drawings, which illustrate a preferred embodiment, which is purely exemplary and not limiting, where:

Fig. 1 shows an overall perspective view of the device that is the object of the present invention.

Fig. 2 shows the device for the quick-change of the strip necessary to change the size used.

Fig. 3 shows a second perspective view of a pair of strips with different sizes and a pair of respective labels obtained from each strip.

Fig. 4 shows a second sectional view of the cutting unit before it is fed with the strip of labels.

Fig. 5 shows in detail a perspective view of the cutting unit fed with the strip, with only the parts of interest, in order to highlight the construction details of the centring devices, supported in an elastic manner so as to be able to move the top part away from the bottom part after the insertion of the pins inside the section of the labels.

Fig. 6 shows what is shown above in Fig. 4 from a different perspective after the insertion of the strip has taken place up to the pre-set length in pre-cutting conditions.

Fig. 7 shows an enlargement of a perspective view of the cutting punch of the strip that was cut for the creation of the labels (or cable marker) retained by the respective centring devices.

Fig. 8 shows a front plan view of the cutting unit, where the lower centring devices have been raised with a consequent shifting of the centre of the slot of the cable markers obtained by the cutting of the strip.

Fig. 9 shows the combination of the opening pins at the centre point of the slot of the cable markers (labels).

Fig. 10 shows the initial input of an opening pin at the centre of a slot of a cable marker, widening it.

Fig. 11 shows a side plan view of the next input sequence of a pin within a slot of a cable marker.

Fig. 12 shows the pickup of a label by a pin released by the centring devices;

Fig. 13 shows a top view of the device of the invention, which clearly shows the movement of the pins unit from the cutting area into the exchange area with the tube holder cylinder unit.

Fig. 14 shows the next event where the cable marker tubes are transferred from the pins unit to tube holder cylinders unit.

Fig. 15 shows, with respect to the previous fig., the return of the pins unit to the initial position, in front of the cutting unit.

Fig. 16 shows a top plan view of the positioning, in front of a first tube of the first extractor, which corresponds to the wire insertion point.

Fig. 17 shows what is set out in the previous fig. from a front plan view, with the wire centring device closed.

Fig. 18 shows the previous figure with the centring device opened for removing the wire with the label made.

Fig. 19 shows a detailed sectional view of the retraction of the first extractor and insertion of the cable marker tube in the cable, following the excitation of the sensor located inside the tube holder cylinder.

Fig. 20 shows the insertion of the next cable marker tube on another cable after the cylinder with through rod was retracted, and the advancement of the cable marker extractor unit with positioning of the second extractor in the wire insertion zone and a similar operation to that of the preceding figures.

Fig. 21 shows by way of an example the flexibility of use of such tubes that can be suitable for wires of different sizes, from a top plan view and a respective front plan view.

[0031] Example of an embodiment of the invention device The device of the invention 1 employs a printer 4 especially suited to purpose, however the technology used is well known.

[0032] Indeed, said printer 4 is controlled, equipped and managed to carry out the printing on the label 2, still in the form of a sash or strip, for as many tubes 5 which constitute the label 2 (hereinafter also referred to also as cable marker, since they constitute the label that distinguishes each end of the electric cable 3), they are crushed and the printing surface is very flattened, almost level, and also said small pipes 5 are still connected to each other by a connection plate 6 of the tubes 5.

[0033] The strip 2 composed in this manner, and therefore flattened, can easily and precisely be printed upon, since it can be easily guided and held during the printing even if the single tube is very small.

[0034] In fact an equivalent label consisting of just the body of a small tube with a roughly circular cross-section and with the same dimensions comparable to those of a tube of the invention, might be firmly kept in position during printing with some difficulty, which in any case would not be equally defined, since the print area beneath the printer's print head would be curved.

[0035] After the printing phase, or while it is being carried out, the label 2 is made to advance by a feeder of the printer 7, which could be the same advancement system that brings the label below the print head.

[0036] The label 2 is then tightly closed within a centring unit 9 which precisely holds the label 2 during the cutting phase.

[0037] These centring devices 9 have the function not only of holding the label 2 precisely, so that the cutting phase is accurate, but also of holding the two tubes 5 as soon as they are formed with the removal of the connection plate 6 and with their cutting to size with respect to the continuity of the strip 2.

[0038] Said centring device 9 is composed of a pair of elements, respectively an upper and a lower centring device, which close at right angles to the main axis of the strip 2 leaving free a central space for the movement of a cutting punch 8, which can remove the connection plate 6 from the strip 2.

[0039] Said punch 8 is part of the cutting unit which also includes a cutting element for the transverse cutting of the tubes 5 determining their longitudinal extension.

[0040] Advantageously said punch 8, which carries out the longitudinal cutting and said transverse cutting element can be unified in a single body, which with a single movement carries out both the longitudinal and transverse cutting of the tubes.

[0041] Following the above-mentioned cuts, a pair of distinct cable marker tubes 5 are formed, which are held by the respective centring devices 9, both at the top and at the bottom. Advantageously, said centring devices 9 are configured with their wing which goes in juxtaposition and in support for containment of the outer side wall of the tubes (relative to the central side, which was joined to the connection plate). Therefore each individual tube is precisely retained.

[0042] Advantageously, said centring devices 9 are locked onto elastic recovery guides.

[0043] If necessary, for production requirements, the plane passing through the center of the slot 13 can be varied, taking account of the need for adjustments for different thicknesses of the label 2 without further kinematic mechanisms, for example to move it to a fixed surface on which the pins 11 lie that are part the device for widening the tubes 5.

[0044] In fact, the tubes 5 are held crushed by the relative centring devices 9.

[0045] The tip of the pins 11 entering the centre of the slot 13 of the tubes 5, and overcoming the elastic support of the centring devices 9 penetrates the full extension of the tubes, leading to an expanded and enlarged form, roughly circular.

[0046] To facilitate the first stage of the threading of the pins 11 within the slot 13, the centring devices 9 are discharged in the central part of the wall which faces the pins, therefore only the material of the transverse section of the tubes 5 stands in the way of the deformation of the enlargement for insertion of the tip of the pins 11 inside the hollow body of the tubes 5.

[0047] Said tubes 5 remain, also due to the elastic resistance coming from the modified geometrical form, in juxtaposition with its inner surface, on the pins 11 that have crossed all of them, after the relative centring devices 9 have retracted from the relative juxtapositioning and retention.

[0048] Such retraction of the centring devices 9 allows the enlargement device to move the tubes 5 for the subsequent operations.

[0049] In fact, each pin 11 must be replaced, at the threading and heading station, by a cylindrical tubular cable 15 within which the relative cable 3 to be headed can pass.

[0050] In fact, said pins 11 are brought into alignment with said tubular element 15, and close to each other, even up to letting the tip of each pin 11 enter said above-mentioned tubular element 15.

[0051] The transfer of one or more tubes 5 from each pin 11 to the respective tubular 15 element is carried out by one or more transfer devices 12 that push the head of the tube 5 from the pin 11 to the tubular element, with a sliding movement along its principal axis. By way of example a transfer device 12 can be composed of a movable plate with one or more holes within which are located the pins 11 and that can slide on the extension of the same.

[0052] Said tubes 5, having been transferred between the pins 11 and the tubes 15, after they have been placed in alignment, and a following the head thrust by a transfer device 12, adhere due to the elastic return, following the deformation force, to said tubular elements 15.

[0053] The device moves laterally on a base guide 19 until it stops up against the cylinder with a through pass-

ing rod 16, the positioning is adjusted by the ring nut 17.

[0054] With the above-mentioned movement of the device, the first tube 5 is positioned at the centring hole 20 where the cable 3 is inserted. As shown in Fig. 20, after the cylinder with the through rod 16 is retracted, the device moves again on the base guide 19 until it stops against the adjustable stop 21, moving into the insertion position of the second tube 5 on the relative cable 3.

[0055] Said tubular elements 15 have a wire presence sensor 14 on the inside, which can detect the presence of a cable 3 entering from the free end of said tubular element 15 and pull back said tubular element into its own seat leaving said tube 5 on said cable 3 to be identified.

[0056] In fact, the tubular element 15 retracting, by means of the extractor 18, into its own perforated seat, whose hole size is at least slightly less than the overall dimensions of the tube, forces said tube 5 to slide on said tubular element 15, and continuing to affect the relative end of the cable 3 that had been inserted and is present inside said tubular element 15.

Claims

1. A device for the automation of the labelling of the ends of electric cables comprising:

a. A printer (4) for printing a strip (2), composed of a pair of small tubes (5) paired together and spaced apart and connected longitudinally by a connecting plate (6) and squashed along the lie of the connecting plate (6), with printing on at least one flat side of a small tube;
b. A feeder (7) for advancing and feeding the printed strip (2);
c. A device for centring (9) the tubes (5) for holding the strip (2) below a cutting unit, and that can become widened following the successive increase in the section of the tubes (5), having lateral shoulders for the lateral containment of the outer walls of the strip (2), and whose squashed walls are contained between an upper wall and a lower wall of the centring device (9);
d. A longitudinal cutting unit for the cutting and removal of the plate (6) connecting the tubes (5) using a punch (8) with a movement perpendicular to the main axis of said connecting plate (6);
e. A transverse cutting unit for cutting to size the tubes (5) into labels by means of a punch (8) with movement orthogonal to the main axis of said tubes (5);
f. A device for enlarging the labels, again composed of tubes (5) crushed as the result of the punched strip (2), consisting of a pin (11) with tip at the end and a tubular configuration, which enters axially into the section of said labels, giving them a circular cross-section, moving, and distancing the relative centring devices (9), splaying the upper wall of the centring device (9) from the lower wall of the centring device (9);
g. A group of extractors for transferring said labels from the pins (11) to cable tubes (15), equipped with a mobile transferor (12), with a through-hole, on said pins (11), which pushes said labels from the pins (11) onto the cable tubes (15) arranged on axis with said pins, the end of which is joined.
h. A connection unit for connecting the labels on the cable tubes (15) to the terminal ends of the conductors (3) to be marked, after said end has been detected by a presence sensor (14) within said tube (15), which retracts within its own seat, and which holds the label in place, pulls on said tube, to join to the outer surface of the conductor (3).

2. A device for the automation of the labelling of the ends of electric cables according to claim 1 **characterised by** the fact that said cutting units are each composed of a respective punch (8) that shears said strip (2) retained by said centring device (9) next to the joint with the crushed tubes (5).

3. A device for the automation of the labelling of the ends of electric cables according to claim 1 **characterised by** the fact that said longitudinal and transversal cutting units are composed of a single punch (8) specially configured with a longitudinal part and a transversal part.

4. A device for the automation of the labelling of the ends of electric cables according to claim 1 **characterised by** the fact that said device consists of a unit for moving the centring devices (9) which moves said centring devices (9) to a height and/or to a position and brings them with the center of said labels in alignment with the subsequent stations, offsetting the dimensions and thicknesses of the various labels and/or strips.

5. A device for the automation of the labelling of the ends of electric cables according to claim 1 **characterised by** the fact that said transfer devices (12) have a through-hole, through which said pins (11) slide, and they have a front wall that, resting against the label section, pushes it to slide onto said pin (11) on which it is attached.

6. A device for the automation of the labelling of the ends of electric cables according to claim 1 **characterised by** the fact the pins (11) are double and paired so they can affect and penetrate simultaneously both labels (2) held by the centring devices (9).

7. A device for the automation of the labelling of the

ends of electric cables according to claim 1 **characterised by** the fact that the transfer of the label placed on a pin (11)) to the relative tubular element (15) takes place in succession moving from the first pin (11) to the second pin through the transverse movement of the connection unit, moving from a first position in axis with the first tubular element (15) with the first pin (11), to a second position in axis with the second tubular element (15) with the second pin (11).

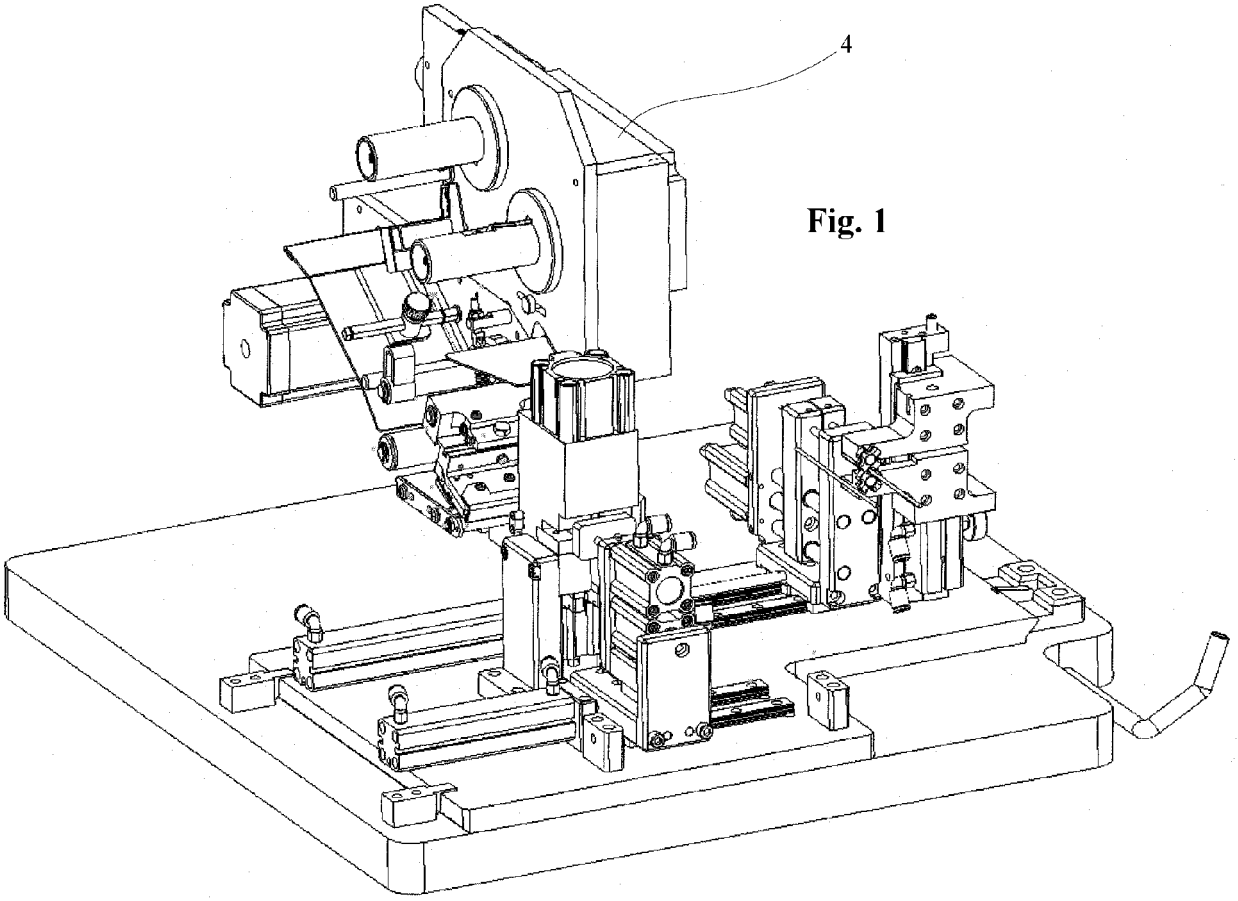


Fig. 1

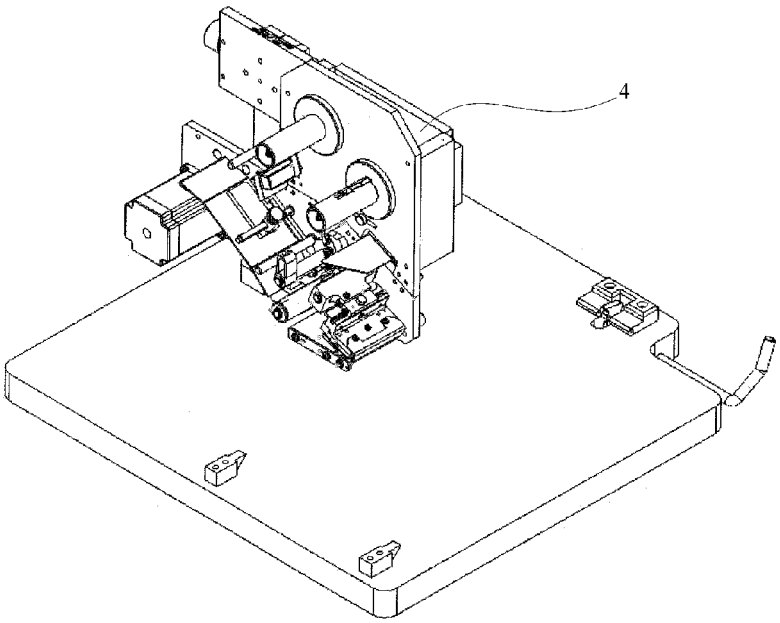


Fig. 2

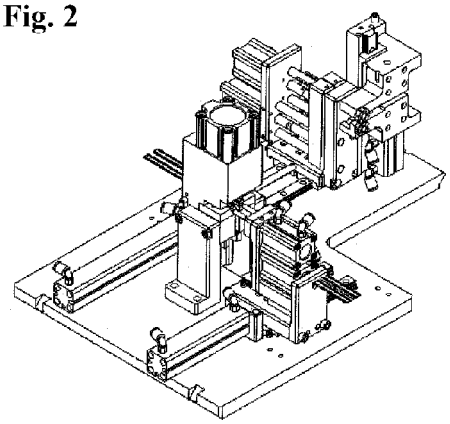
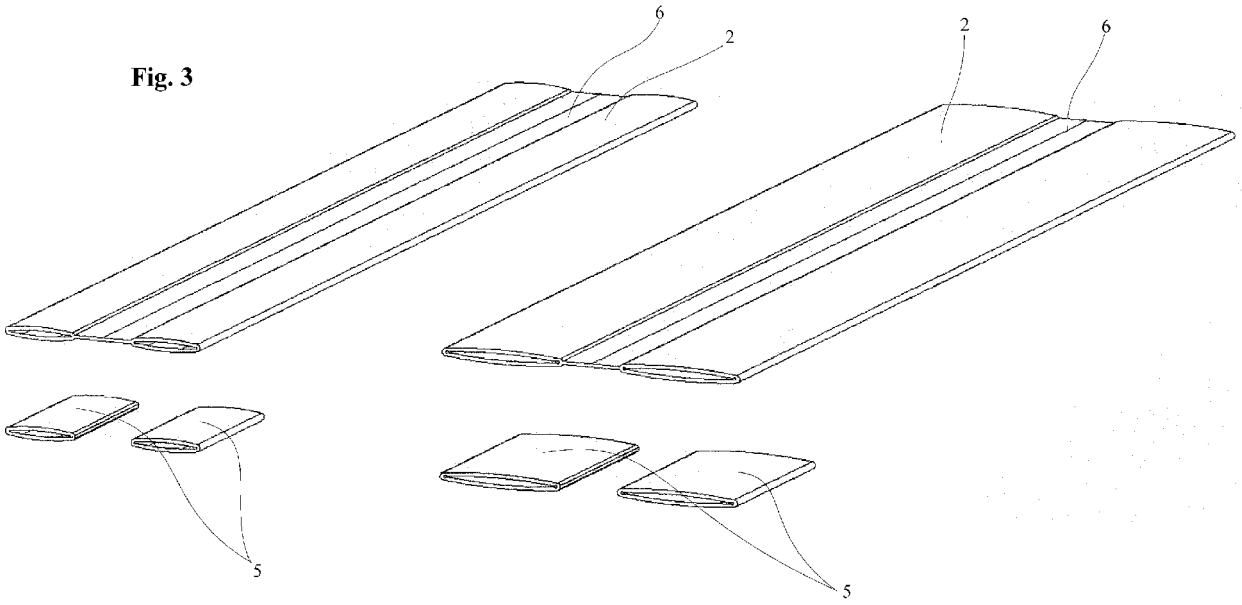


Fig. 3



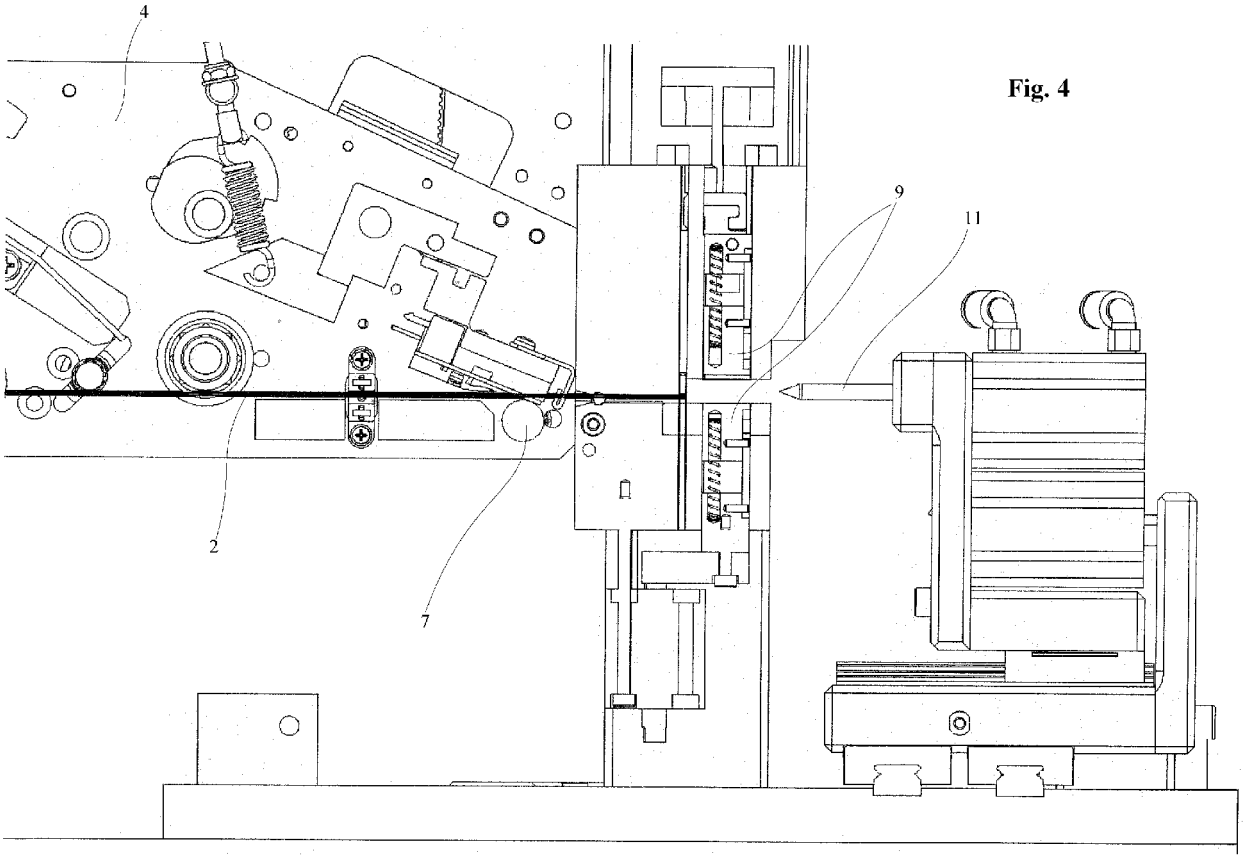


Fig. 4

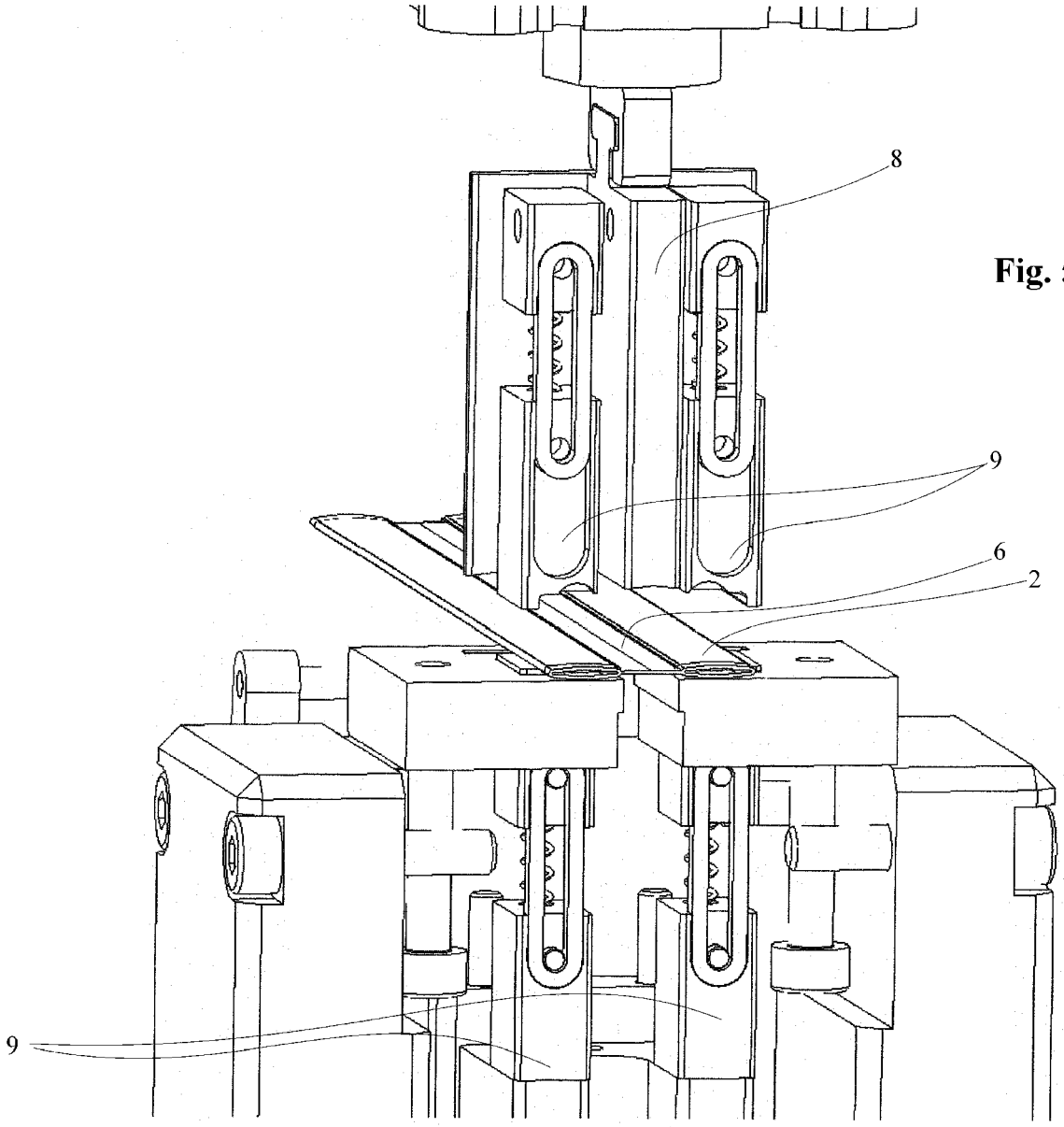
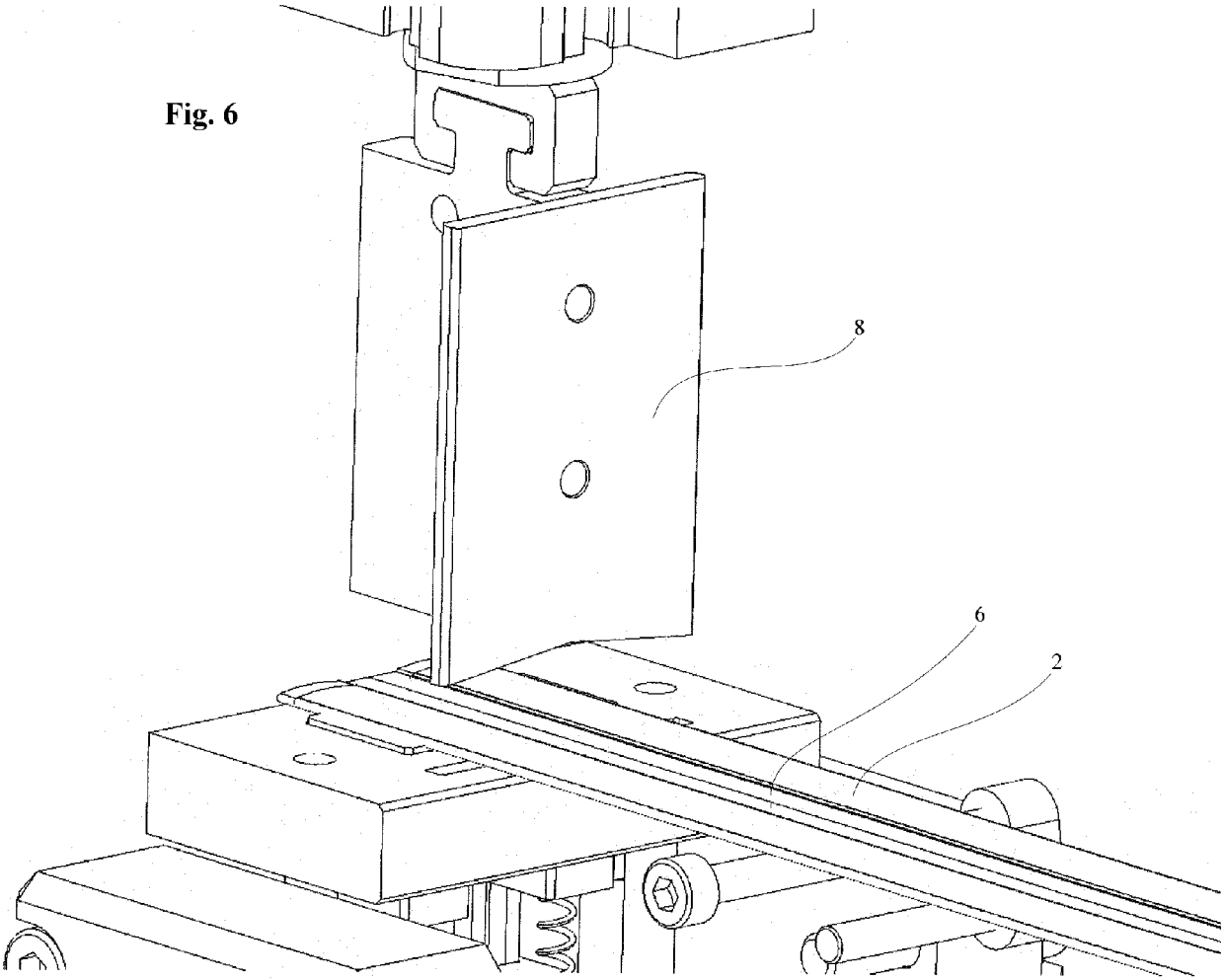


Fig. 5

Fig. 6



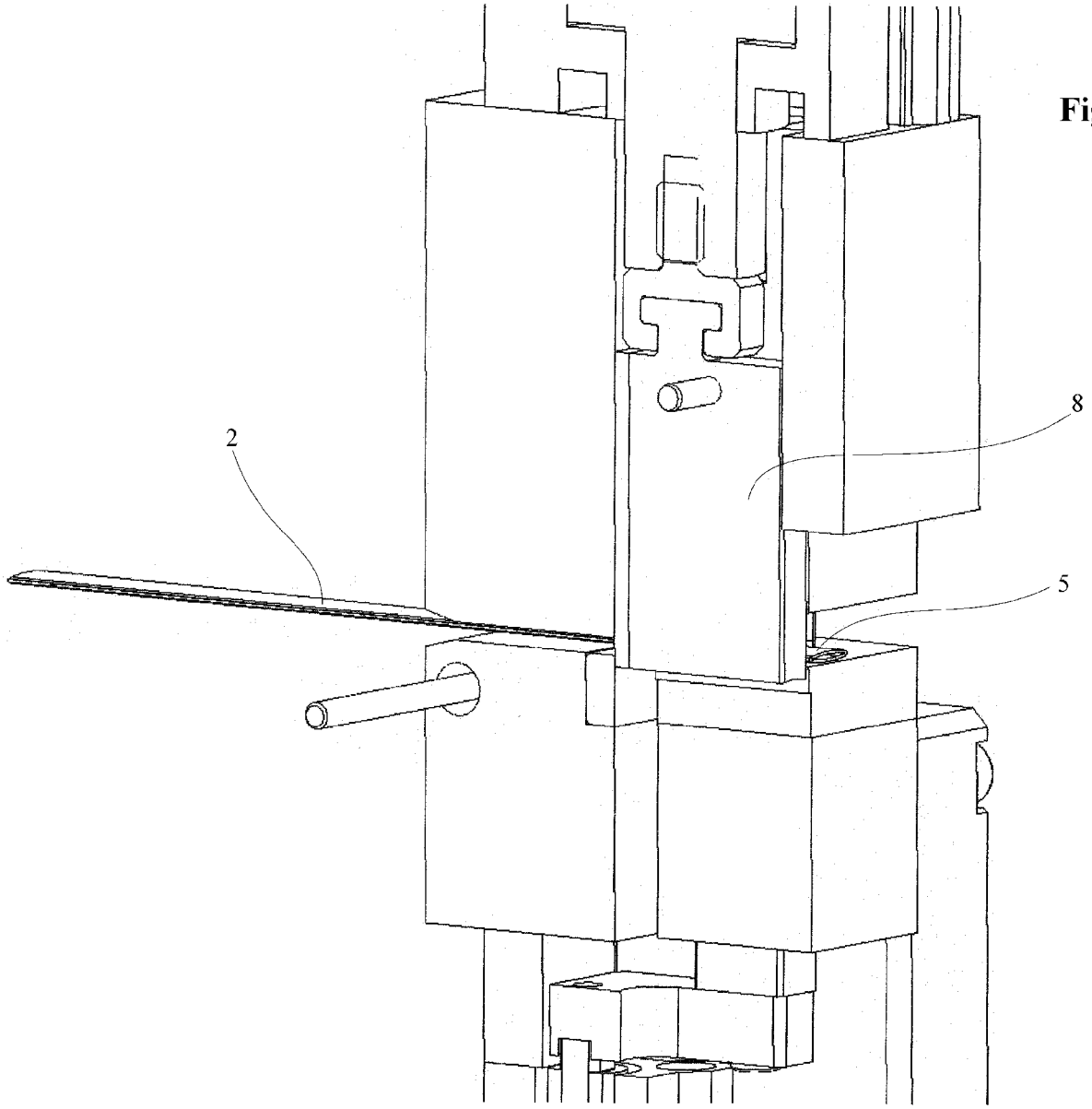
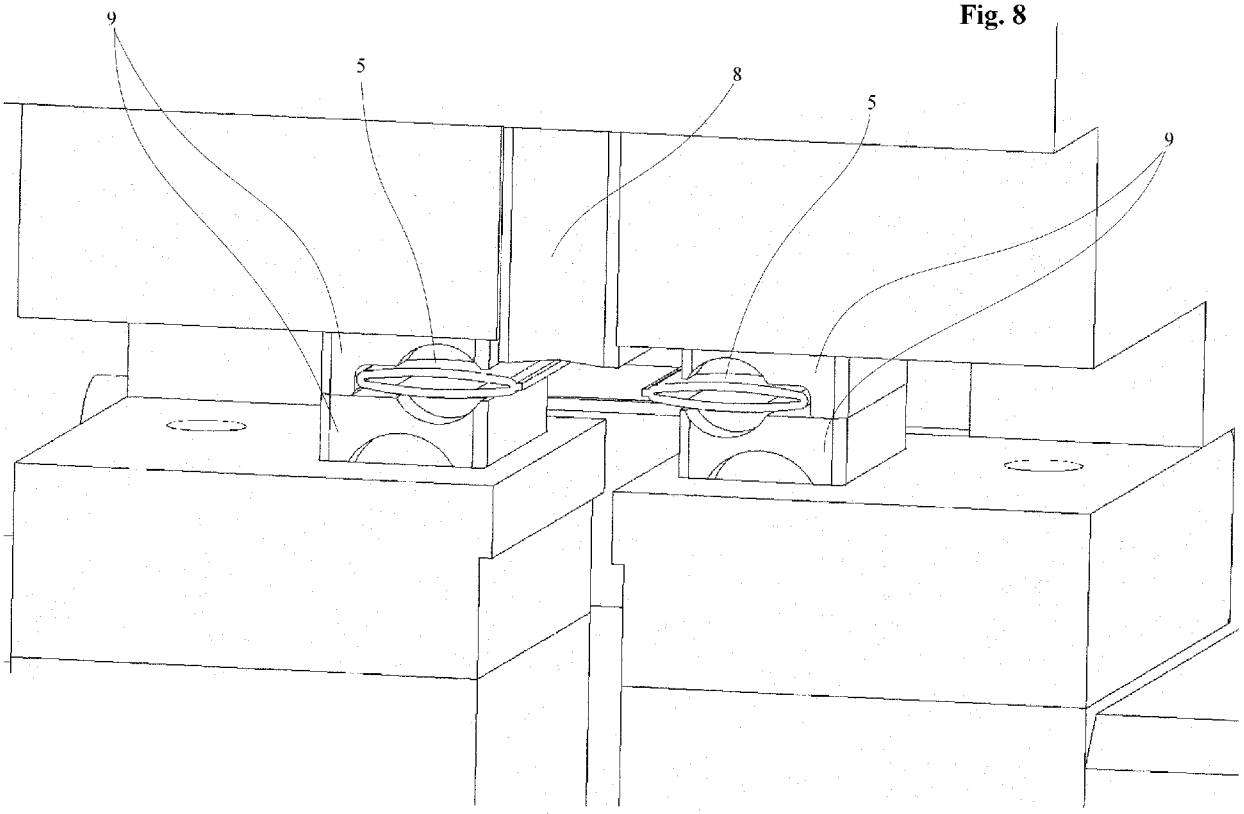


Fig. 7

Fig. 8



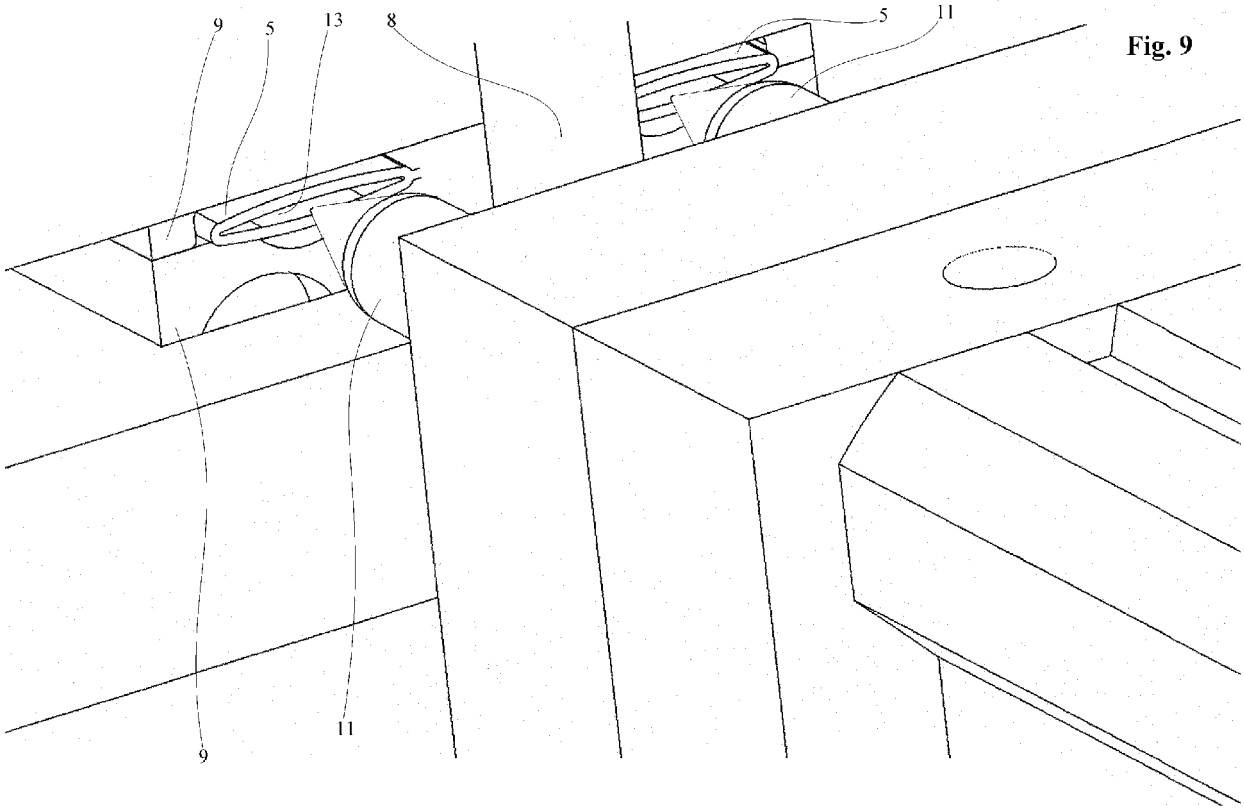


Fig. 9

Fig. 10

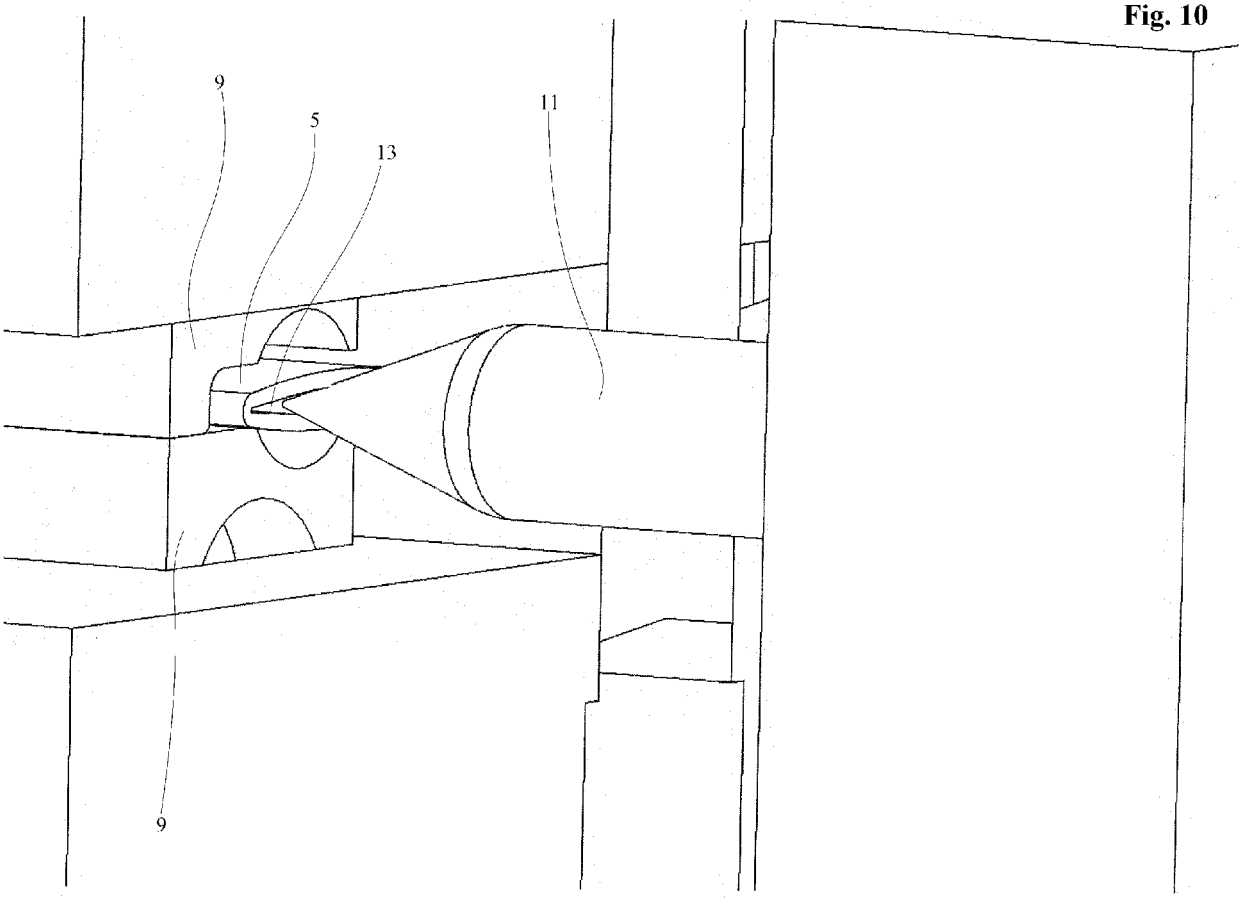
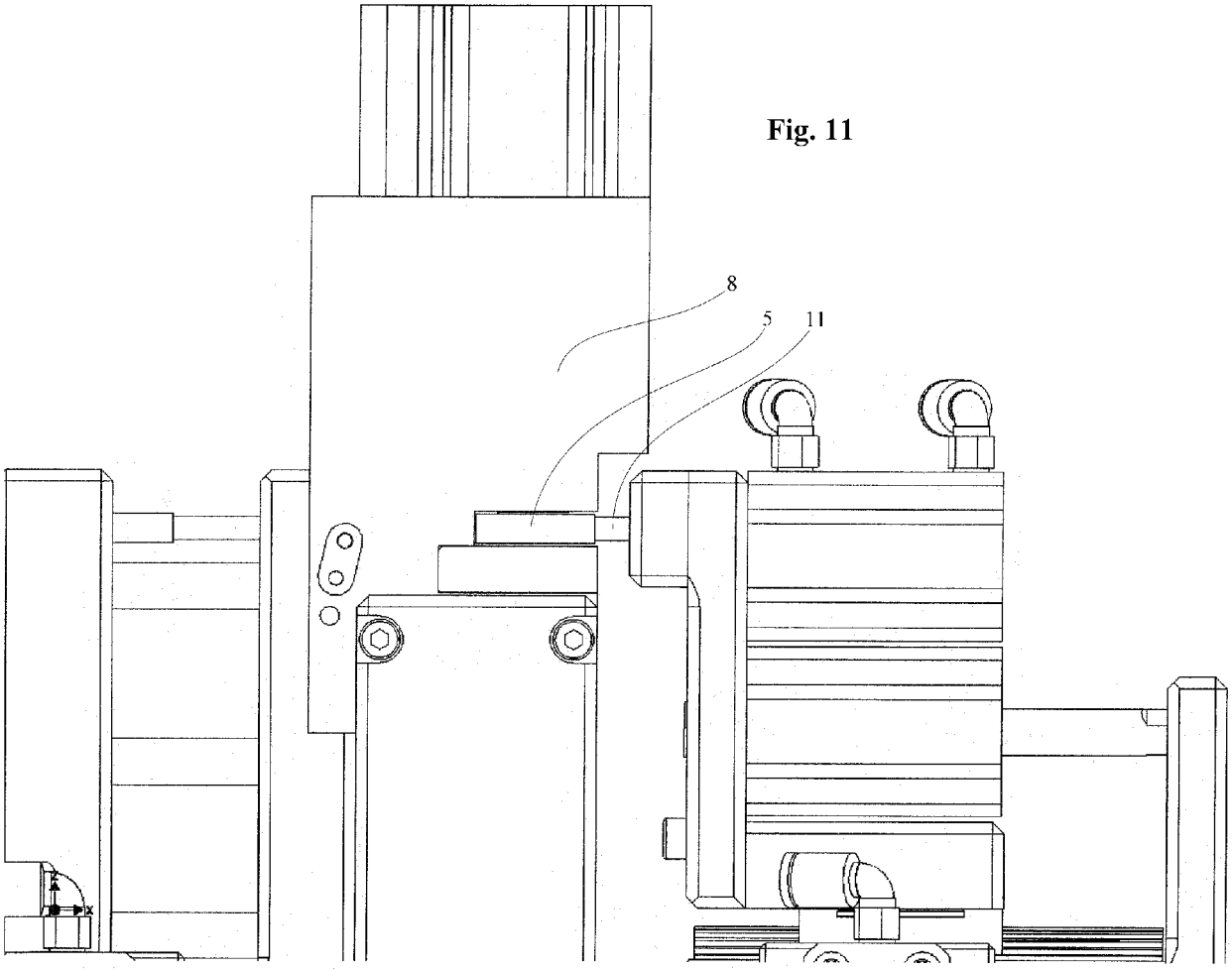


Fig. 11



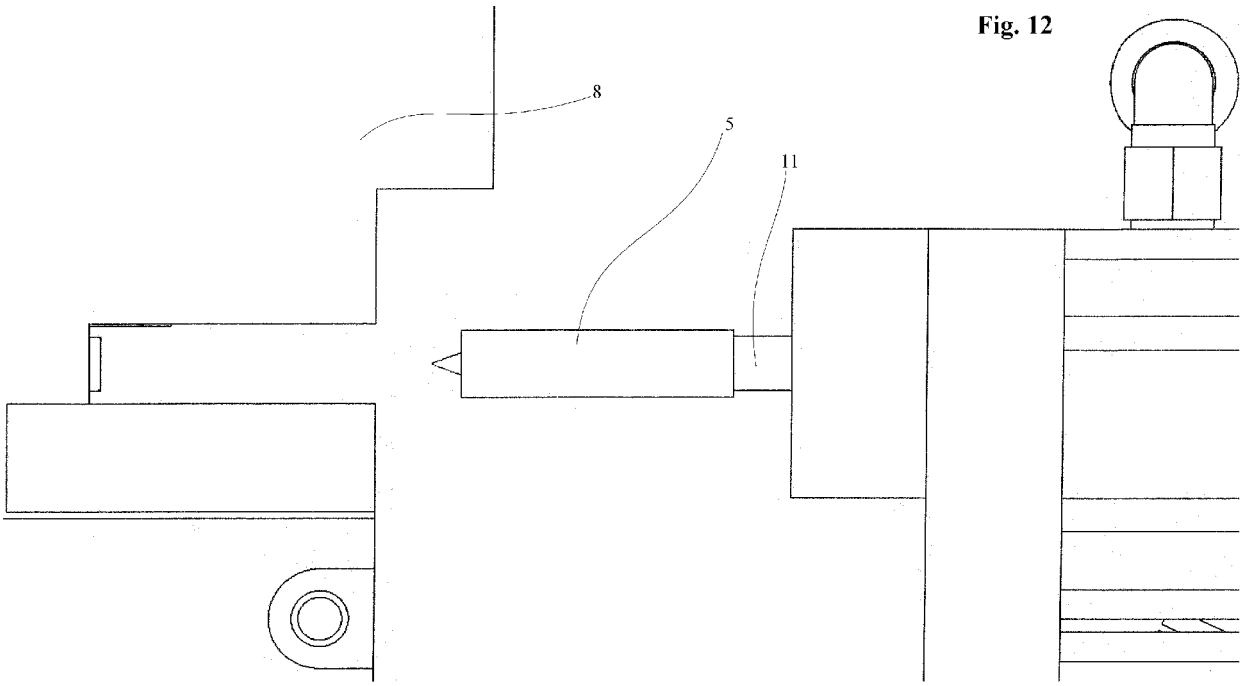


Fig. 12

Fig. 13

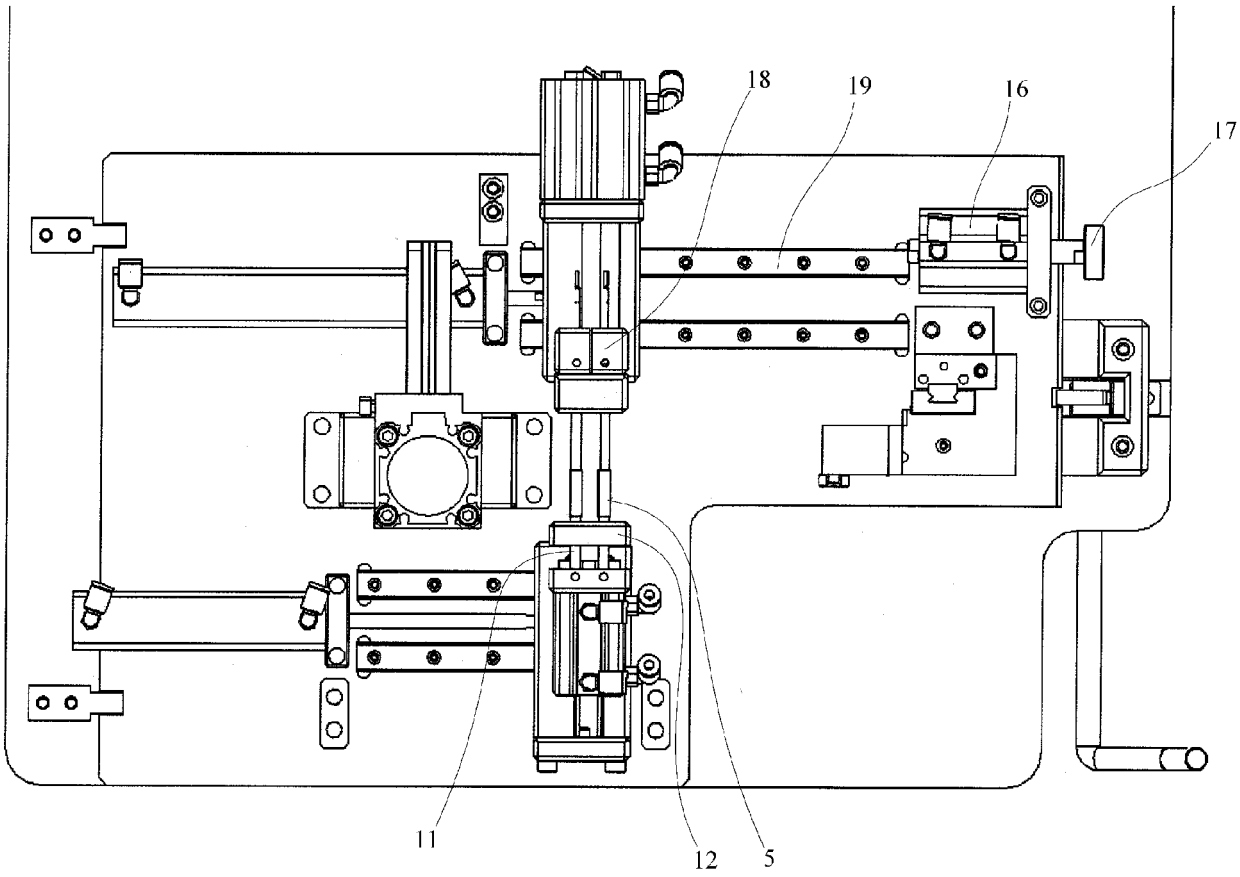


Fig. 14

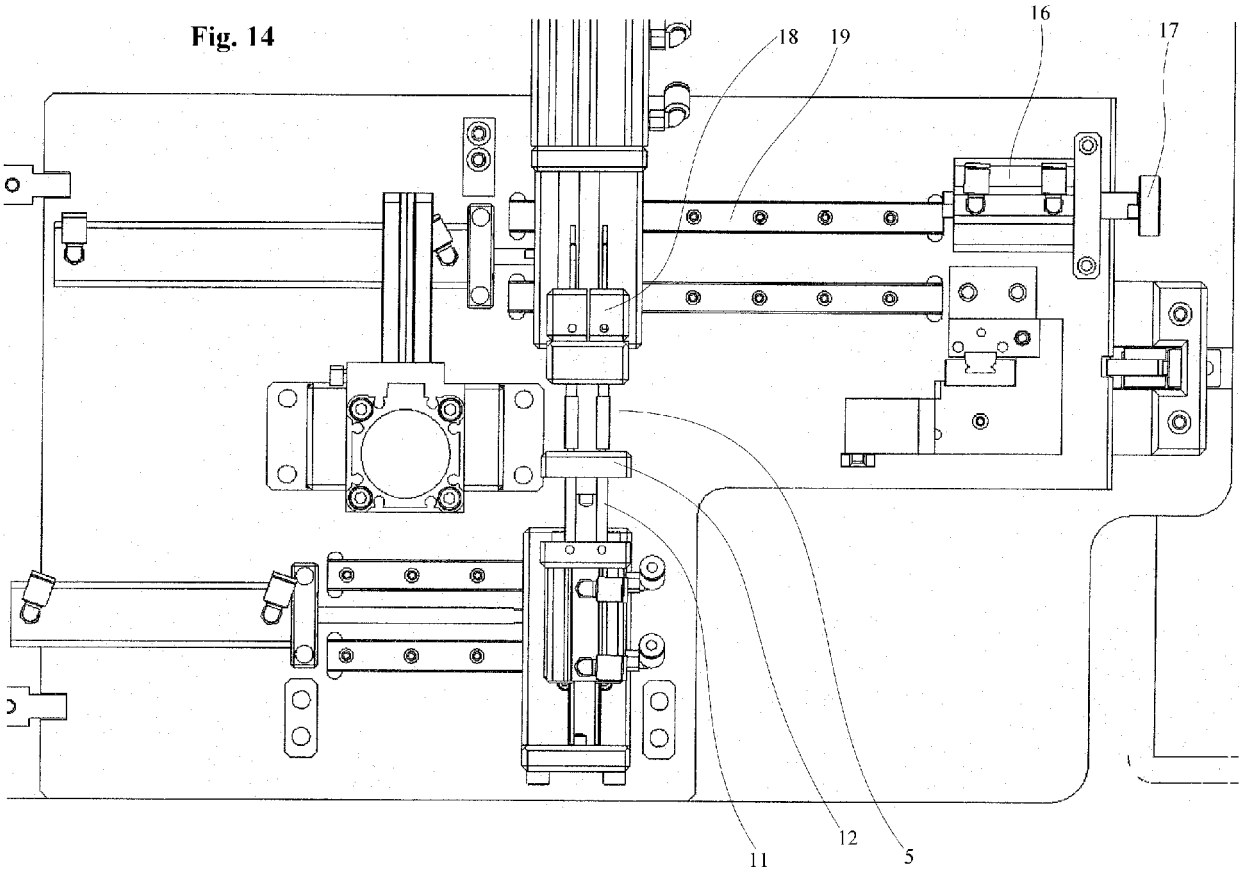


Fig. 15

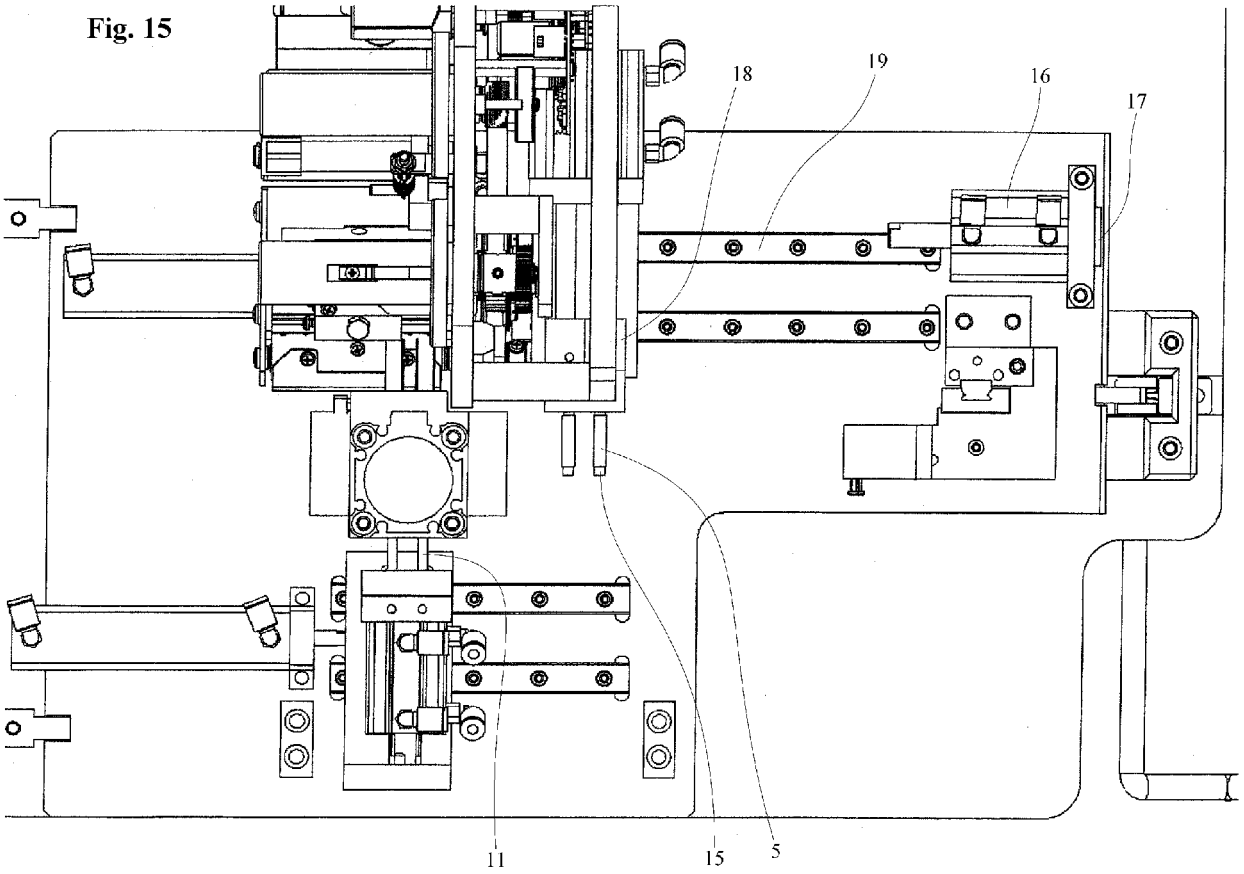


Fig. 16

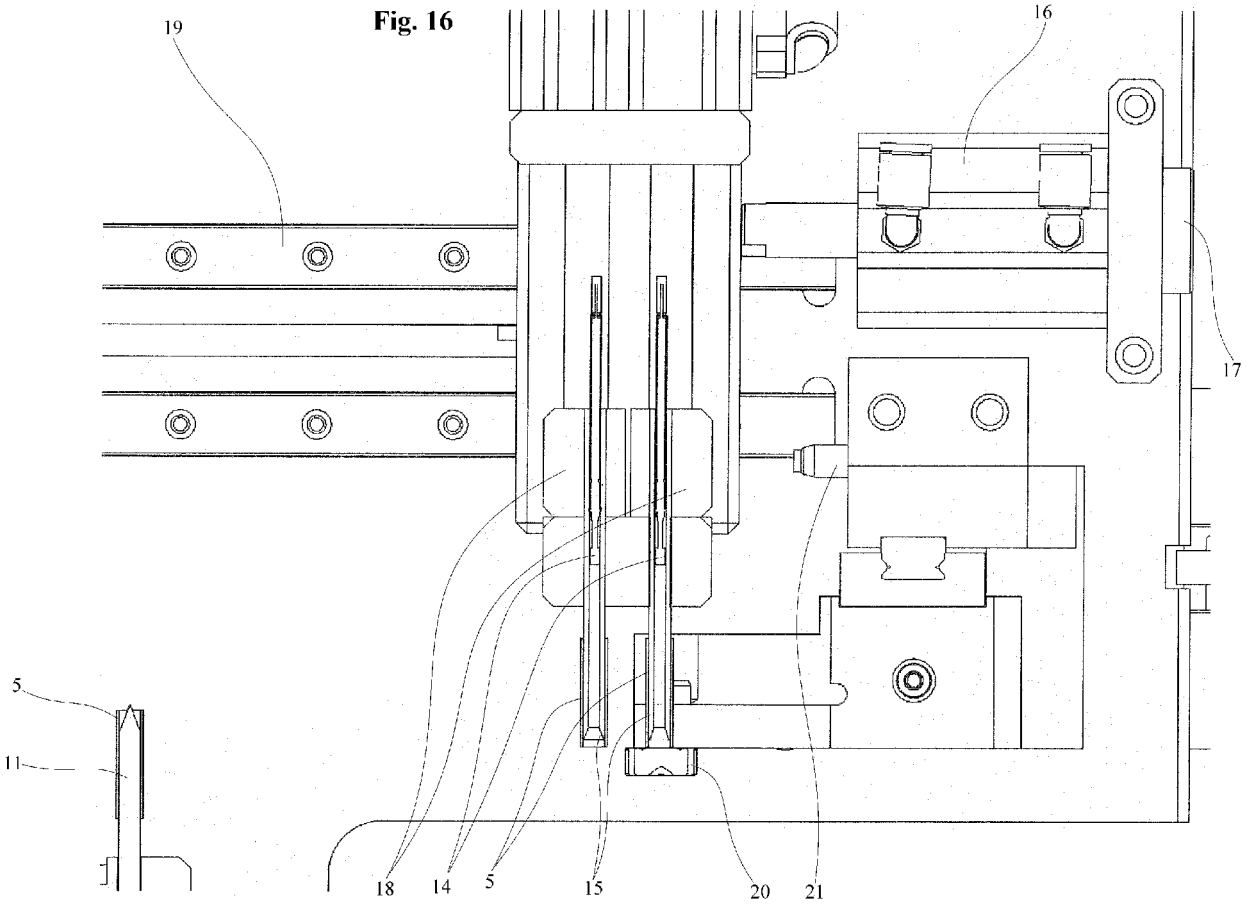


Fig. 17

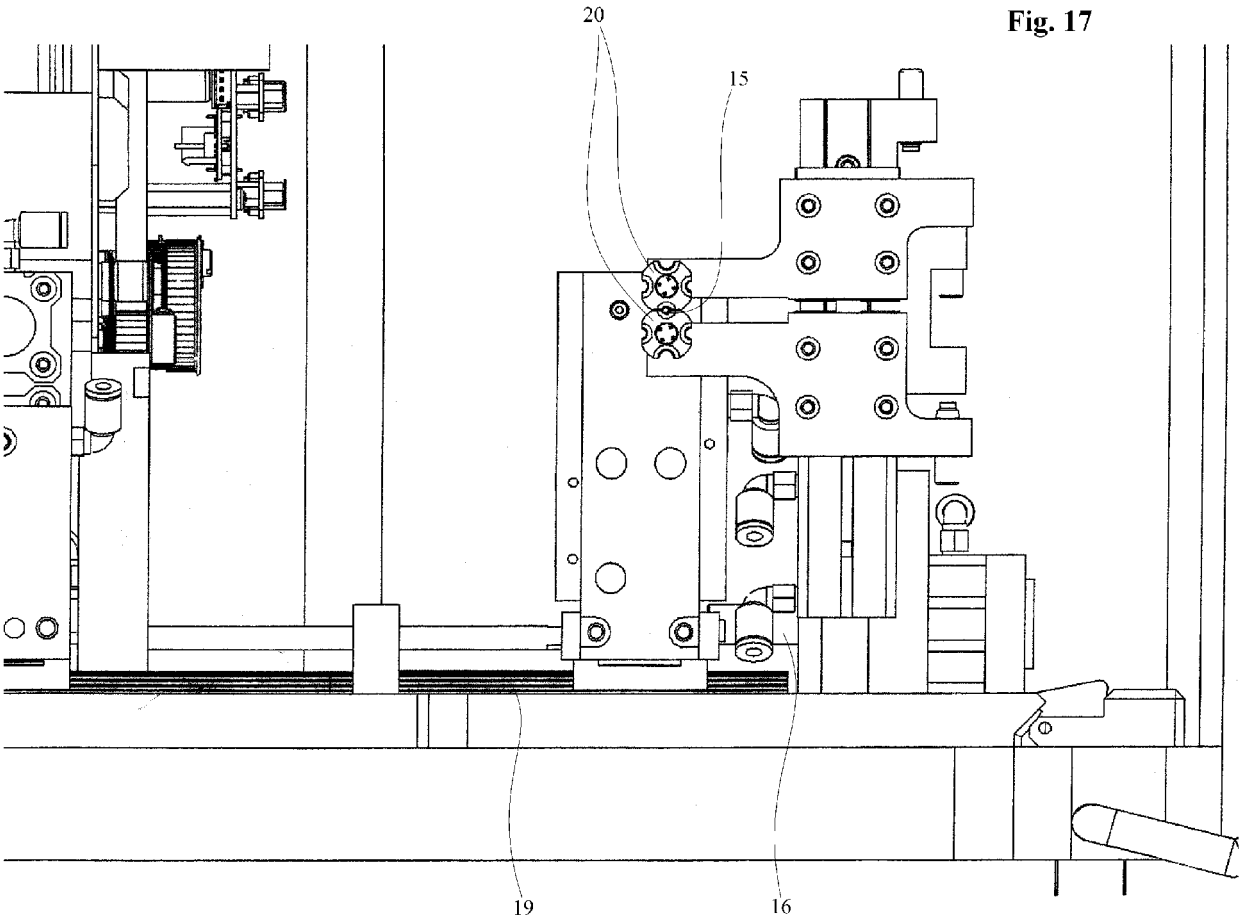
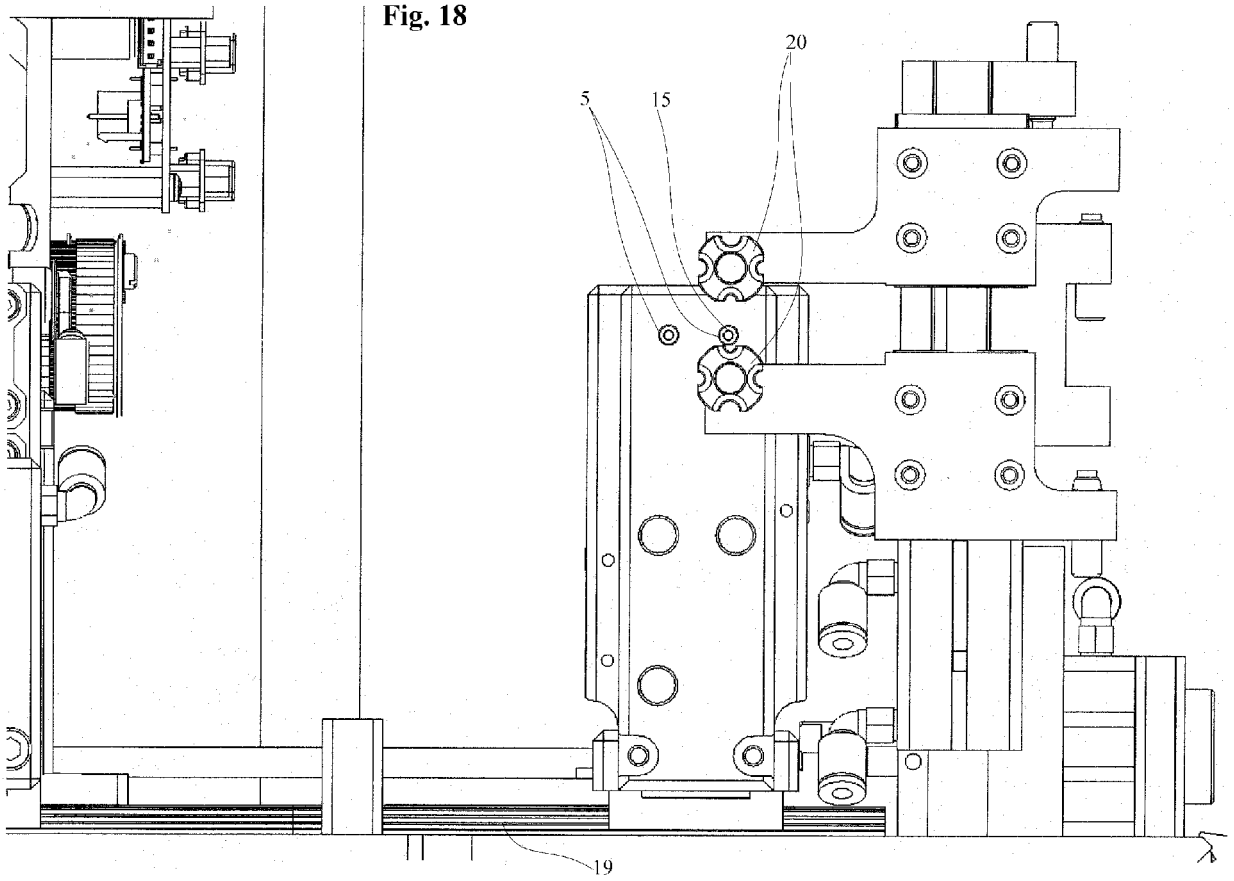


Fig. 18



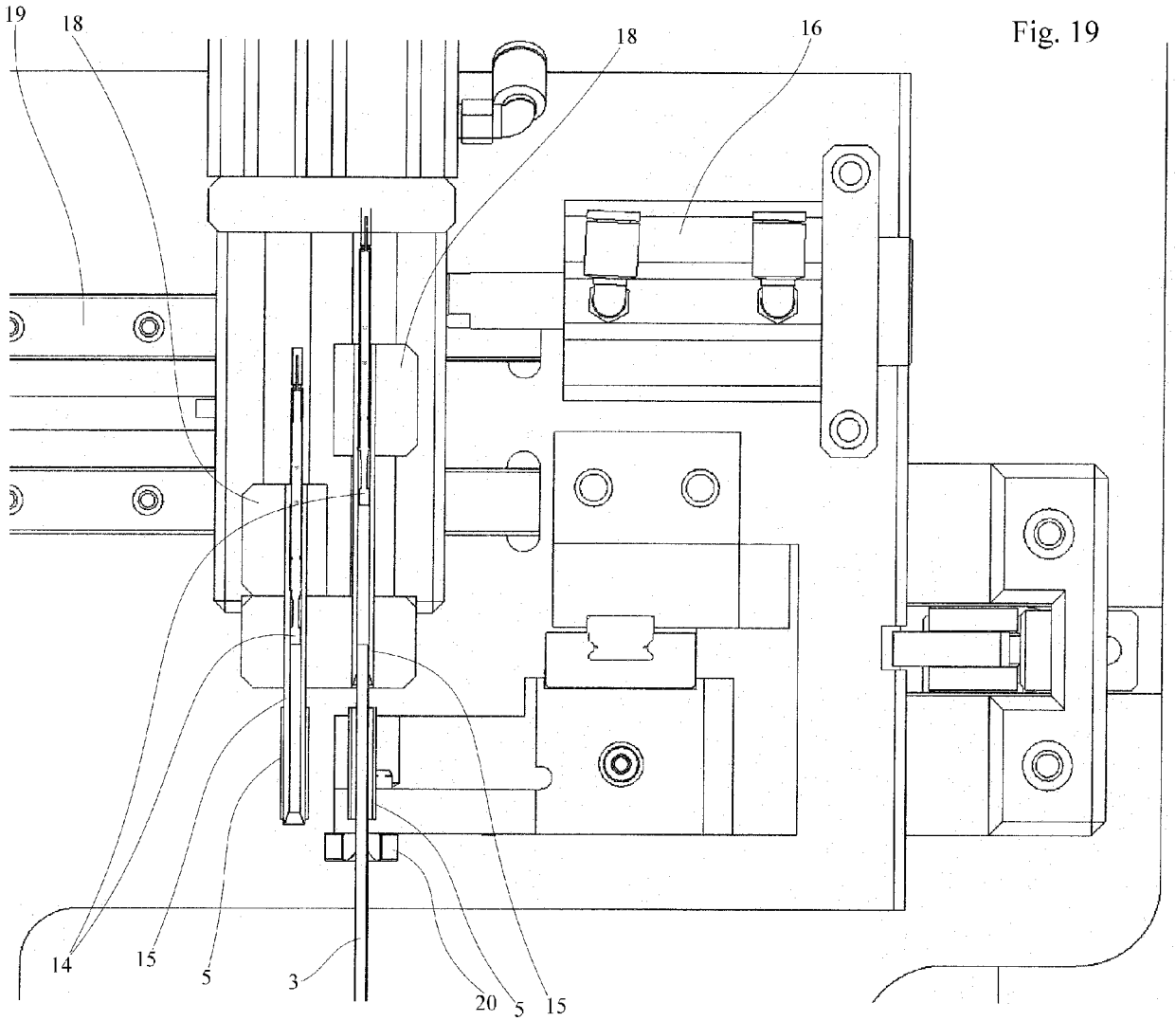


Fig. 19

Fig. 20

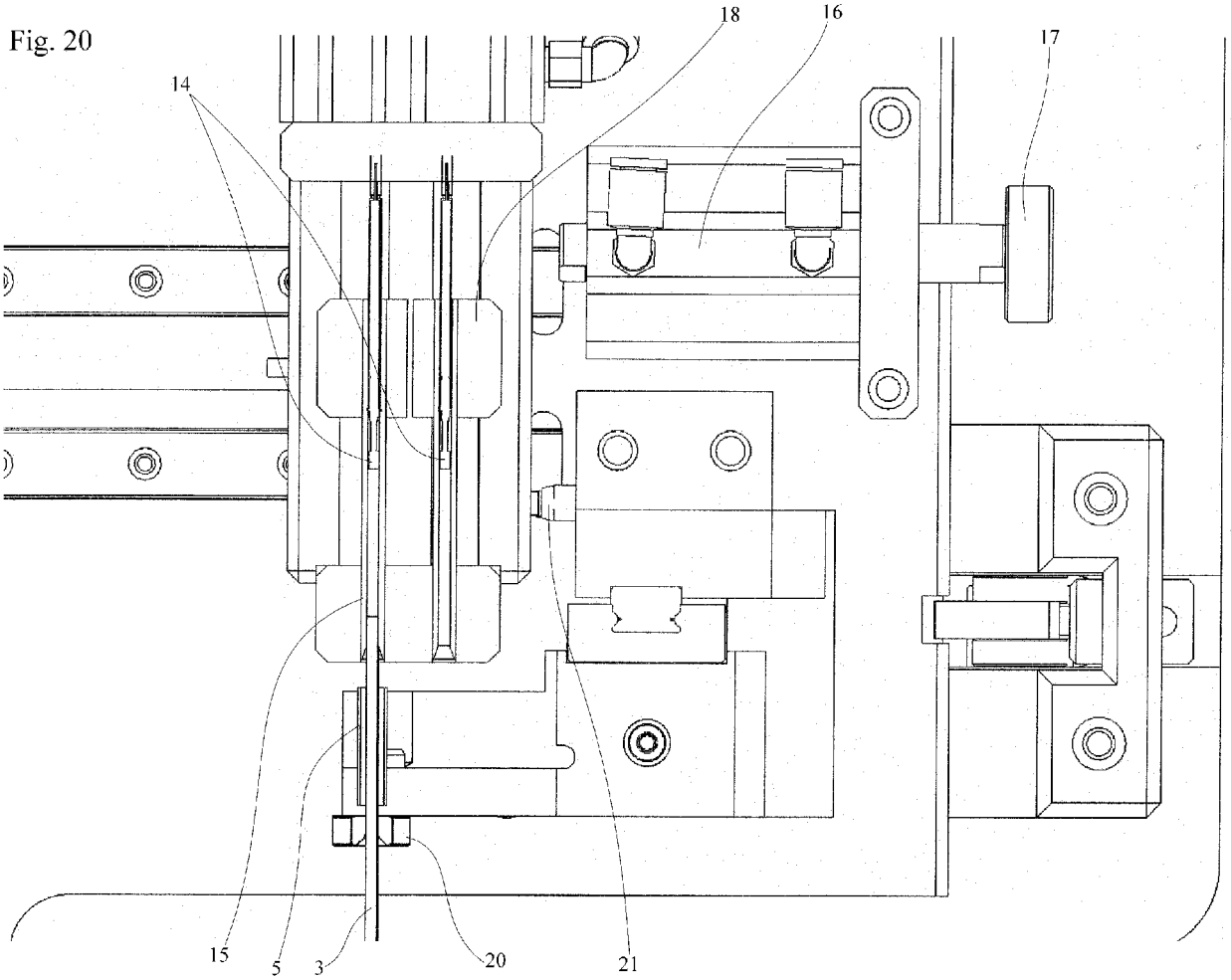
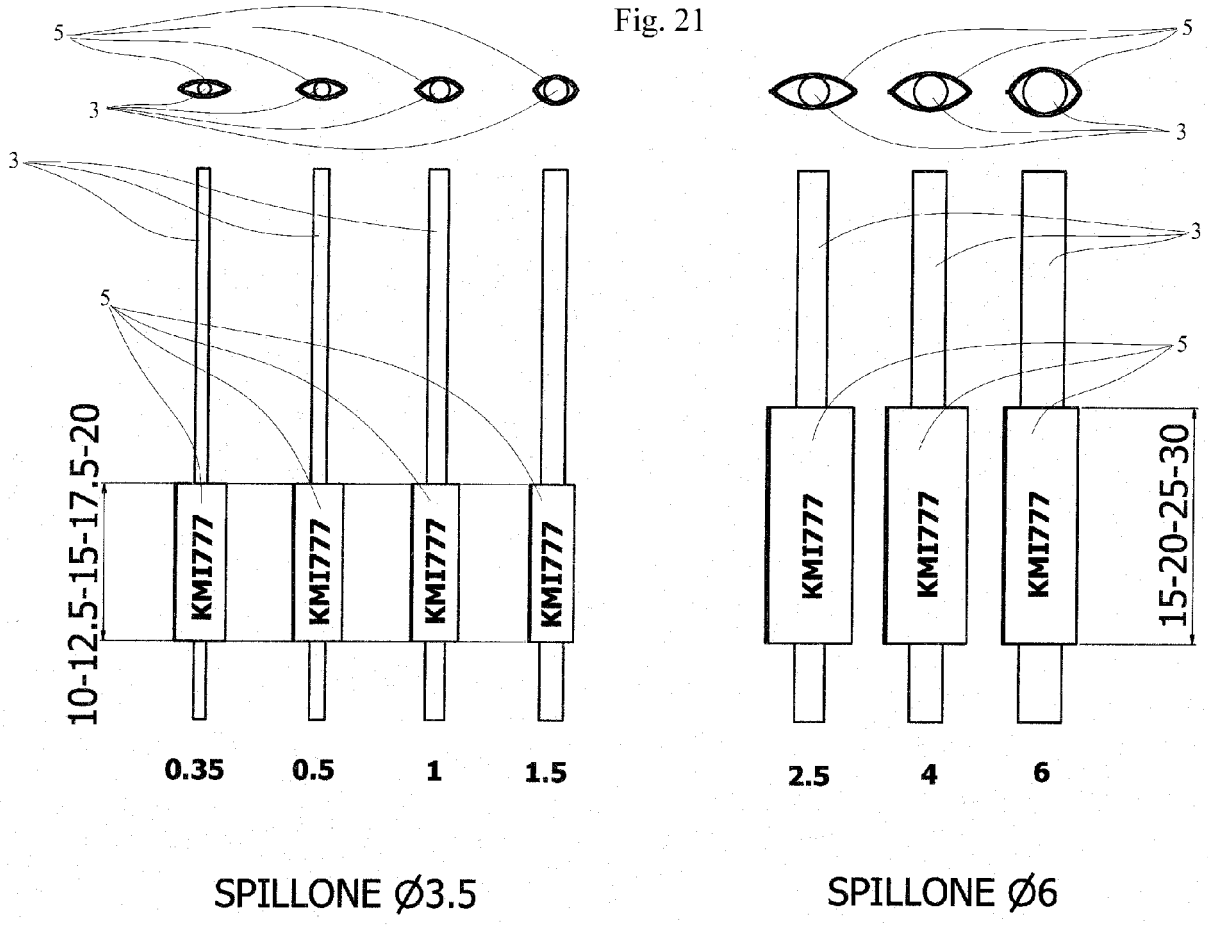


Fig. 21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SPILLONE Ø6

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EUROPEAN SEARCH REPORT

Application Number
EP 17 19 2474

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	EP 2 452 884 A1 (CARLOTTO VLADIMIRO [IT]) 16 May 2012 (2012-05-16) * paragraphs [0016], [0051], [0063], [0064], [0071], [0073], [0083], [0084]; figures 2, 12, 16 *	1-7	INV. B65C3/02
Y	EP 0 218 000 A1 (BRADY CO W H [US]) 15 April 1987 (1987-04-15) * column 19, line 48 - line 59; figures 1, 8 *	1-7	
A	US 2015/284126 A1 (SCHANKE ROBERT L [US] ET AL) 8 October 2015 (2015-10-08) * paragraphs [0035], [0046], [0050], [0052], [0054], [0060], [0063], [0068], [0071], [0072]; figure 1 *	1-7	

TECHNICAL FIELDS SEARCHED (IPC)
B65C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	26 February 2018	Luepke, Erik

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26-02-2018

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2452884 A1	16-05-2012	NONE	
EP 0218000 A1	15-04-1987	CA 1249377 A	24-01-1989
		EP 0218000 A1	15-04-1987
		JP S6294535 A	01-05-1987
		US 4655129 A	07-04-1987
US 2015284126 A1	08-10-2015	EP 3126123 A1	08-02-2017
		US 2015284126 A1	08-10-2015
		WO 2015153195 A1	08-10-2015

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