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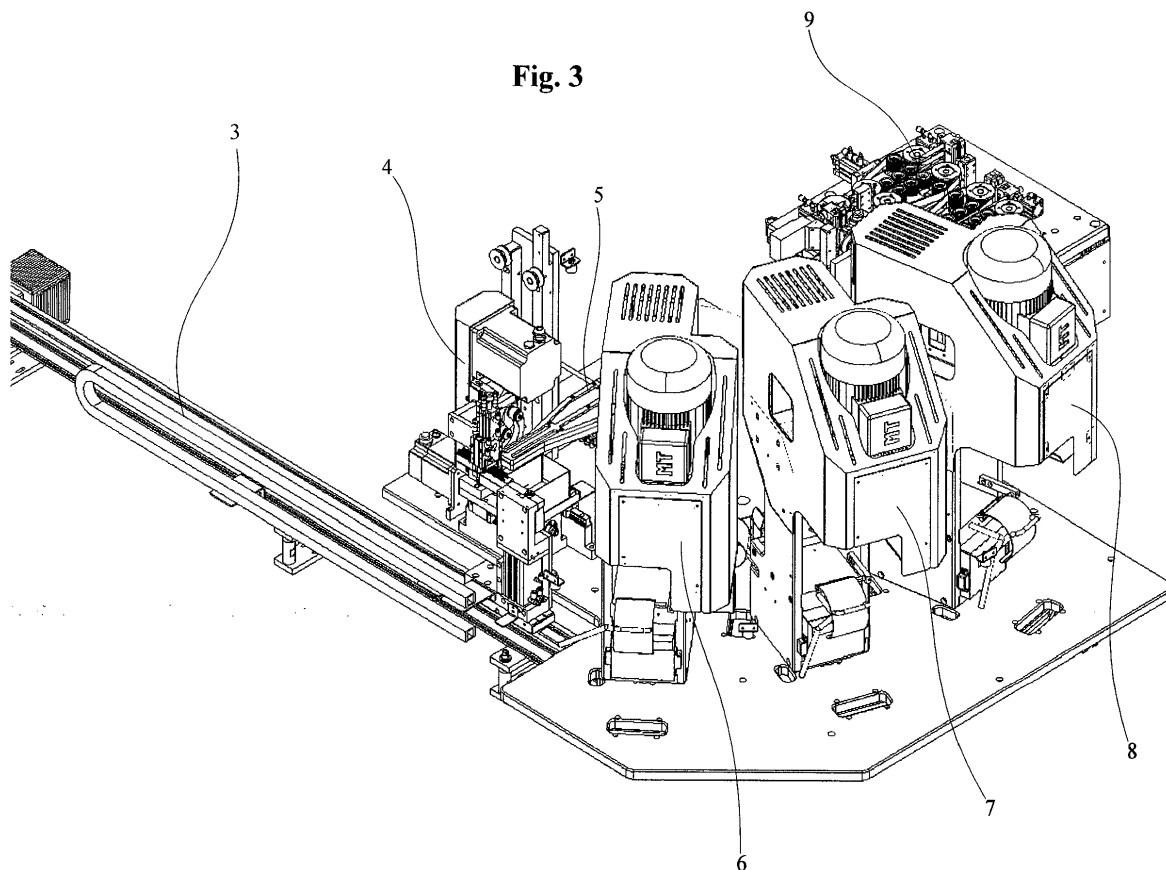
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(54) **Positioning head for cable ends**

(57) This invention concerns a device (1) to complete electrical wiring connectors with insulation piercing both sides, in which is requested in the same wiring a series of cables, which on the one hand, in place of the connec-

tor insulation piercing there is a terminal crimped, with further opportunity to meet the request of isolation devices (cover sockets, rubber, tin).

Fig. 3



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Description

[0001] The present invention relates to an independent device or in combination device that produces electrical wiring with insulation displacement (IDC) by loading wires on a wire comb loader to complete a wiring where it is required on one lead, at the place of a connector IDC, a crimped terminal.

[0002] It is disclosed a device for loading of wires on a wire comb loader in patent PD2005A297.

[0003] The above mentioned devices show as it can automate the loading of wires on a wire comb loader particularly to produce electrical wiring with insulation displacement (IDC).

[0004] Now the above mentioned devices ate the best offer of the market to produce crimped wiring.

[0005] However, the wiring requests include other possibilities that the above mentioned device can limited solve.

[0006] In fact it is necessary sometimes that some wires should be with a free lead and not loaded into the comb loader (recovered wires) for a different heading from the insulation displacement.

[0007] This forecast of a free wire could be managed by the above mentioned device.

[0008] However, this free lead of this free wire had to be recovered by manual for the specific and desired heading.

[0009] Considering that the heading forecast could be very different for a series of free wires, it is evident that the complexity of such operations could have a high factor of fault.

[0010] Nor it was possible, by the known art, a preliminary treatment of the free lead with the desired heading.

[0011] In fact the loading of the wires into a wire comb loader and their transfer into a corresponding connector is possible only for wires without terminals, so not headed.

[0012] Finally, the forecast of a heading could be so various for the free lead of a different free wires.

[0013] For all these inconveniences the heading of the lead of free wires is recovered by manual after the connectors crimping.

[0014] All inconveniences of such a procedure are all these of an automatic/manual admixture: increase of producing time, increase of costs, low quality of final product, low global productivity, poor adaptability and poor configurability

Presentation of the invention

[0015] The aim of the present invention is to solve one or more inconvenience of the known art.

[0016] Another aim of the invention is that the device of the invention can be associated to loading devices of wires into connectors in original manner or also next.

[0017] Another aim of the present invention is to provide a device for the heading of free leads of free wires

and not crimped on both leads, but only on one of these leads.

[0018] A different aim of the present invention is to provide a device that can allow the complete discretion on terminals to be headed on free leads of free wires.

[0019] Another aim of the present invention is to provide a device that allow the possibility to put one or more elements (for instance: faston and sleeve, seal, tinning) on free leads.

[0020] An important aim of the present invention is provide a device that can allow to process the free leads also before the relative association with the terminal.

[0021] A not least aim of the present invention is to provide a device that can run in an independent way but in a coordinate manner with known devices.

[0022] A different aim of the present invention is a device that can proceed in a coordinate way, but its operations can be previous or next to all operations of the all devices that it is associated with, without interfering with the production.

[0023] An important aim of the present invention is to provide a device that can head the wires, also those which length would be impossible to head manually, after their insertion into connectors. A different aim is to provide a process for heading free leads of recovered wires that can use the device, object of the present invention.

Description of the invention

[0024] This aim and these and other objects are achieved by a heading device characteristics by one or more of the characteristics, exposed on the claims.

[0025] In particular, it is a heading device of free leads of recovered wires constituted by a feeder of one or more electrical wires, for feeding at least one wire to be headed, able to feed in a first phase the wire to be headed for the desired length and to submit a preprogrammed quantity of wire by a rotating unit, being said rotating unit able to rotate in a programmed manner, to take the final portion of the recovered wire, submitted under at least one heading station and take the wire, after all heading operations to a second heading station that can be the original and expected starting position to be proceeding to a second phase when the wire is cut by a cutting device at the desired measure and the end at the ned accommodated not a predetermined position in a free seat of the wire comb loader.

[0026] Advantageous characteristics of the invention Advantageously the first position of exposure of the wire corresponds to a stripping device of the free lead, for the preparation of a heading of the wire that requires preliminarily this phase.

[0027] Advantageously the second or different position of rotations corresponds to that of a first heading at a proper device.

[0028] Further in an advantageous way, after the return to the first position, there is a feeding of the headed wire of the requested length, at the same time the head is cut

and inserted inside a predetermined position of a seat of a wire comb loader, at the same time it can be done a possible stripping of the next wire for heading at one or more heading stations.

[0029] Advantageously, the heading station can be more than one, put in circular way or on a circular arc to be properly interested by the wire lead to be headed, after a proper rotation of the rotating unit. Advantageously said final position of exposure, of return of the headed wire corresponds to that in proximity of the insertion seat of the wire comb loader,

[0030] The wire is fed at the predetermined length and guiding after it is locked by a guiding clamp, which clamp is placed between the headed terminals and the rotating unit.

[0031] Said clamp is a mobile one.

[0032] Advantageously said guiding clamp is constituted by a couple of plates reciprocally rotating in a speculate manner, upper jointed and placed in a first open position able not to interfere with the lead of the wire during the rotation of the rotating unit and in a second closed position faced and spaced able to keep the lead of the headed wire in a guided position.

[0033] Advantageously said headed wire and locked by the guiding mobile clamp is accommodated into a predetermined free position in the wire comb loader.

[0034] Said insertion into the predetermined free position of the wire comb loader is performed by a punch, that sliding a space between the two tabs of the guiding clamp that lock the said recovered wire, pushes said wire into the said free position.

[0035] At the same time or after, but preferably just before the push inside the wire comb loader, by the push punch which crosses through the two tabs of the guiding clamp; there is the cut of the second lead of the wire that is inserted into the wire comb loader. Advantageously the lock block of the recovered wire fed by a feeder of electrical wire, for the feeding of at least a wire to head, is constituted by a locking device at pressure, put in proximity of the end of the rotating head.

[0036] Said locking device at pressure is constituted by eccentric elements able to lock the wire into a sliding seat specially crafted with its own perimetric profile and to automatically fit to the different wire sections which the feeder can be provided.

[0037] This fitting can be advantageously done by elastic elements that act on the periphery of the profile of such eccentric elements.

[0038] In the sequel of the present invention it will refer to a specific and preferred realization having as object a device to complete a wiring with insulation displacement connectors on both leads, where it is required on the same wiring a serie of wire that on one lead, at the place of the insulation displacement connector, there is a crimped terminal with further possibility to satisfy the request of insulation devices (sleeve, seal, tinning) according the advantageous characteristics above mentioned, without having any limiting effect on the protection scope

that in generic can be included into the definition of the invention in its essential characteristics.

Brief description of the drawings

[0039] Technical characteristics of the invention, according to the said aim, are clearly found in the content of the claim listed below and the advantages of the invention will become better apparent from the following details description of a preferred but not exclusive embodiment thereof, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 and figure 2 are different perspective view of a whole of a device according to the invention in association with a known device operatively associated by a transfer slide of the wire comb loader.

Figure 3 and figure 4 are different perspectives of the device according to the invention and the transfer slide of the wire comb loader for the possible association with a known device (not shown) for the connectors processing.

Figure 5 is a perspective view of the portion of the device according to the invention, without the heading device and the wire feeding group, for a clarity. Figure 6 is the transfer slide with a series of recovered wires for the wiring IDC-IDC accommodated into the wire comb loader performed by a known device which is going to the device according to the invention to receive the headed wires and accommodate in the provided seats of the wire comb loader, after that the slide can come back to the known device and accommodate IDC connectors.

Figure 7 is a top view of the device according to the invention with evident rotating arm of the feeding unit rotated to the correspondence to a heading unit.

Figure 8 shows a particular of the feeding unit on a very large perspective view and the device for accommodating the wire inside the wire comb loader to complete the wiring

Figure 9 and figure 11 show what described on fig. 8 on a different perspective view completed by inserted wires by the known device according to a head-head wiring and a series of headed wires inside the provided seats on the wire comb loader.

Figure 10 shows what described in fig. 8 on a different perspective view completed by recovered wires to a hybrid wiring, on one side IDC connector and on one side headed wires as the predetermined requests.

Figure 12 and 13 are enlargement of a different perspective view of the feeding unit and of the insertion device of the wire into the wire comb loader.

Figure 14 is a second front view of the device according to the invention provided of centering of the wire with cutting and stripping blades according to the colour and the section of the wire exiting from the rotating feeding unit.

Figure 15 is a particular of the previous figure with highlighted the centering device

Figure 16 up to 20 show in single way the insertion device with highlight to the guiding clamp, with relative movement of the guiding plates and the movement of the punch in the different phases of the locking of the wire and its accommodation into the comb

Figure 21 and figure 22 show the insertion device with raised plates to underline the positioning and displacement of the insertion

Figure 23 and figure 24 show respectively a flat section and a perspective view of the end of the rotating head of the wire feeder

Figure 25 is an enlargement of figure 24 to underline the locking device of the wires with eccentric closure that allows to obtain an independent lock of a wire from another one

Figure 26 show a partial view of said block device for locking the wires, without the arm of upper movement, of raising and lowering, at which end various eccentric lock are jointed, contrasted in their rotating movement by elastic elements. This device easily and precisely grant the locking of the wires, also of different diameters, performed by eccentric elements contrasted by elastic elements in proximity of the end of the head.

[0040] The wire locking in proximity of the feeding head allows to have high precision on the length of the wire exiting from the head, avoiding inaccuracies due to rebounds of a remote and far feeding-locking system, considering that the seat where said wire slides must be slightly loose per the sliding.

Detailed description

[0041] Referring to the drawings, the device of the invention 1 is shown in association with a known device 2, joint to it by a transfer slide 3 of the comb loader 10. Said transfer can be occurred both also after that all operations of the known device 2 are finished and during these operations, because the headed recovered wires 17 and jointed to the comb holder 10 don't interfere with the normal running of one or other device.

[0042] Previously the known device 2 could only joint recovered wire without any heading to the comb loader 10 of the connector 10, due to the fact that this operation must be performed manually by an operator.

[0043] The device 1 is fed by a wire feeder 9 that can be single or multiple so to have a proper colour and/ section of the wire.

[0044] The generic wire fed by the feeder 9 is pushed in a guiding manner inside the feeding head, supported by a rotating arm 18, which feeding head 5 can be a multiple pitches taking to the exit hole 13 the wire to be processed.

[0045] Possibly said feeding head 5 can be equipped by different devices to verify the wire, its speed, its lock-

ing.

[0046] Said rotating feeding head 5 can rotate, in a controlled manner, to submit the free leads of the recovered wires 17 at the proper heading unit 6,7,8, which the device is equipped with.

[0047] A first unit, said transfer unit 4, is placed in proximity of the arrival point and delivery by the transfer rod 3 of the comb loader 10.

[0048] This transfer unit 4 is the whole of elements that received the headed recovered wire 17, cut the wire that exits from the exit hole 13 of the feeding head 5 and accommodate this wire to the comb loader 10 pushing by a transfer punch 16 into the predetermined position into the comb.

[0049] Preferably before, but also at the same time or also after, it occurs the cut of the wire by a shear, constituted by a couple of "V" opposing blade 19. Considering that it is very important that the cut wire is correctly and precisely accommodated into the free position of the comb loader 10, the transfer unit 4 is equipped by a guiding clamp achieved by a couple of mobile plates 11,12.

[0050] Said mobile plates 11,12 are upper jointed and can be placed in a vertical position, in faced and spaced manner, for a space equal to the thickness of the wire to lock or they can be placed in an horizontal position, allowing the transfer of the recovered wire 17 by the feeding head 5, without interfering.

[0051] In fact during the transfer of the recovered wire 17 by a rotation of a part of the feeding head 5 to position it correctly under the transfer punch 15 for the accommodation in the predetermined free seat of the comb loader 10, said plates 11,12 must be lifted up not to interfere with said rotating movement. The recovered wire 17 is equipped with a terminal or connector 20 or other heading device in its free lead and said plates 11,12 closes to lock the recovered wire 17 in the space included between the exit hole 13 of the feeding head 5 and the head terminal of the same recovered wire 17.

[0052] This locking of the cut recovered wire 17 by the guiding clamp closes with plates 11,12 as tabs shape with a movement of 90° is enough solid for the safe locking, but without submitting an excessive hold opposing the sliding in the space created by the said plates, pushed by the transfer punch 16, inside the predetermined free seat in the comb loader 10.

[0053] In fact the displacement of the transfer punch 16 to transfer said recovered wire 17 locked by the clamp constituted by close plates 11,12 occurs by a sliding inside the space created by said coupled and faced plates 11,12. So very advantageously said feeding head 5 equipped of many exit holes 13 matched and spaced can feed the recovered wire 17 of predetermined colour and/or section, the device according to the invention 1 is equipped by transfer means both of the comb loader 10 that moves it to the correspondence of the predetermined free seat to accommodate the recovered wire 17 properly headed that of transfer means of the transfer station 4. Moreover, as terminals 20 of the recovered wire 17 before

being jointed to the lead of the recovered wire 17 require that the said wire is stripped on final lead, the device of accommodation is equipped by a stripping unit.

[0054] Said stripping unit is constituted by a couple of "V" blades 14 and 15 speculate to cutting blades 19 at a predetermined distance that can perform a maximum determined measure of stripping; being shorter than cutting blades, so that before the cut is performed and then it occurs the retraction of the feeding head 5 that much it is necessary to perform the required stripping, at the same time the stripping blades 14 and 15 close up to incise the insulation. After that the feeding head 5 shrinks back to perform the extraction of the insulation, that can be partial.

[0055] This stripping operation is usually the first operation performed by device 1, before that feeding head 5 moves the free lead of the wire under one or more following heading station 6,7,8 from station 4. Afterwards, the recovered wire 17, stripped at the predetermined measure, is moved by a partial rotation of the feeding head 5, in proximity of one of the heading station 6,7,8.

[0056] Possibly, by a partial rotation it can be performed the transfer of the recovered wire 17 headed by a first heading station to a second heading station for a second heading. For instance it can be necessary a heading with electrical terminal and then the insertion of a sleeve cap (faston and coprifaston).

[0057] Or said heading stations 6,7,8 can be suitably arranged for the heading of wires of different diameters so the same heading can be performed on wires of different dimensions.

[0058] Said operations, that in the past were performed manually, are all performed directly in an automatic manner with all safety that they will be precisely and quickly performed and without faults. Finished the heading phase, at the stations 6,7,8 suitably equipped, the feeding head 5, by an additional rotation places the recovered wire 17 headed with a terminal 20 in proximity of the transfer station.

[0059] After pushing said wire by a feeding device 9 from the exit hole 13 of the feeding head 5 at the predetermined length, locking plates 11,12 lower so that the wire is cut and after accommodated into the comb loader 10. At the end of the feeding head 5, in proximity of the exit holes 13 of the exit of the recovered wires 17, said head is equipped by a locking device of the said wire.

[0060] Said locking device is constituted by a lever 21, where the first arm 22 is solicited by an actuator to lower and rise. On the second arm 23, contrasted to the first arm 22, is hold up by a pin 25 where is spliced a serie of lock with eccentric profile, preferably crescent shaped.

[0061] Said eccentric profile in retired position stands pushing the wire inside its own seat of the feeding head 5, not allowing the displacement.

[0062] The eccentric profile of the locks 24 allows to the locking device to auto fit to the variations of the different diameters of the wire. In face said locks can be slightly rotate respect the support pin 25, opposed by

elastic means 26. Fitting to the diameter of the wire which is in the below seat.

[0063] As the actuator moves the first arm 22 of the lever 21 of the locking device, the wire feeding 9 feeds one of the recovered wire 17 following the predetermined programme and said wire, sliding free into the seat of the feeding head 5, exits of the predetermined quantity from the exit hole 13 in the end of the feeding head 5. By this kind of locking device, placed near exit hole 13, it obtains a high precision of the quantity of the recovered wire 17, not having rebounds and windings that could happen in a wide seat of the feeding head 5.

15 Claims

1. Device of headings of free lead of a recovered wire constituted by a feeder (9) of one or more electrical wires, to feed at least one recovered wire (17) to be head, able to feed the recovered wire for a predetermined length and submit in a first phase a quantity of predetermined quantity of wire from a feeding head (5). being said feeding head (5) able to rotate in a programmed manner to place the end part of the wire (17) under at least one heading station (6,7,8) and take it back, after the heading operations, on a second position that can be in proximity of the original station (4) and expected starting position, to proceed on a second phase some pre-programmed quantities of wires and cut by a cutting device at the desired measure and finally inserted into a predetermined seat on a free seat of the comb loader (10).
2. Heading device of free leads of recovered wires following claim 1, **characterized by** the fact that a first position of submit of the recovered wire (17) corresponds to a stripping device of the free leads.
3. Heading device of free leads of the recovered wires following the claim 1 or 2, **characterized by** the fact that a second or different position of the rotation of the feeding head (5) corresponds to that of a first heading at a suitable heading device (6,7,8).
4. Heading device of free leads of recovered wires (17) following one or more previous claims, **characterized by** the fact that said device (1) is equipped by a cutting unit to cut the recovered wires after that the feeding head (5) have taken back the recovered wire (17) headed by the original station (4).
5. Heading device of free leads of the recovered wires following one or more previous claim, **characterized by** the fact that said heading stations (6,7,8) are placed in circular way or on a circular arc respect the feeding head (5).

6. Heading device of free leads of recovered wires following one or more previous claims, **characterized by** the fact that original station is equipped by a guiding clamp constituted by a couple of locking plates (11,12) in proximity of the headed end of the recovered wire (17), those plates (11,12) are rotating. 5
7. Heading device of free leads of recovered wires following one or more previous claims, **characterized by** the fact that said rotation of the plates (11,12) is roughly of 90° respect their upper joint. 10
8. Heading device of free leads of recovered wires following one or more previous claims, **characterized by** the fact that the locking device placed in proximity of the end of the feeding head (5) is constituted by locks (24) with eccentric profile and opposed in their rotation of wire crishing inside their seats, by elastic means (26). 15
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9. Heading device of free leads of recovered wires following one or more previous claims, **characterized by** the fact that said feeding head (5) is equipped by many exit holes (13) matched and spaced, to feed many recovered wires (17) and by the fact that are present some transfer means both of the comb loader (10) that the transfer station (4). 25
10. Heading process of free leads of recovered wires that use the heading device as claims 1 up to 7 **characterized by** the following steps: 30
- feeding of the recovered wire (17) from a suitable wire feeder (9) to a feeding head (5)
 - possible stripping of the free lead of the recovered wire (17) by a stripping unit which the transfer station (4) is equipped by; 35
 - programmed rotation of said feeding head (4) from transfer station (4) submitting the free lead of the recovered wire (17) to a first station of heading; 40
 - possible additional preprogrammed rotation of the feeding head (5) to submit the free lead of the recovered wire (17) to a following heading at a different heading station: 45
 - possible repetition of the previous step for other heading stations.
 - rotation of the feeding head (5) to submit the recovered wire with the headed lead at a transfer station (4) 50
 - feeding of the recovered wire (17) to achieve the desired length;
 - rotation of the mobile locking plates (11,12) of the guiding clamp in approach to the recovered wire (17) up to lock it; 55
 - cut of the recovered wire (17) by a part of the cutting unit which the transfer unit (4) is equipped by;
- possible drop of the transfer punch (16) inside the space included between the mobile plate (11,12) with the accommodation of the recovered wire (17) inside the comb loader (10).

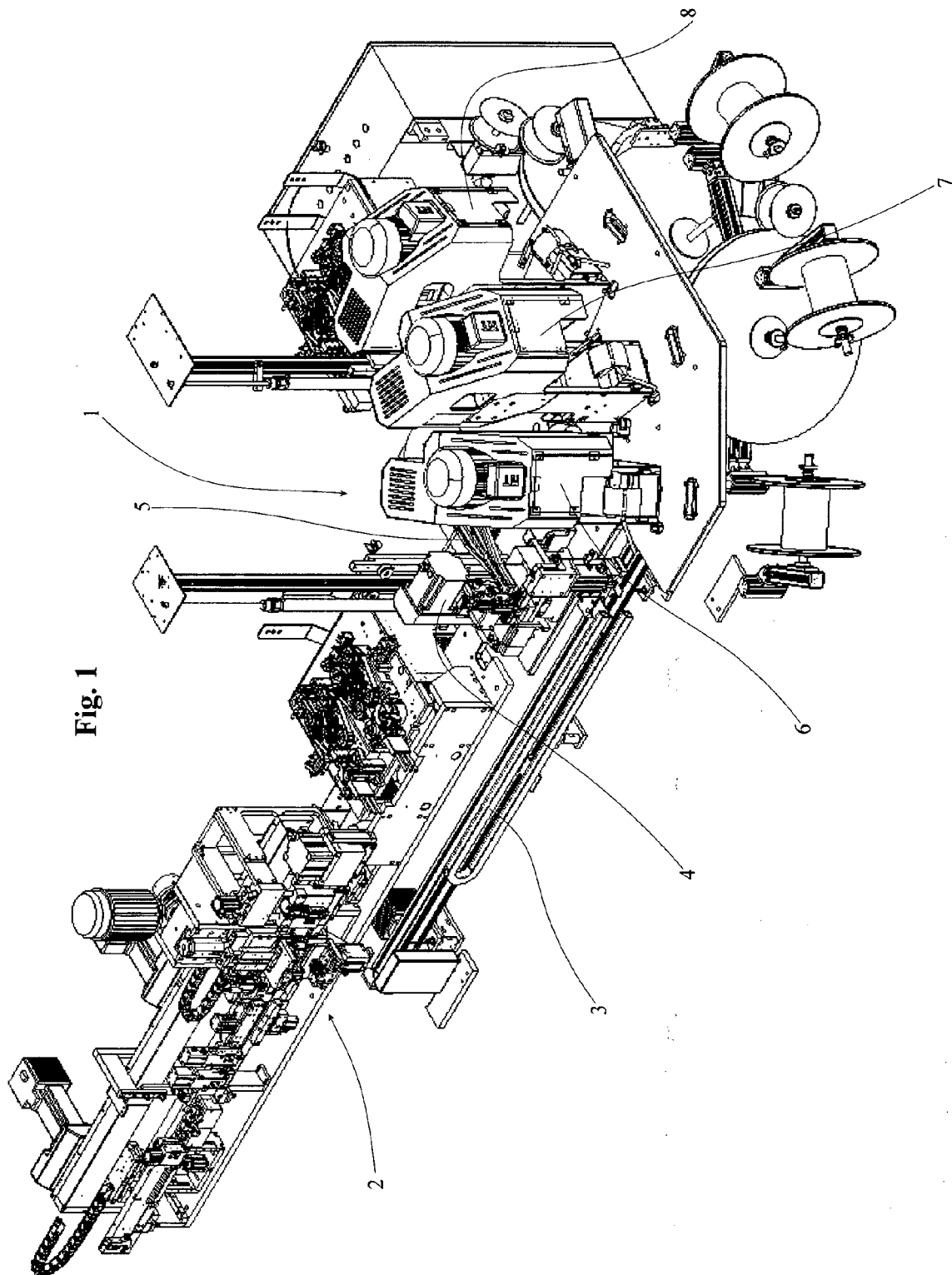
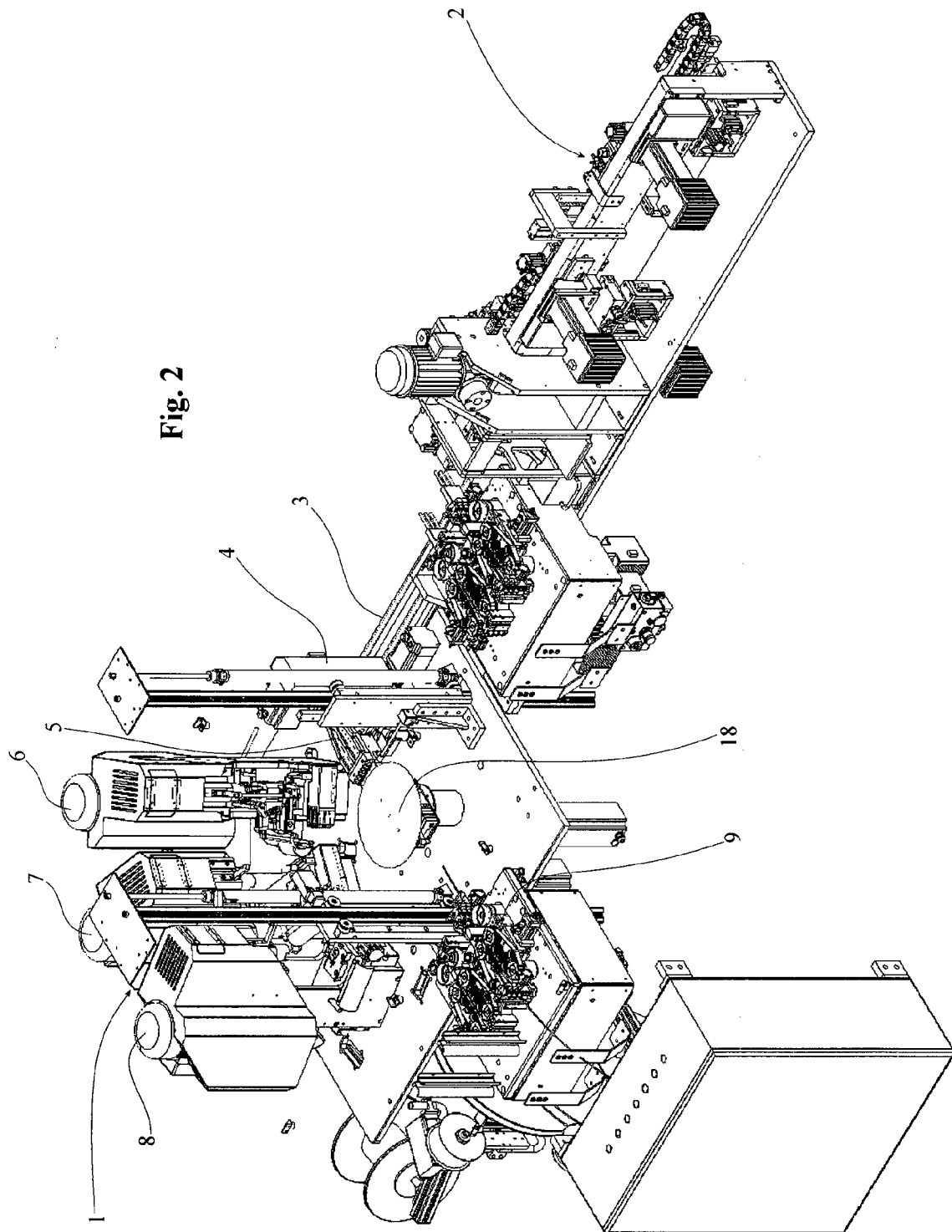


Fig. 1



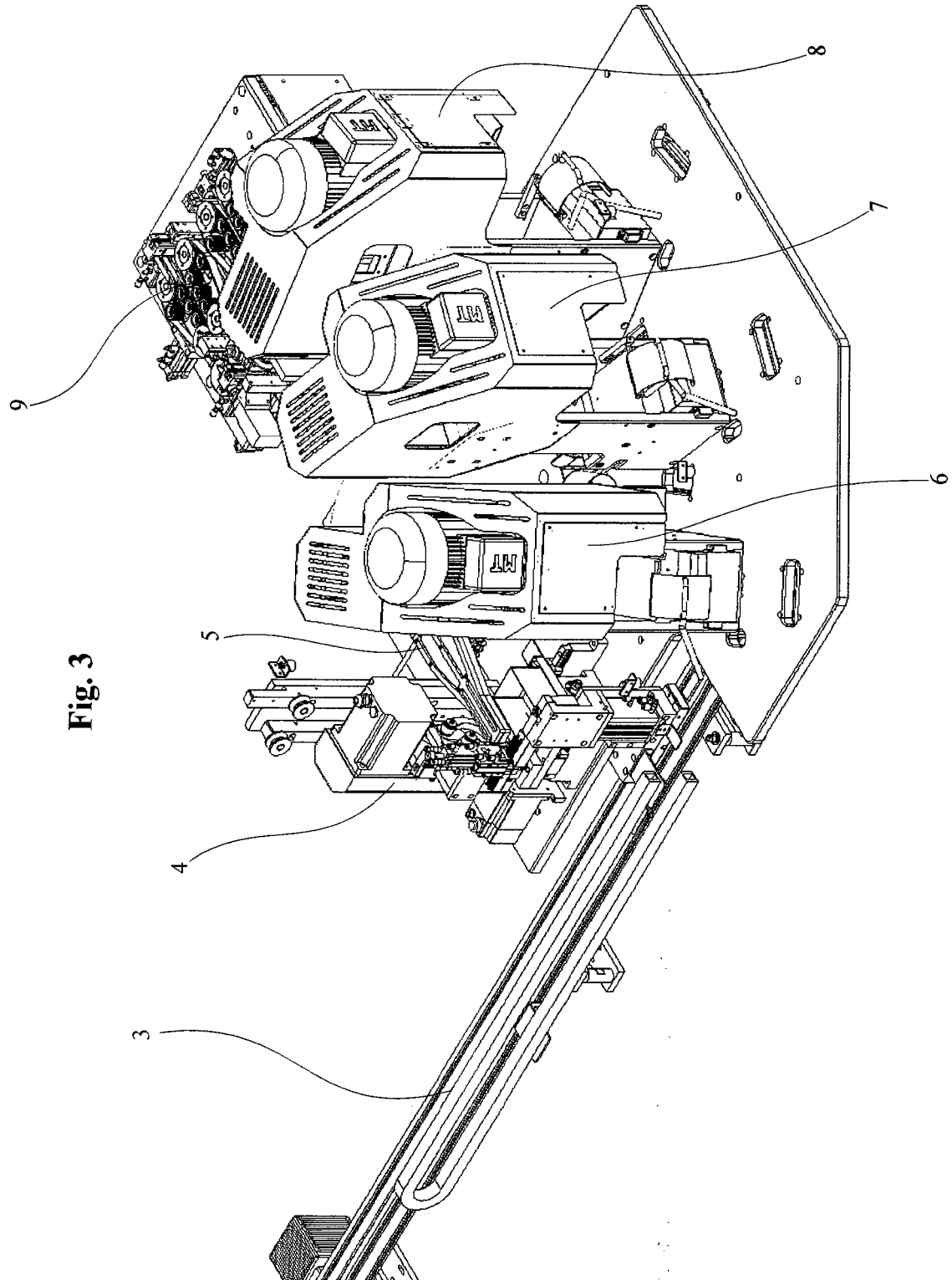


Fig. 3

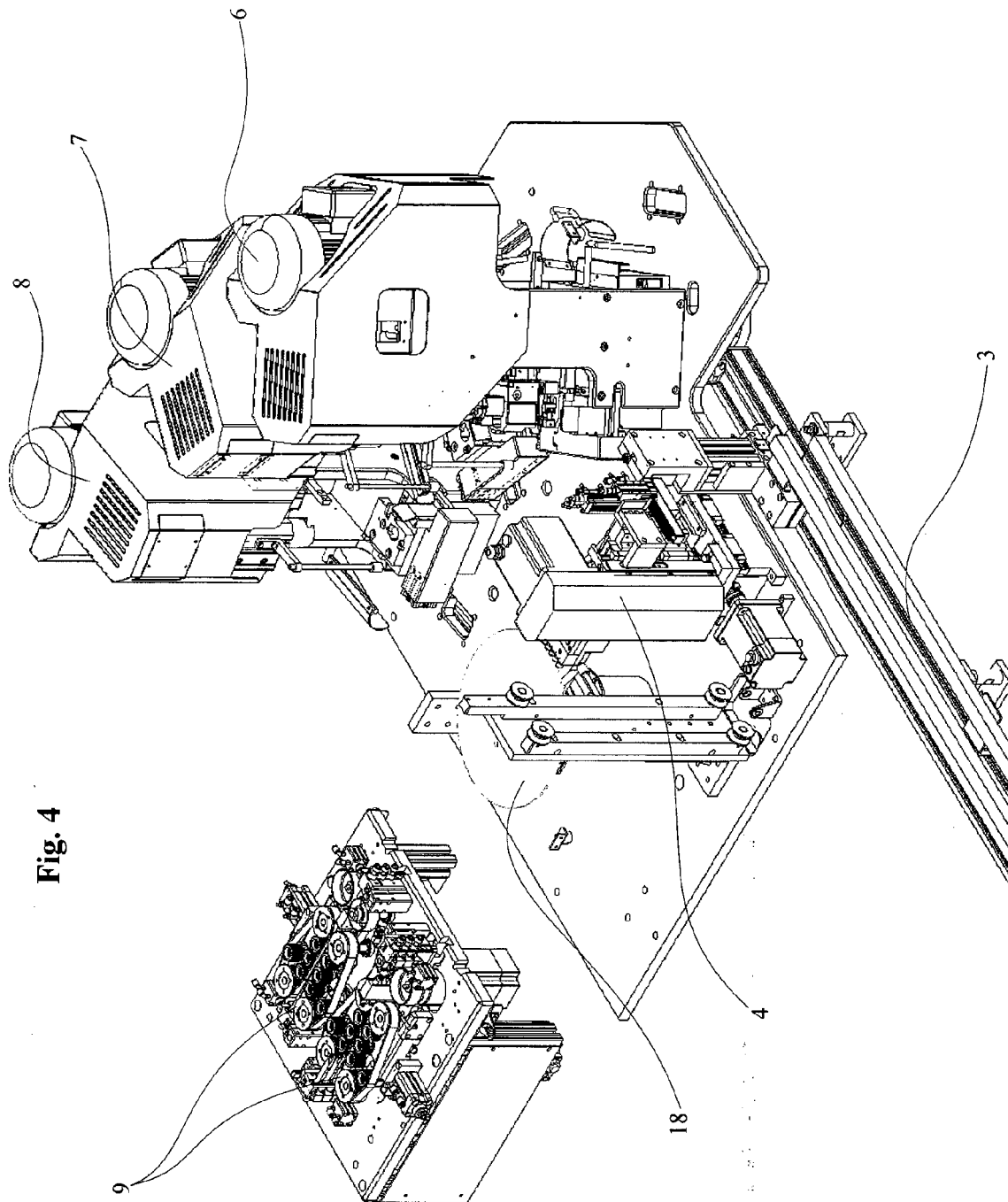


Fig. 4

Fig. 5

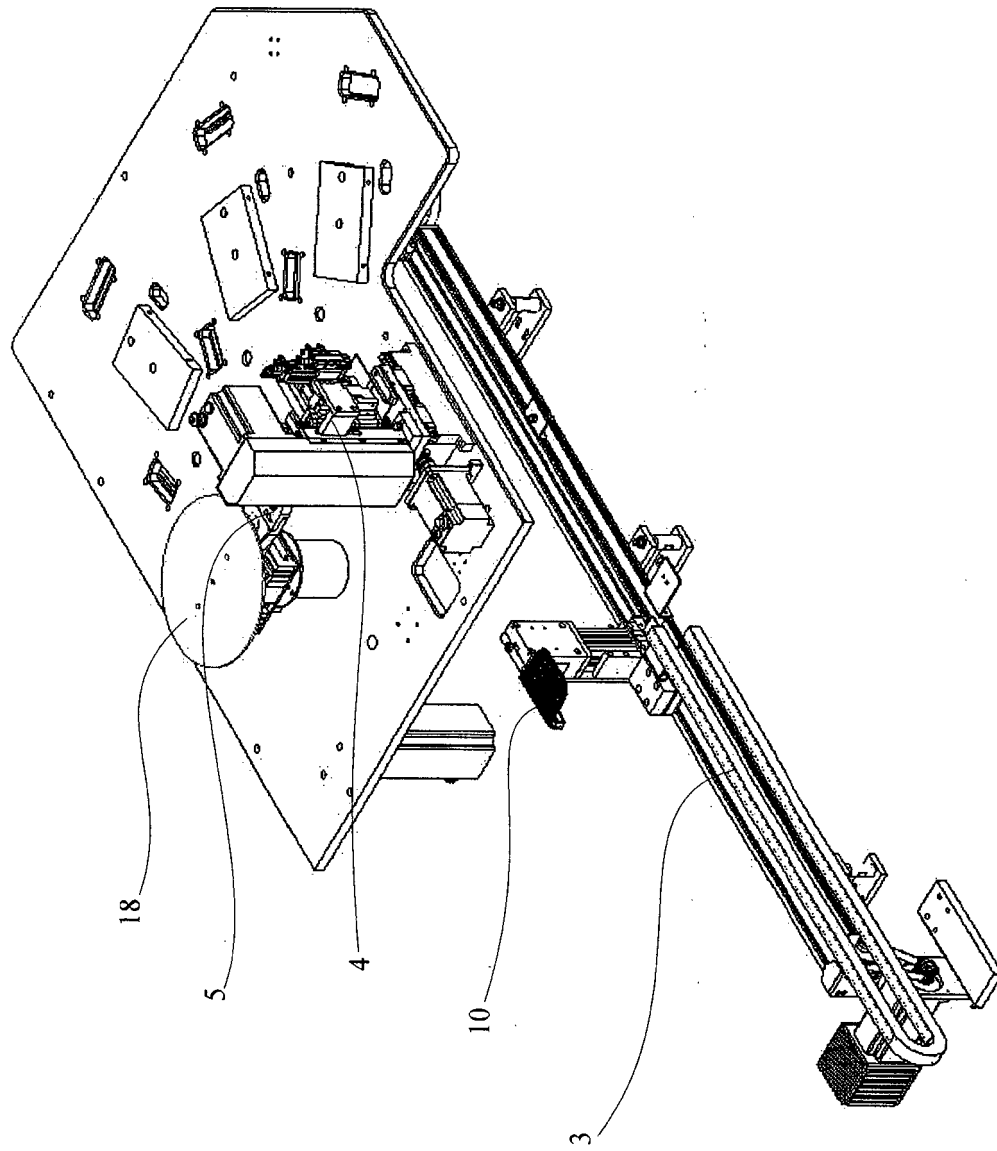
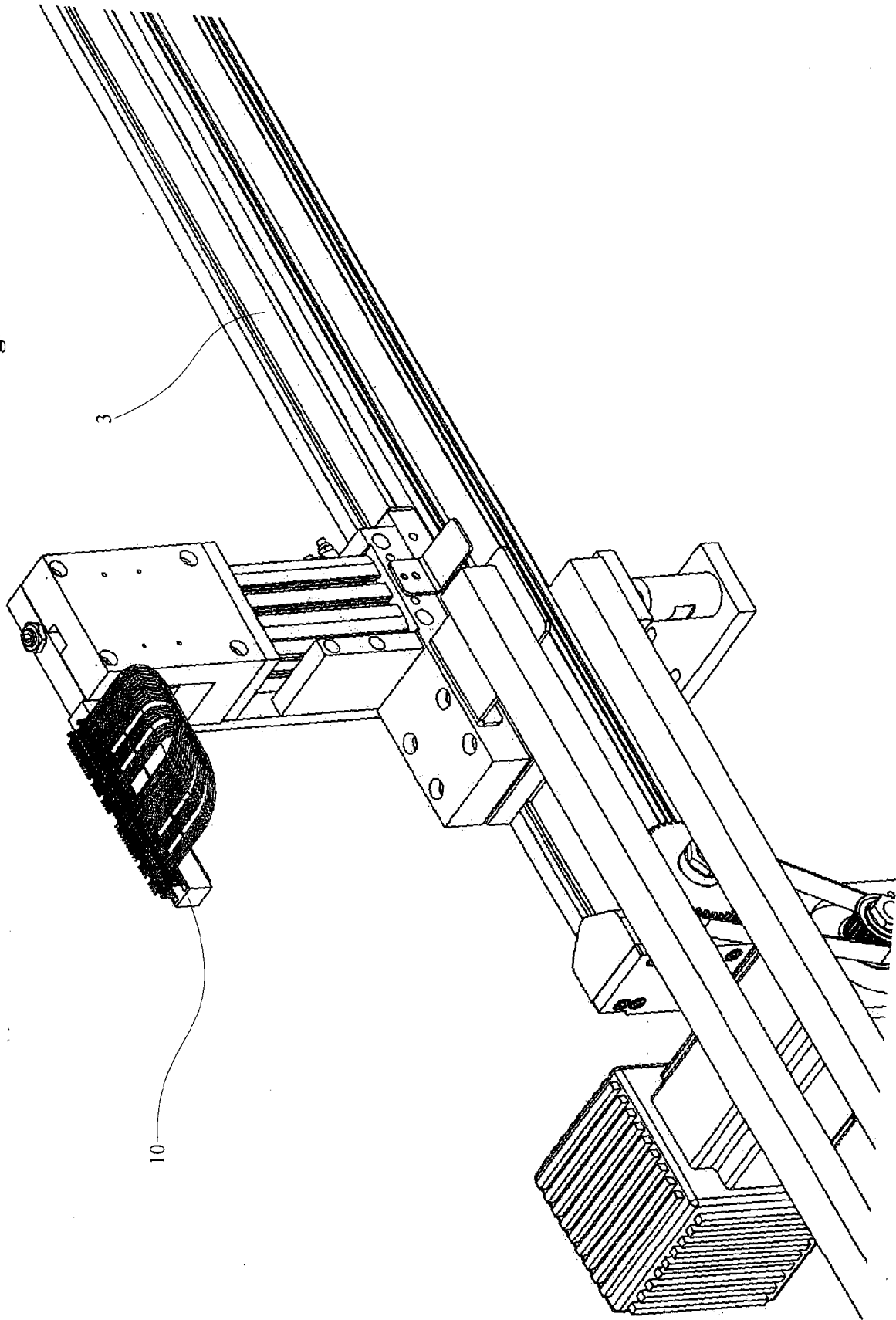


Fig. 6



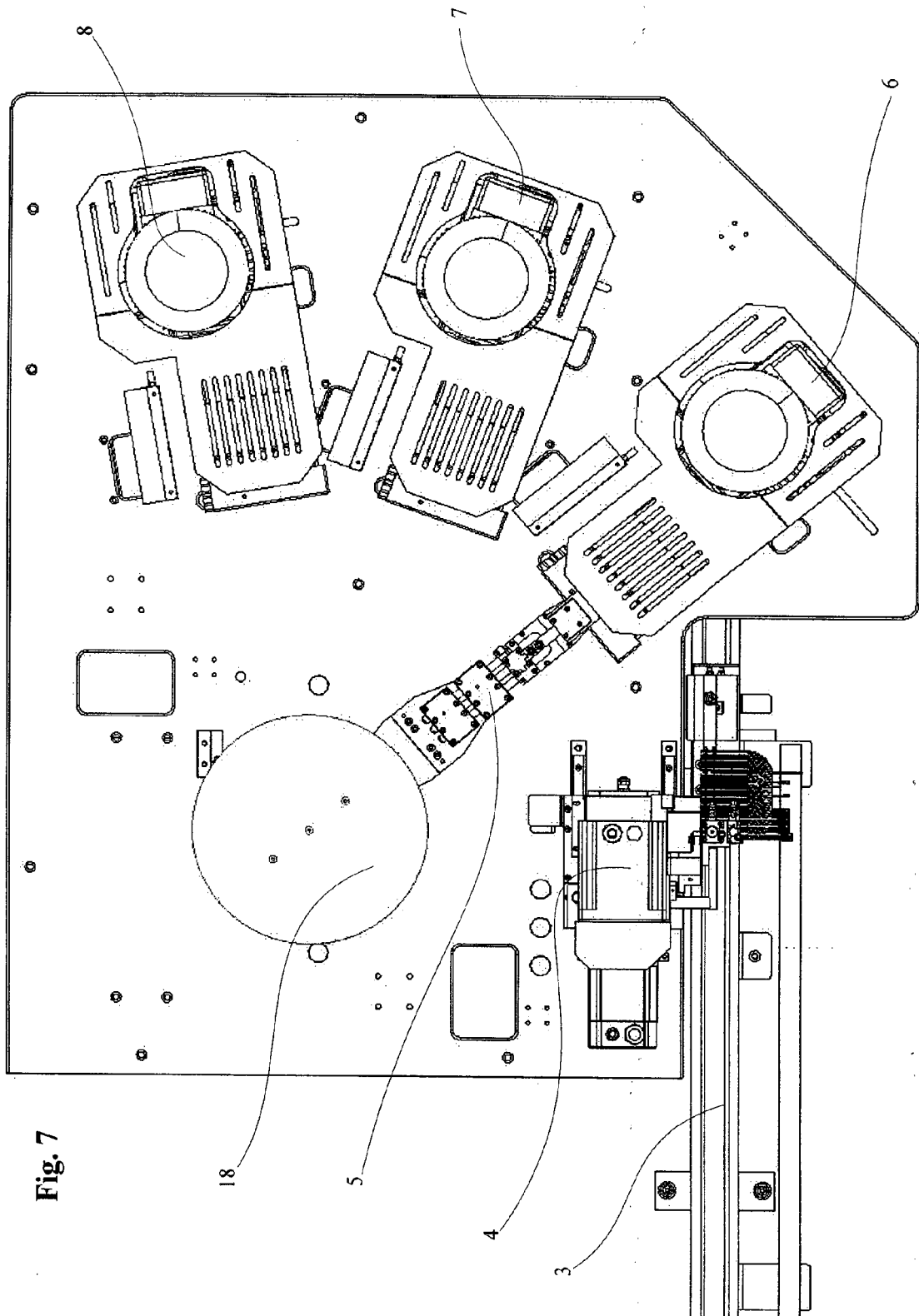
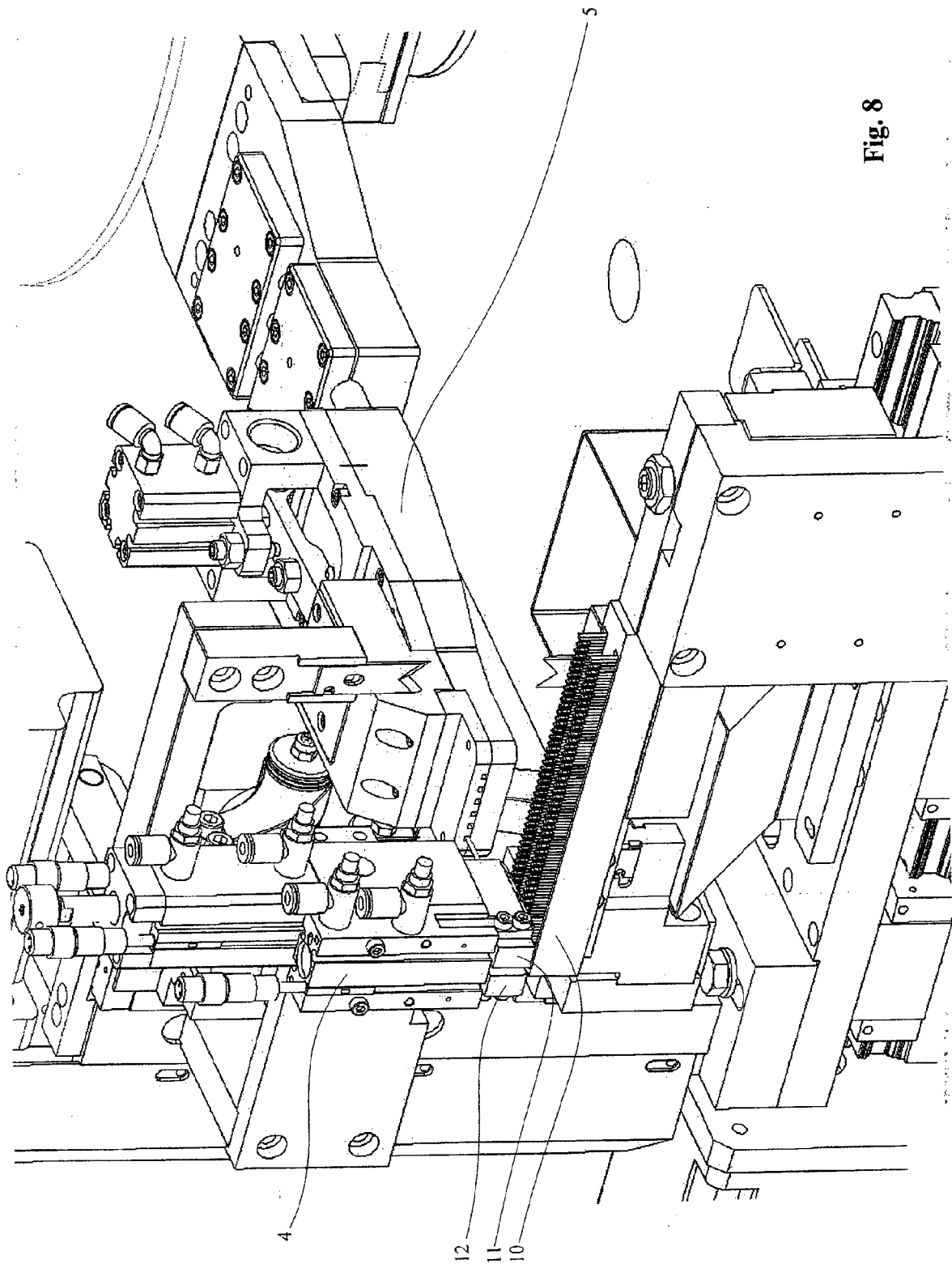
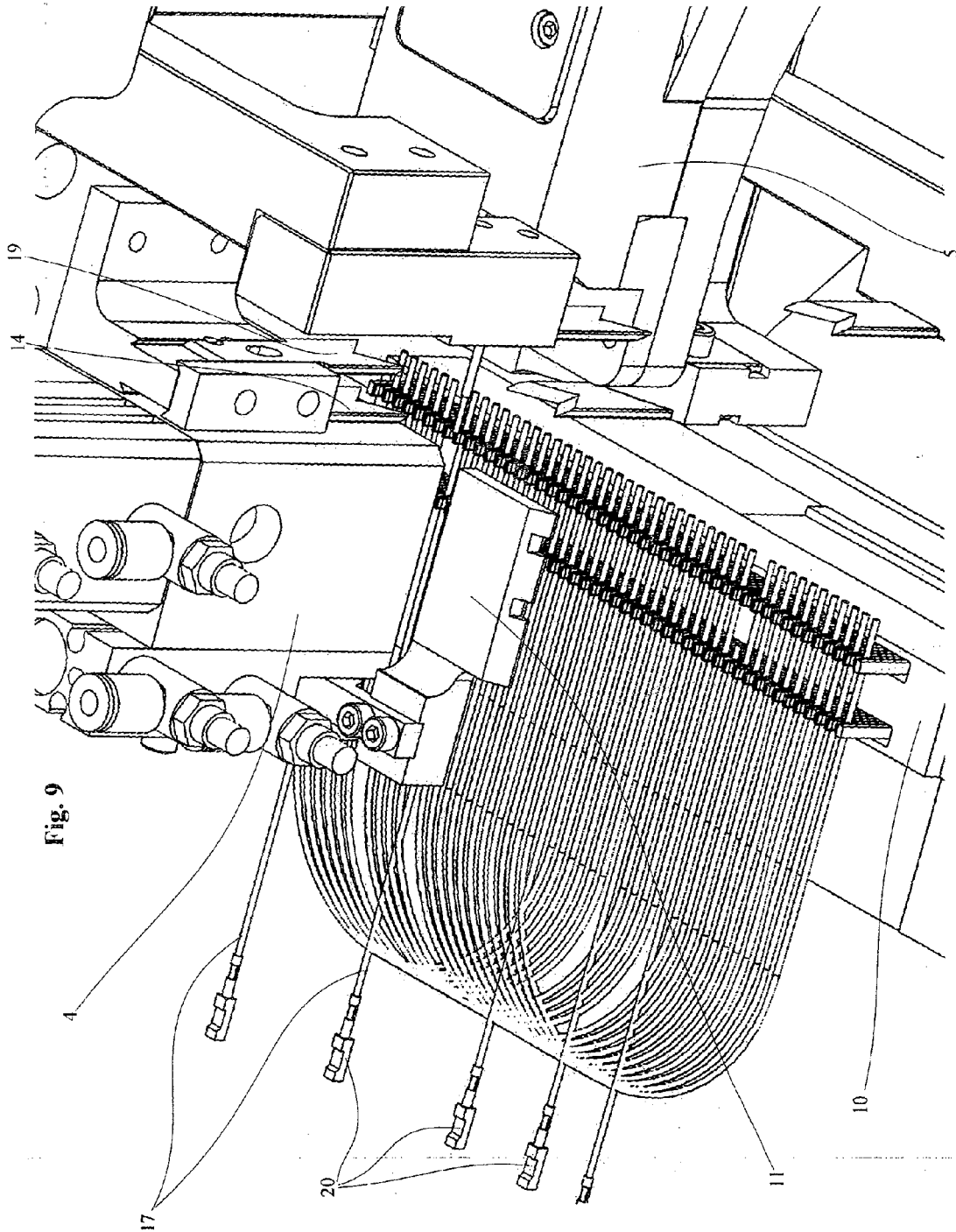


Fig. 7





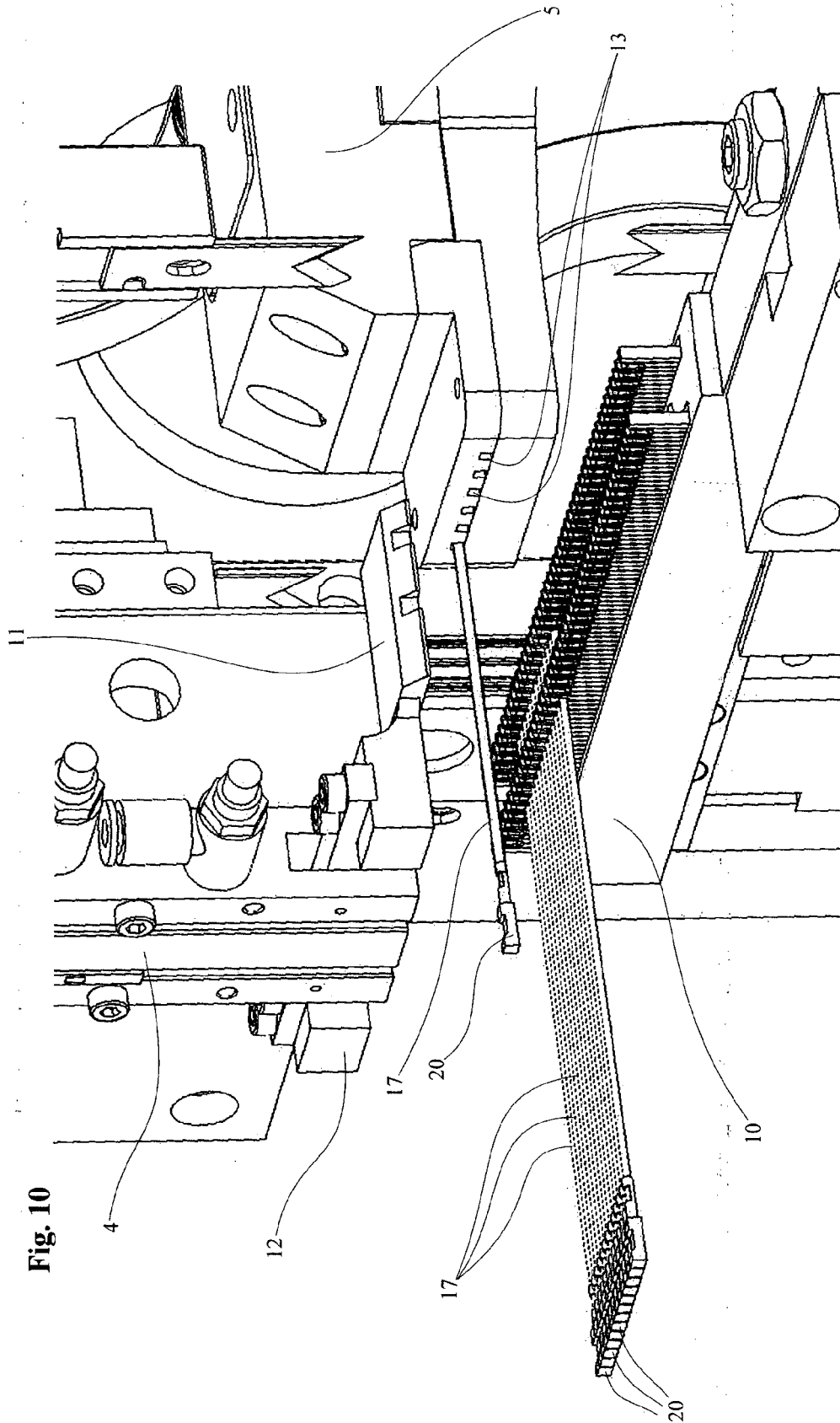
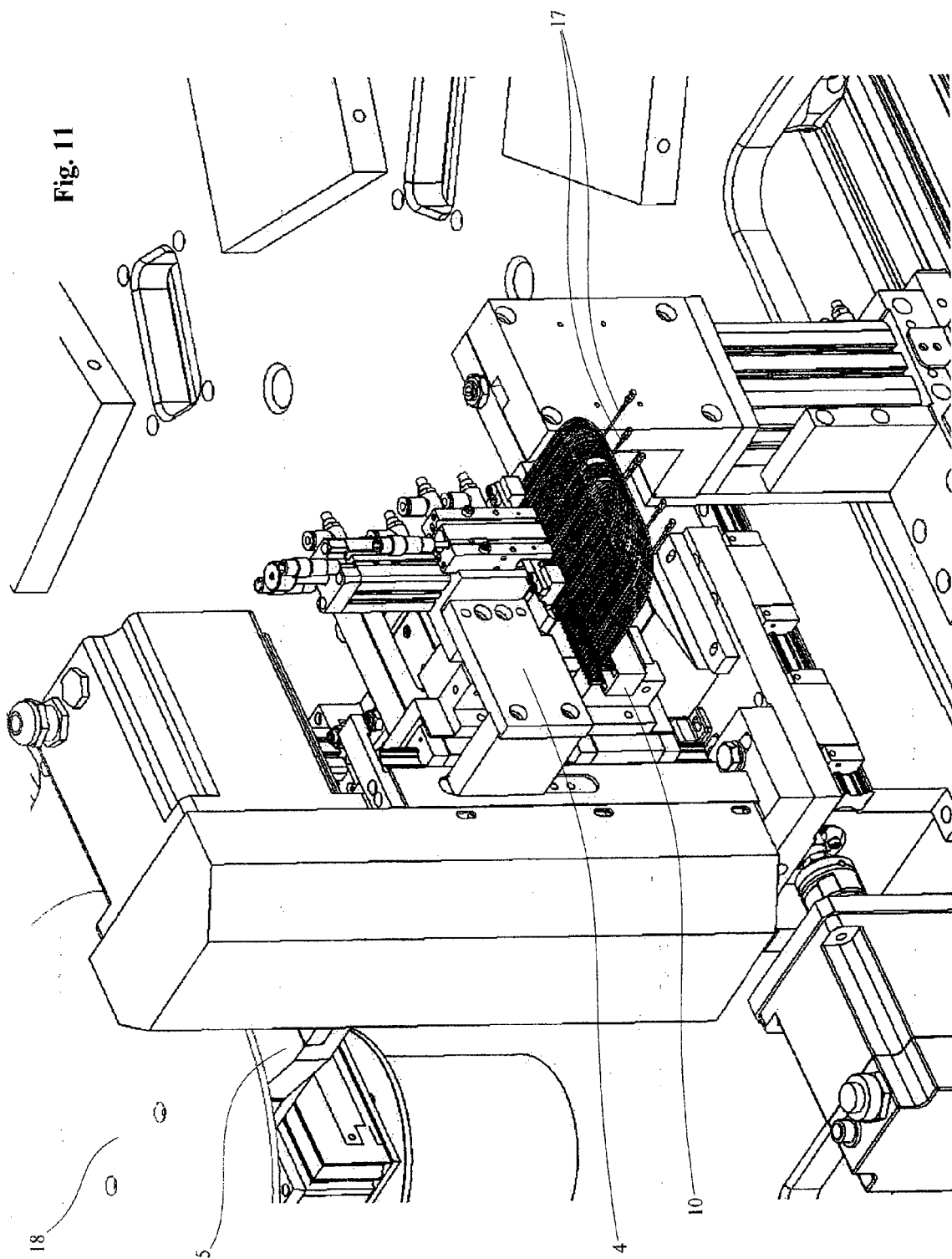


Fig. 10



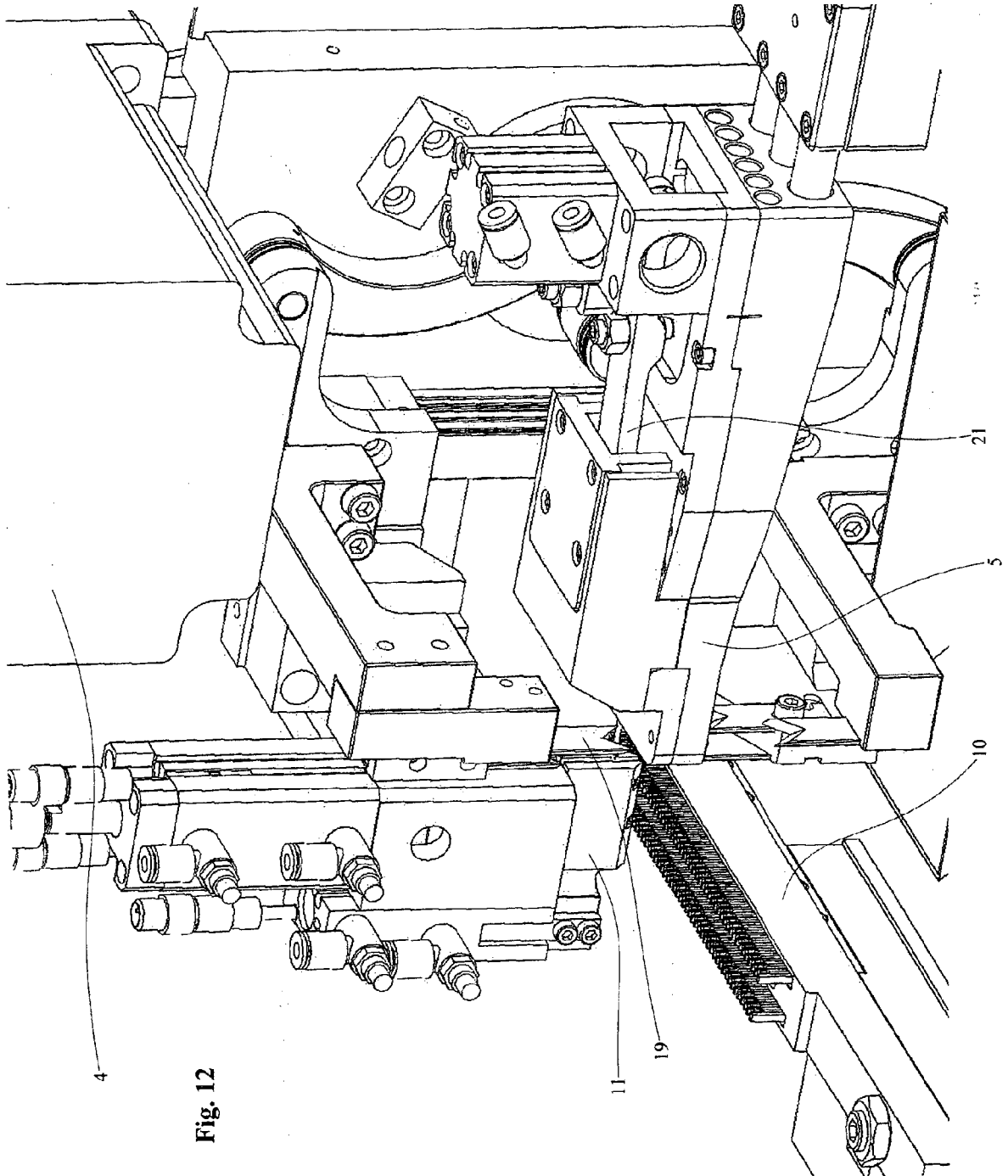


Fig. 12

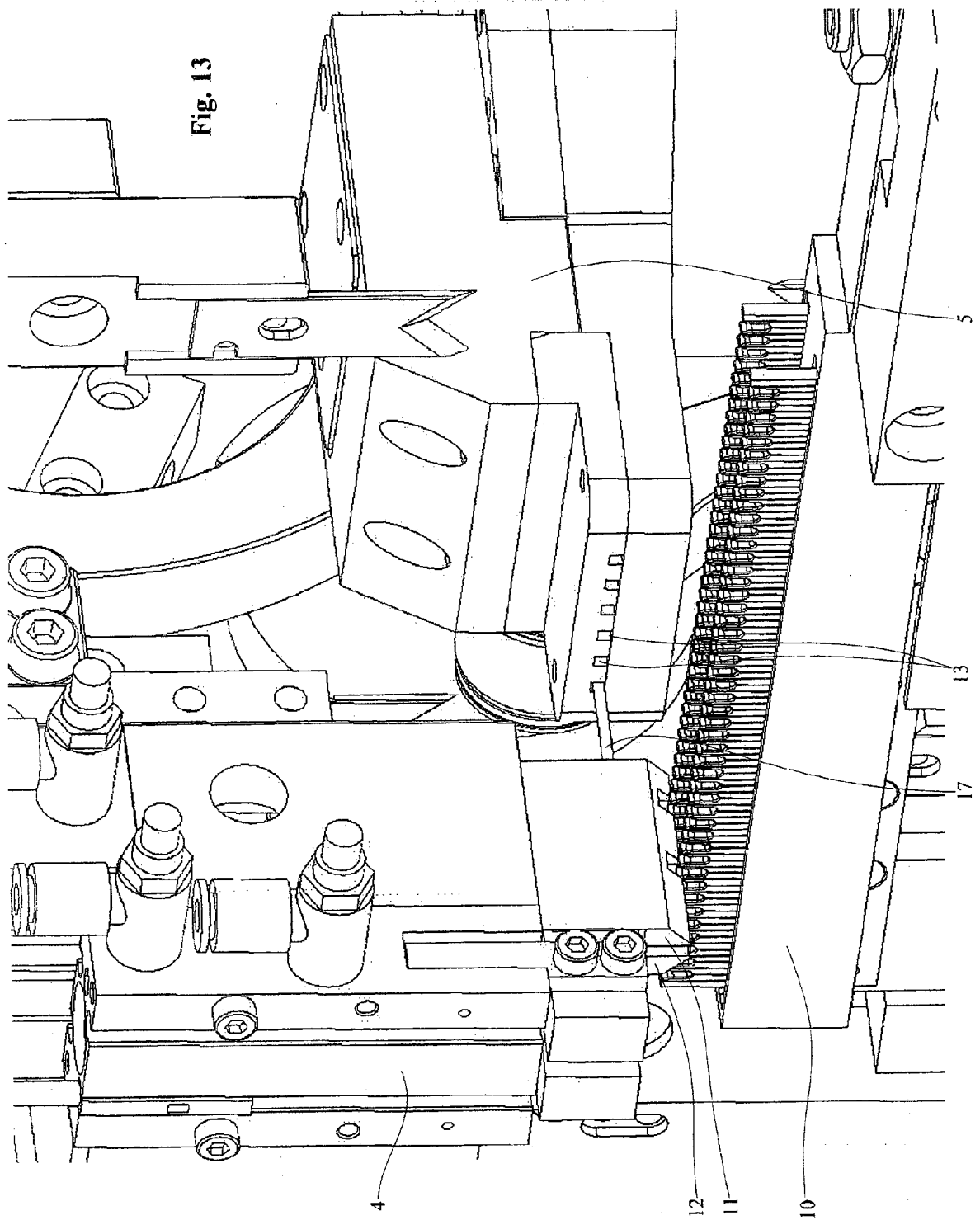
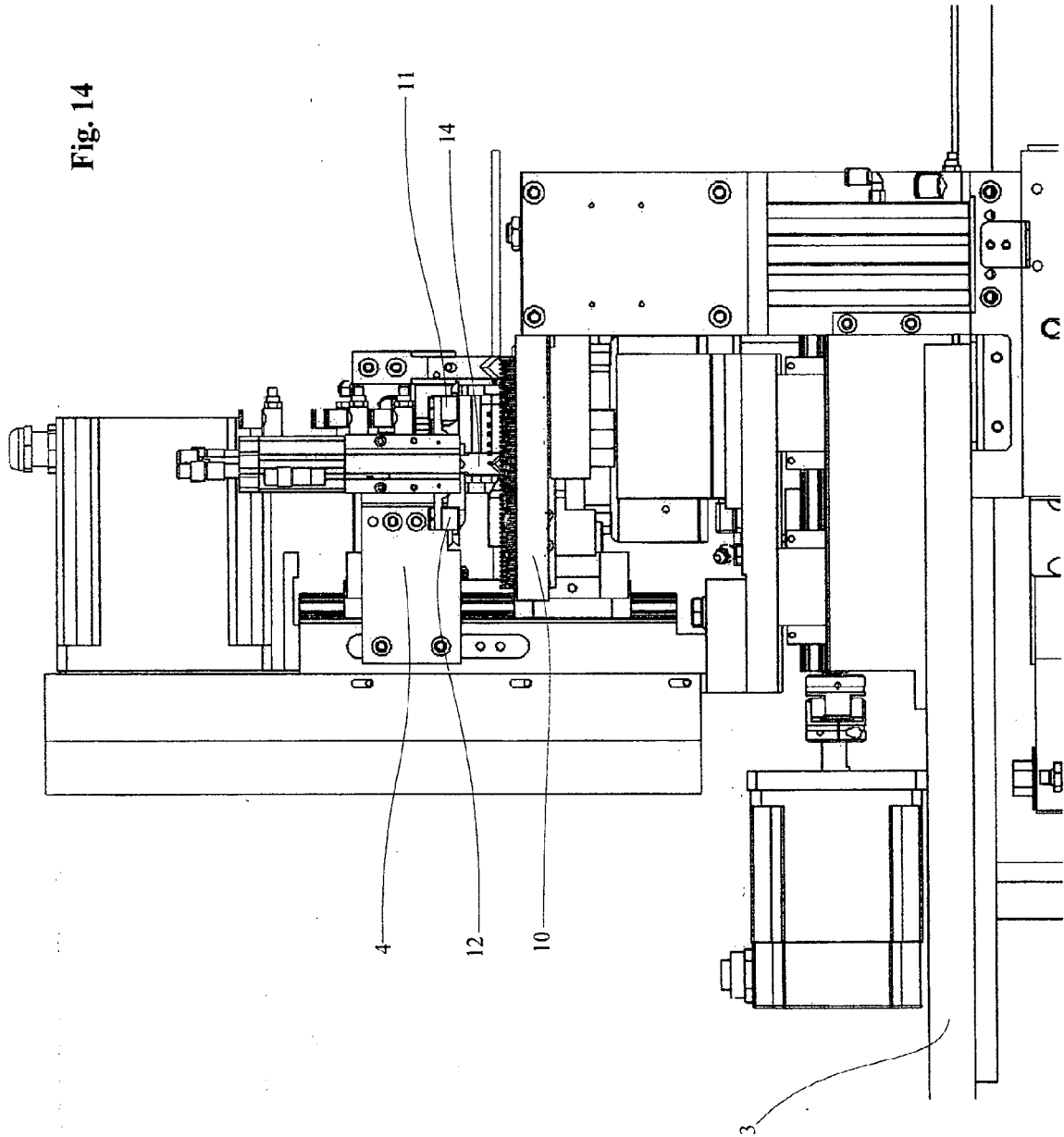
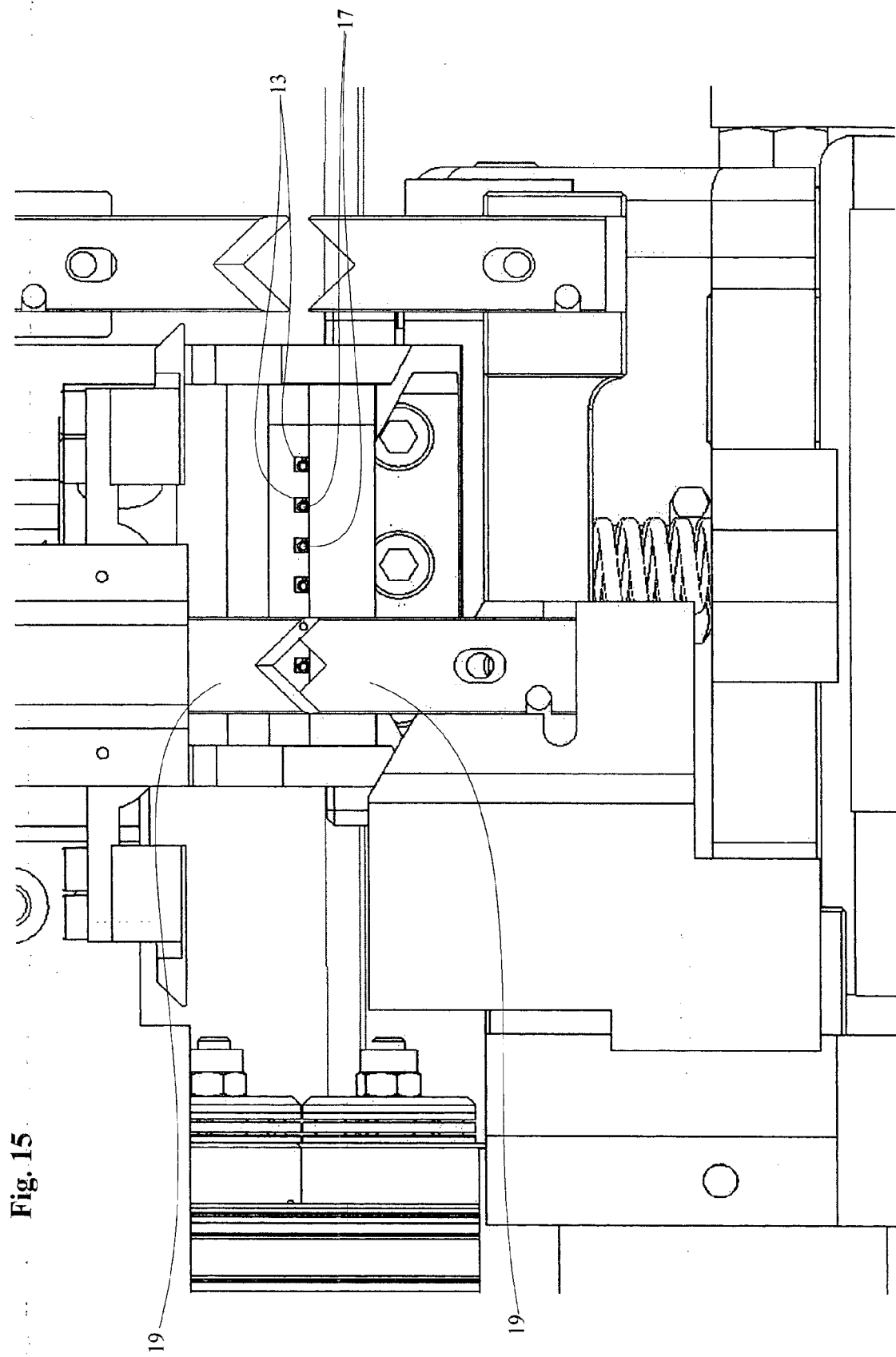


Fig. 14





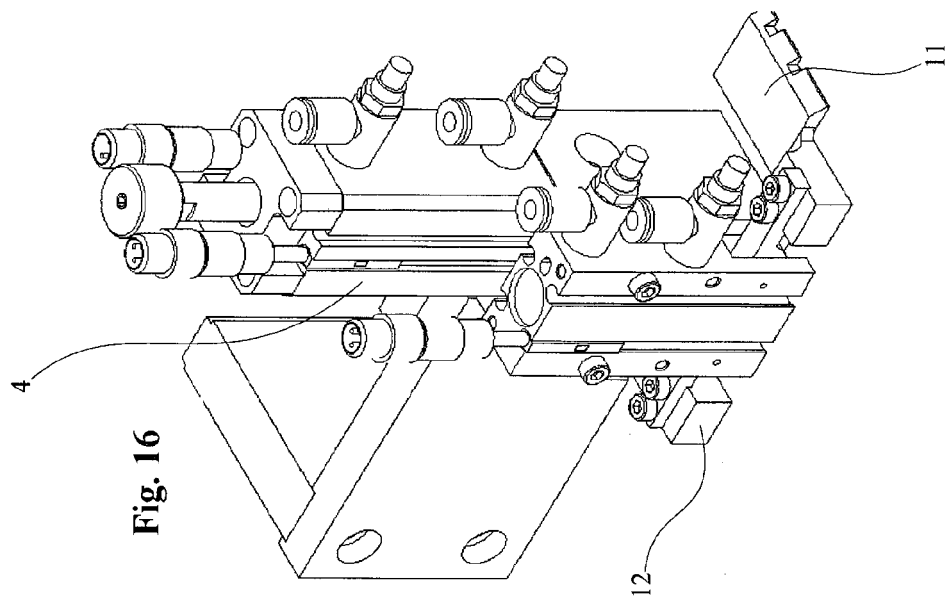
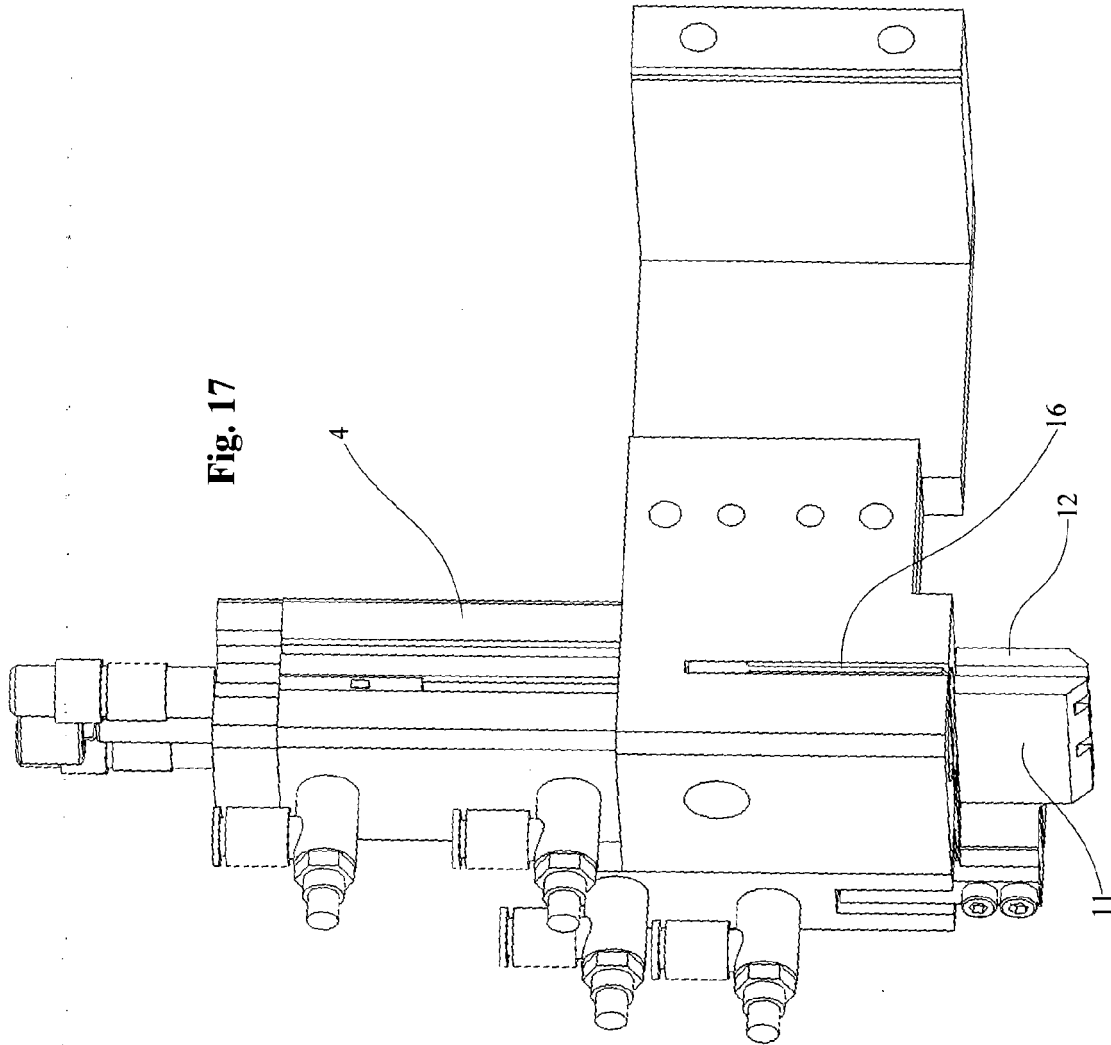


Fig. 19

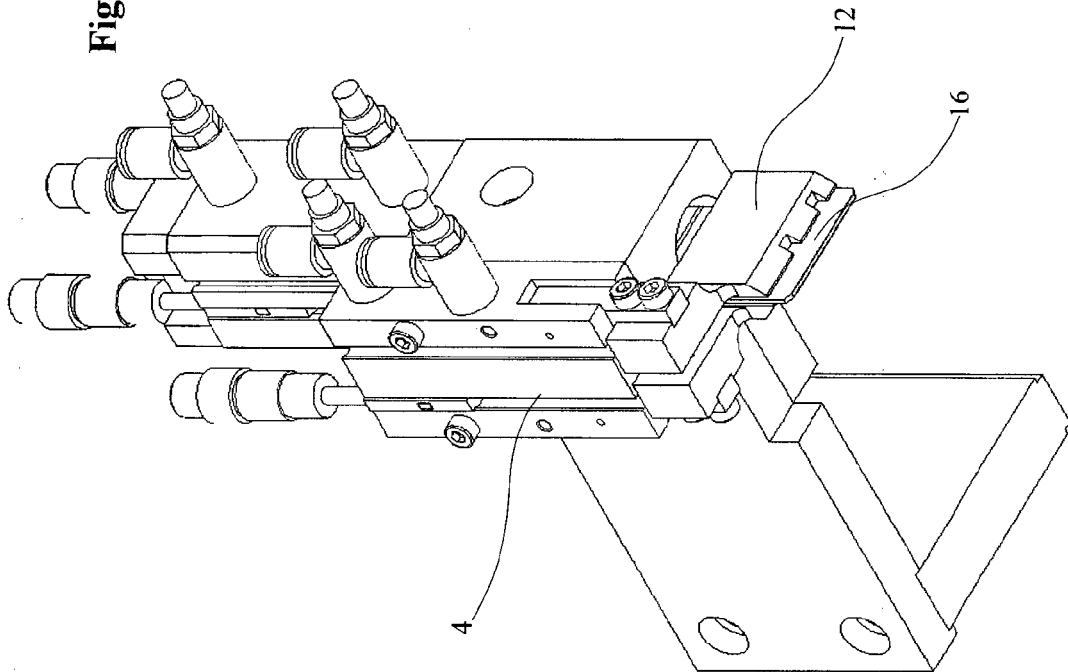
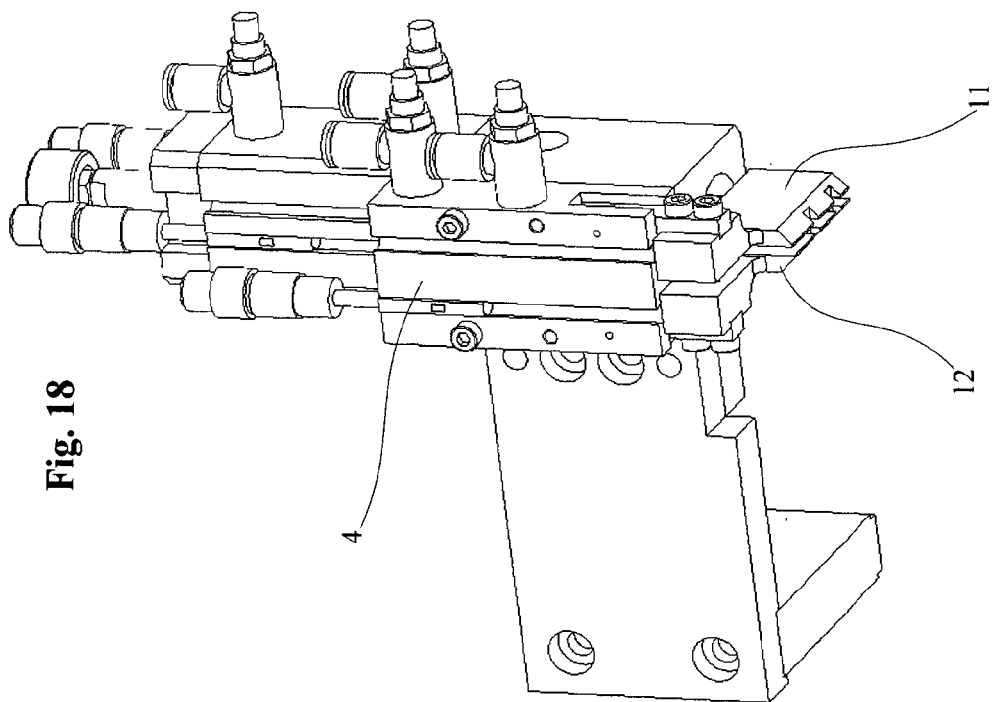
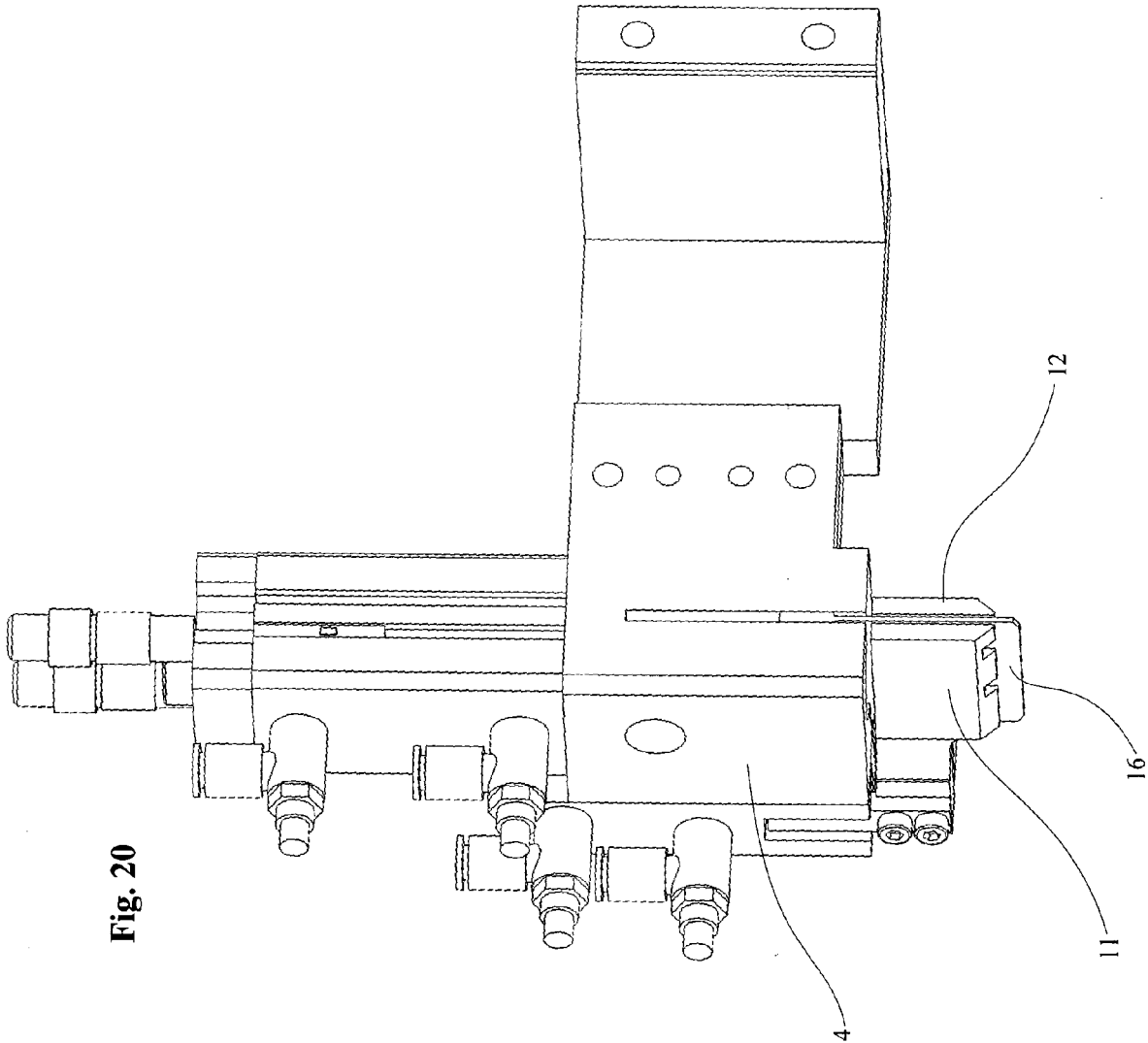
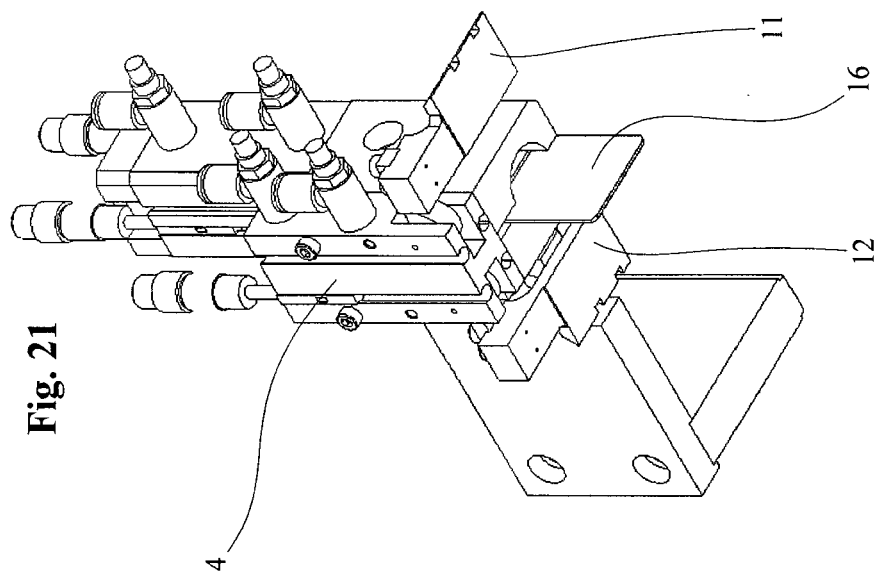
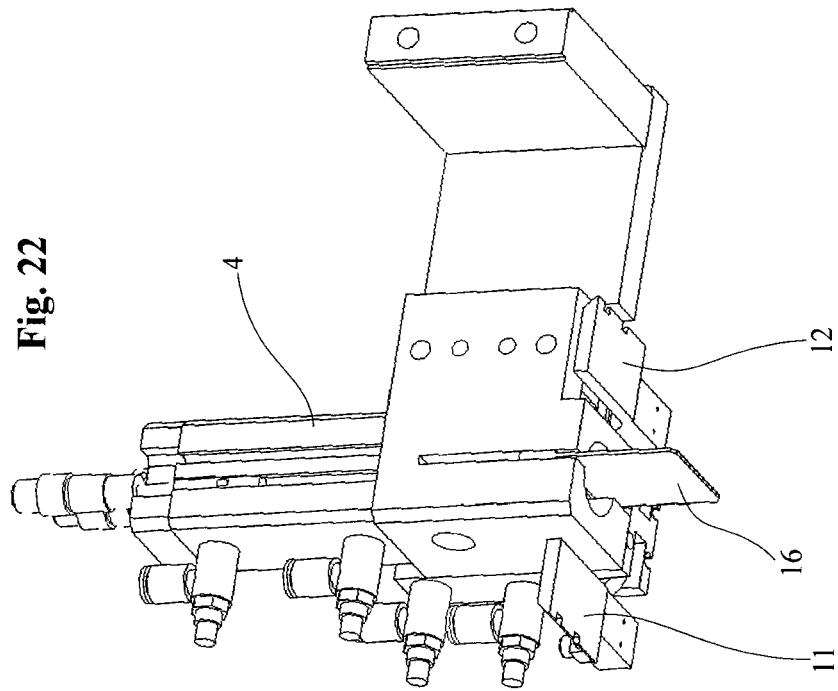


Fig. 18







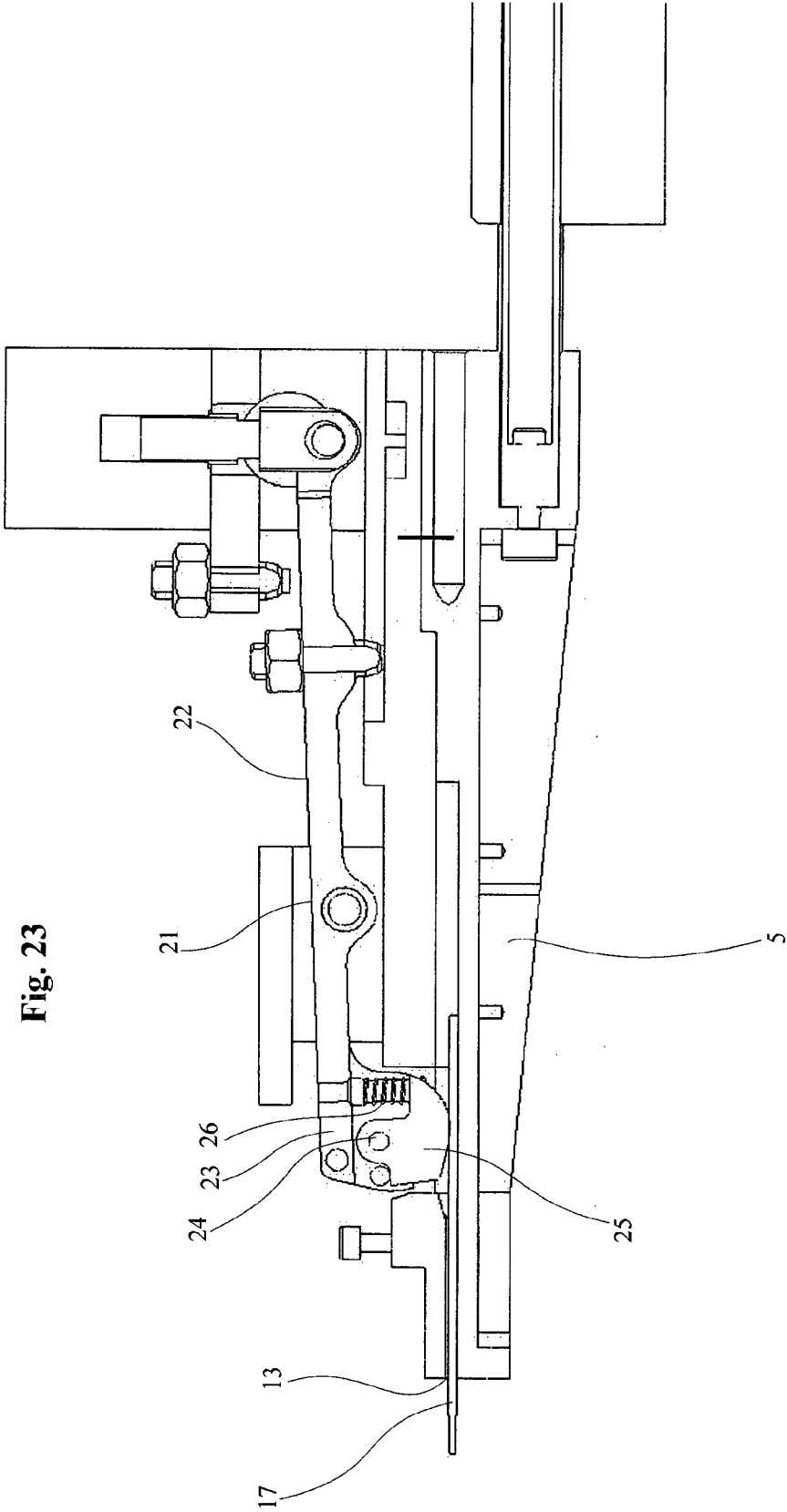


Fig. 23

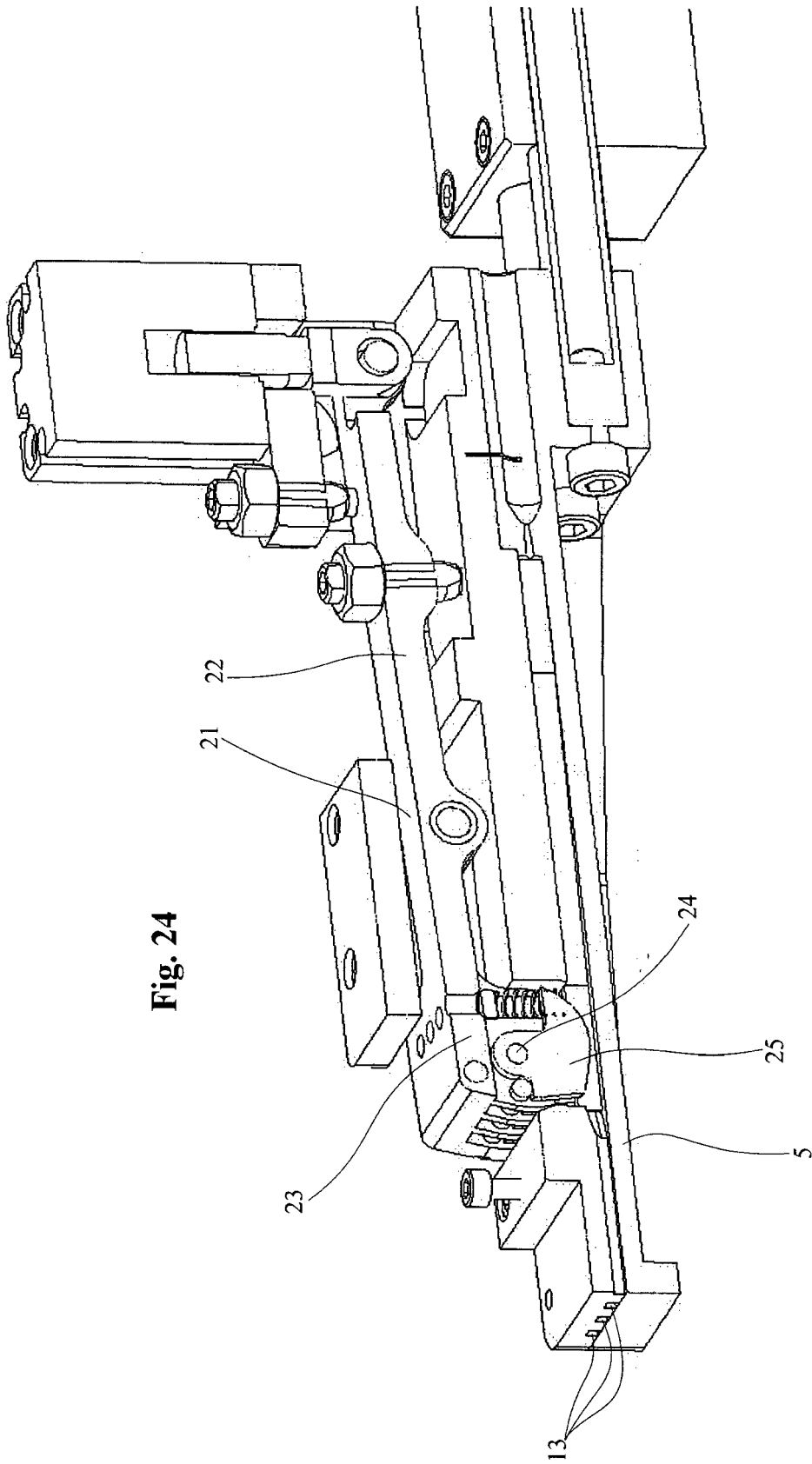
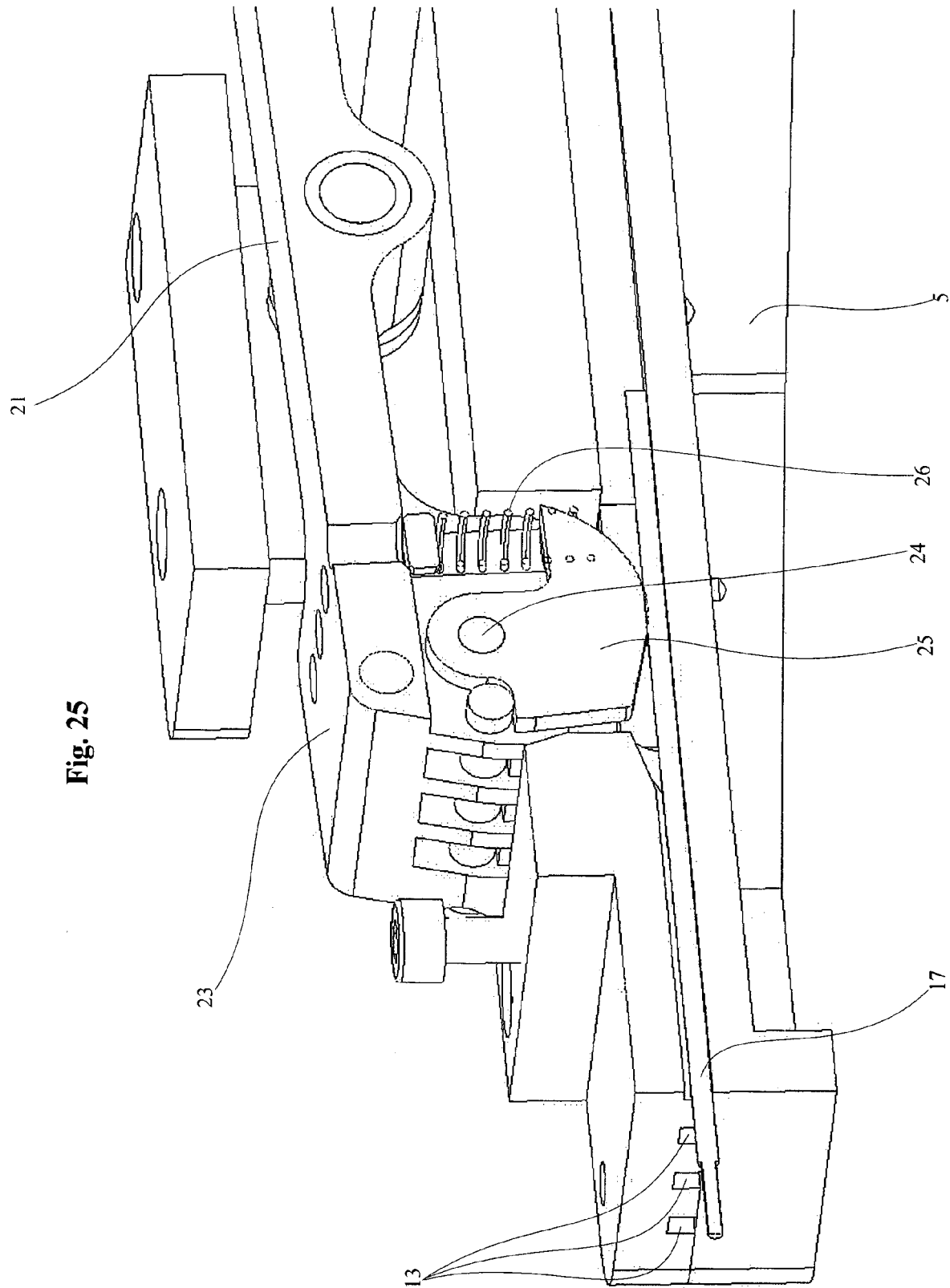


Fig. 24



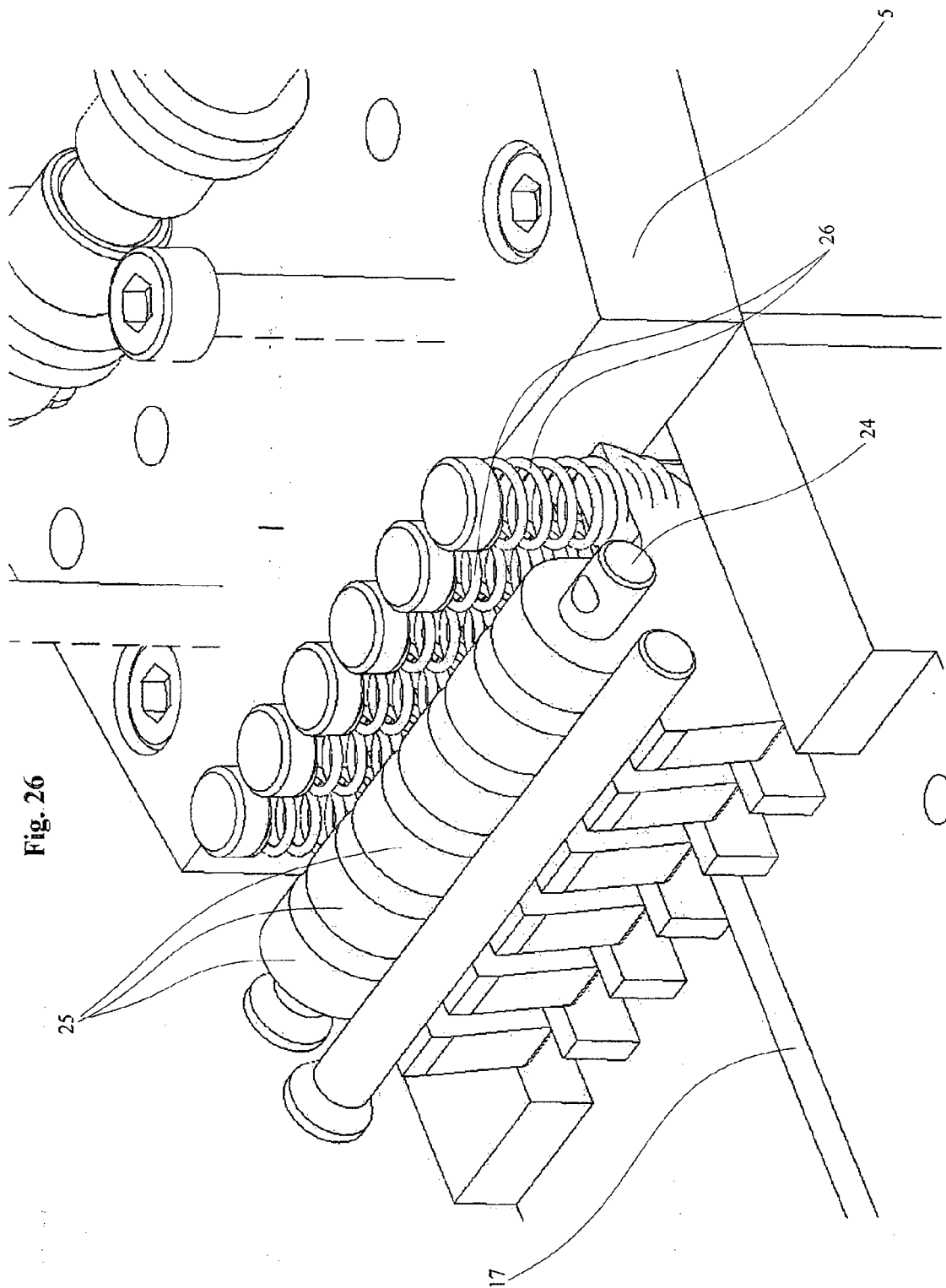


Fig. 26



EUROPEAN SEARCH REPORT

 Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2005/050722 A1 (VIVIROLI STEFAN [CH]) 10 March 2005 (2005-03-10) * the whole document *	1-10	INV. H01R43/28
X	US 2006/230597 A1 (RODRIGUEZ CESAR [US] ET AL) 19 October 2006 (2006-10-19) * abstract * * paragraph [0001] - paragraph [0031] * * figures 1-8 *	1-10	
X	EP 0 994 538 A2 (YAZAKI CORP [JP]) 19 April 2000 (2000-04-19) * abstract * * figures 4-11 *	1-10	
X	US 5 168 611 A (HORNUNG CRAIG W [US]) 8 December 1992 (1992-12-08) * the whole document *	1-10	
X	WO 2013/105262 A1 (JAPAN AUTOMATIC MACHINE CO LTD [JP]; KUNITA MASAKI [JP]; MAKITA KAZUNO) 18 July 2013 (2013-07-18) * abstract * * figures 1-14 *	1-10	TECHNICAL FIELDS SEARCHED (IPC) H01R
A	EP 1 775 804 A2 (K M I TRADE S R L [IT]) 18 April 2007 (2007-04-18) * the whole document *	1-10	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 December 2014	Examiner Pugliese, Sandro
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 00 3035

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-12-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005050722 A1	10-03-2005	EP 1515403 A2	16-03-2005
		US 2005050722 A1	10-03-2005
US 2006230597 A1	19-10-2006	NONE	
EP 0994538 A2	19-04-2000	EP 0994538 A2	19-04-2000
		JP 2000123950 A	28-04-2000
		US 6230386 B1	15-05-2001
US 5168611 A	08-12-1992	NONE	
WO 2013105262 A1	18-07-2013	JP 5079935 B1	21-11-2012
		WO 2013105262 A1	18-07-2013
EP 1775804 A2	18-04-2007	EP 1775804 A2	18-04-2007
		US 2007082558 A1	12-04-2007