

(2)

EUROPEAN PATENT APPLICATION

(21) Application number: **88202320.3**

(51) Int. Cl.⁴: **D03D 47/30**

(22) Date of filing: **18.10.88**

(30) Priority: **05.11.87 BE 8701254**

(43) Date of publication of application:
10.05.89 Bulletin 89/19

(34) Designated Contracting States:
CH DE FR IT LI

(71) Applicant: **Picanol N.V.**
Polenlaan 3-7
B-8900 Ieper(BE)

(72) Inventor: **Bouve, Albert**
Canadaweg, 2
B-8994 Proven(BE)
Inventor: **Nuytten, Patrick**
St. Omerlaan, 11
B-8900 Ieper(BE)

(74) Representative: **Donné, Eddy**
M.F.J.Bockstael Arenbergstraat 13
B-2000 Anvers(BE)

(54) Device for electrical connection of sley-mounted nozzle valves on weaving machines, and components used with it.

(57) Device for electrical connection of nozzle valves mounted on a sley on weaving machines, characterized in that it consists essentially of: a number of electrically conducting slides (14) mounted along the length of the sley (1); mounting devices (15) which enable the nozzle valves (9) to be mounted essentially at any desired point along the sley (1); and contact elements (16) to which the electrical circuit of a nozzle valve (9) is connected, where said contact elements (16) operate on the electrically conducting slides (14).

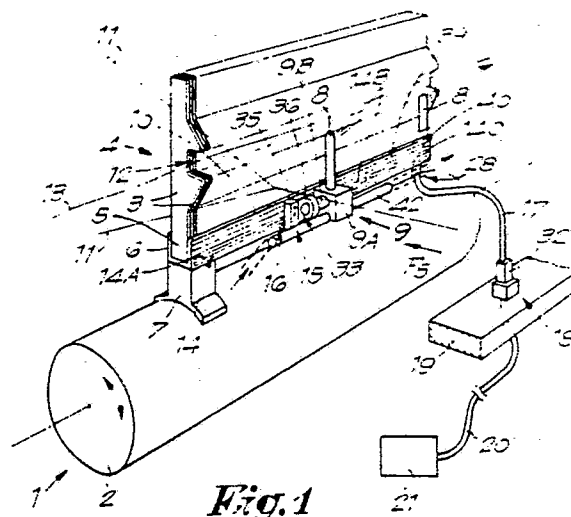


Fig. 1

EP 0 315 240 A1

Device for electrical connection of sley-mounted nozzle valves on weaving machines, and components used with it

This invention concerns a device for electrical connection of nozzle valves mounted on a sley on weaving machines, and also the separate components which can be used with this device and which can be constructed according to a modular system. The device according to the invention can be used for all nozzle valves which may be found on a sley, in other words it can be used both for the relay nozzle valves and for the valve of a tensioning nozzle, and possibly also for a main nozzle which moves with the sley.

It is known for electromagnetic nozzle valves mounted on a sley which moves to and fro to be connected by means of cables to a connector on a fixed part of the frame. Since a relatively large number of relay nozzles are used on weaving machines, it is clear that such a construction has a large number of relatively loose-hanging wires, so that at high weaving machine speeds these wires set up unwanted oscillation and vibrating motion.

In order to limit this disadvantage, it is also known for such cables to be led from each relay nozzle along the sley and connected to a single connector at one end. Since when weaving a new article the relay nozzles have to be repositioned, it is obvious that such cables must have sufficient length for the nozzle valves to be moved axially. It is therefore also clear that such constructions include a considerable bundle of cables, and that when the relay nozzle valves are repositioned, complete cabling or rewiring has to be carried out.

The aim of the present invention is to provide a device for the electrical connection of nozzle valves mounted on a sley, by means of which the disadvantages described above can be systematically avoided. In essence, this means that the device according to the invention makes possible very simple, vibration-free connection of the nozzle valves, as well as rapid mounting of the nozzle valves, and that the distance between successive nozzle valves is simple to adjust.

The present invention also concerns a device for electrical connection of nozzle valves mounted on a sley on weaving machines, with the characteristic that it consists essentially of: a number of electrically conducting slides mounted along the length of the sley; mounting devices which enable the nozzle valves to be mounted at any desired position along the sley; and contact elements to which the electrical circuit of the nozzle valves is connected, where said contact elements operate on the electrically conducting slides.

In order to explain the characteristics of the

invention, by way of example only and without being limitative in any way, the following preferred embodiments are described, with reference to the accompanying drawings, where:

- 5 - fig. 1 shows a device according to the invention;
- fig. 2 is a front view of a connecting strip fitted with the above-mentioned electrically conducting slides, and to which a cable with an electrical connector is attached;
- 10 - fig. 3 is a cross-section along line III-III in fig. 2, to a larger scale;
- fig. 4 is a rear view of said connecting strip;
- 15 - fig. 5 is a view in the direction of arrow F5 in fig. 1;
- figs. 6 to 8 are cross-sections to a greater scale, along lines VI-VI, VII-VII and VIII-VIII respectively in fig. 5;
- 20 - fig. 9 shows a variant of said connecting strip and of said conducting slides;
- fig. 10 is a cross-section along line X-X in fig. 9, showing in particular the location of the contact elements with respect to the connecting strip;
- 25 - fig. 11 shows a similar view to that of fig. 10, but for a different position;
- fig. 12 is a schematic diagram of how the modular connecting strips are used on the sley of a weaving machine;
- 30 - figs. 13 and 14 are schematic diagrams of another two variants of said electrically conducting slides.

35 Fig. 1 shows in perspective a sley 1 which as is known consists of e.g. a sley shaft 2 and a reed 4 consisting of reed dents 3, where the dents 3 are for example attached at one end 5 to the reed beam 6, which in turn is mounted by means of sley swords 7 on the sley 1.

40 Other components shown in figure are the relay nozzles 8, each of which is controlled by means of an electromagnetic relay nozzle valve 9 - for example consisting of a valve section 9A and an electromagnetic section 9B, the shed 10 formed by the top and bottom warp threads 11, and the thread insertion channel 12 in the reed dents 5 through which the weft thread 13 can be inserted.

45 According to the present invention, the electrical connection to the nozzle valves 9 mounted on the sley 1 is provided by means of a device consisting essentially of a combination of: a number of electrically conducting slides 14 mounted along the length of the sley 1; mounting devices 15

which enable the nozzle valves to be mounted at any desired position along the sley 1; and contact elements which can operate on the electrically conducting slides 14. Said contact elements are shown very schematically in fig. 1 by reference 16 but will be described in more detail with the help of subsequent figures. As shown also in fig. 1 the conducting slides 14 are preferably connected by means of a cable 17 and a connector 18 to a fixed part of the frame 19, from where the necessary electrical conductors 20 lead to a control unit 21.

As shown in figs. 2 to 4, the conducting slides 14 are made up of connecting strips which can be attached to the reed beam 6, for example by means of adhesive.

As shown in figs. 2 to 4, such connecting strips 22 consist respectively of: a base 23 of synthetic material; conducting slides 14 mounted along one side 24 of said base 23; electrical connections 26 mounted along the other side 25; and possibly electrical insulation 27 applied over the electrical connections 26. The conducting slides 14 consist for example of thin metal strips made of copper. In the preferred embodiment, the connecting strips 22 are made in standard lengths and have two conducting slides, as shown in fig. 2, where one conducting slide is formed by a continuous section 14A and the other of successive sections which are separated electrically from each other, respectively 14B, 14C, 14D and 14E. The electrical connections 26, located on side 25, are preferably in the form of a printed circuit, as shown in fig. 4, and make an electrical connection between said sections 14B to 14E and a number of electrical connection points 28. Naturally, the strip sections 14B to 14E must be connected electrically through to the electrical connections 26 in a suitable way, for example by means of drill holes 29 through which there are soldered connections 30 at suitable points, for example as in fig. 3.

In figs. 2 to 4 various drill holes 29 are shown, not all of which are soldered, but which as described below can also have a second function.

The electrical insulation 27 can consist of a layer of synthetic material glued onto the side 25, or a coating which is applied to it. This prevents the electrical connections 26 being short-circuited when the connecting strips 22 are fixed to the reed beam 6 or otherwise.

From the above-mentioned connection points 28 of the sections 14A to 14E, electrical conductors or wires 31, grouped together in the form of a cable 17, are led to a connector 32, such as a plug.

As shown in figs. 5 to 7, the above-mentioned mounting device 15 used to mount the nozzle valves 9 at any desired point along the sley 1 preferably consists of a mounting unit 33 in which a blower nozzle valve 9 with the nozzle 8 mounted

on it can be gripped, and attachments 34 by means of which the mounting unit 33 can be mounted on the sley 1, for example against the reed beam 6. The mounting unit 33 preferably consists of a base 35 and a holder 36, which for example may be ring-shaped, in which the nozzle valve 9 can be placed. The attachments 34 consist of bolts 37 and 38 and T-shaped slots 39 and 40 set into the reed beam 6 or any other continuous structure of the sley 1, such that the bolts 37 and 38 can fit into the respective T-shaped slots 39 and 40, where said bolts also extend through the base 35. Thus it is clear that the mounting unit 33 can be fitted at any desired point along the reed beam 6.

It should be noted that the base 35 can also have a collar 41 which fits in a slot 39 or 40, so that the mounting unit 33 is always correctly positioned while it is being fitted. Obviously, the above-mentioned holder 36 is made in such a way that allows free passage for the pneumatic series conduit 42, at least in the case where the nozzle valves 9 are of the series type.

The above-mentioned contact elements 16 are preferably mounted in a specially-designed contact unit 43 which is secured to the mounting unit 33 or makes up part of it. As shown in fig. 8, in its preferred embodiment said contact unit 43 consists essentially of a holder 44, the contact elements 16 in the form of contact pins which can slide freely in the holder 44, and elastic contact strips 45, one end 46 of which presses the free end 47 of the contact elements 16 out of the holder 44, and the other end of which forms the contact tags 48. It is clear that when everything is assembled together, as shown in fig. 6, the contact elements 16 are pressed against the conducting slides 14 and made an electrical connection.

As further shown in fig. 7 the above-mentioned mounting unit 33 preferably has a recess 49 or suchlike situated between the above-mentioned contact tags 48 and the seating of the valve 9, in which the conductors 50 which are attached to the contact tags 48 and which provide the electrical circuit of the valve 9 can be sunk and possibly embedded together with the contact tags 48 by means of a filling material 51.

In order to prevent the nozzle valves 9 and the nozzles 8 being positioned with their contact elements 16 right at the transitions 52 between the above-mentioned sections 14B to 14E, other small elements 53 consisting of insulating material, preferably synthetic material, can also be placed on the conducting slides 14, for example as shown in fig. 9, so making it impossible for a nozzle valve 9 to be mounted at this point in the way described above. These elements 53 consist of small strips or blocks placed across the conducting slides 14 at the transition points 52, and which for example are

anchored in the above-mentioned drill holes 29.

Figs. 10 and 11 show how by suitable shaping of the underneath of the mounting unit 33 and in particular of the contact unit 43, the possible positioning, i.e. the possible movement, of the nozzle valve 9 and the nozzle 8 is only restricted by the elements 53 over a number of small distances D.

The present invention also concerns the individual components as described above, and in particular the connecting strips 22 and the mounting unit 33 with its contact unit 43. The special feature of these components is that they make possible modular construction of a device for electrical connection of the nozzle valves, thus making said components especially suitable for mounting on weaving machines. Fig. 12 for instance shows how four connecting strips 22 with the necessary cables 17 and connectors 18 can be mounted in a modular way.

Fig. 13 is a schematic diagram of a variant in which use is made of three conducting slides 14, two of which, 14I and 14J, are continuous and one of which is divided into sections 14F, 14G etc. In this way, a supply voltage for electromagnetic energization of the valves can for example be provided on the continuous strips 14I and 14J, while the discontinuous conducting slide can be used to provide at intervals different control signals to the nozzle valves 9, where said supply voltage may or may not be passed to the electromagnetic section of the nozzle valves 9 by means of an electronic circuit 54 included in the nozzle valves 9. For example, by supplying a voltage to section 14F, a transistor in the nozzle valve 9 can be activated, which in turn can pass the voltage from the continuous strips 14I and 14J to the electromagnetic energization system of the valve. It is clear than in fig. 3 there must be three contacts per nozzle valve 9.

Fig. 14 shows yet another variant in which all conducting slides 14 are continuous, or at least are continuous per module, where for example the first nozzle valve 9 is controlled by the first and second conducting slides, the second nozzle valve 9 is controlled by the first and third conducting slides, the third nozzle valve 8 is controlled by the first and fourth conducting slides, etc.. Obviously other combinations are also possible. In this embodiment the electrical connection to the fixed part of the frame 19 can be limited to one cable 17.

It is also clear that on each separate section, 14B - 14H respectively, more than one nozzle valve 9 can be connected.

Finally it should be noted that the contact elements 16 do not necessarily have to be integrated in the mounting unit 33, but instead it is also possible for the contact elements 16 to be fitted at a different point than where the nozzle valve 9 is

attached.

All parts which make contact, in particular the conducting slide 14, the contacts 16 and the contact strips 45 should be covered with a thin anti-corrosion layer, for example gold.

The present invention is not limited to the embodiments described by way of example and shown in the figures; on the contrary, such a device for electrical connection of nozzle valves mounted on a sley, and also the components used therein, can be made in all forms and dimensions while still remaining within the scope of the invention.

Claims

1. Device for electrical connection of nozzle valves mounted on a sley on weaving machines, characterized in that it consists essentially of: a number of electrically conducting slides (14) mounted along the length of the sley (1); mounting devices (15) which enable the nozzle valves (9) to be mounted essentially at any desired point along the sley (1); and contact elements (16) to which the electrical circuit of a nozzle valve (9) is connected, where said contact elements (16) operate on the electrically conducting slides (14).

2. Device according to claim 1, characterized in that it has at least two electrically conducting slides, one of which consists of a section (14A) which is continuous over at least a certain length, while the other is divided into several sections (14B, 14C, 14D, 14E) over this same length.

3. Device according to claim 1, characterized in that it has three electrically conducting slides (14), two of which are continuous over at least a certain length, while the third is divided over this same length into a number of separate sections (14F, 14G, 14H) where on each nozzle valve (9) there are contact elements (16) which respectively can operate on the three conducting slides (14), and where the continuous conducting slides (14I, 14J) carry a supply voltage for energization of the solenoids of the nozzle valves, while the discontinuous conducting slides are used to provide at each section (14F, 14G, 14H) the different control signals.

4. Device according to claim 1, characterized in that it has several continuous conducting slides (14), while different nozzle valves (9) can be electrically energized by differently conducting slides (14) by means of differently-positioned contact elements (16).

5. Device according to any of the above claims, characterized in that the electrically conducting slides (14) are connected electrically to a

control unit (21) by means of a cable (17) and connectors (18) mounted on a fixed part of the frame (19).

6. Device according to any of the above claims, characterized in that the electrically conducting slides (14) make up part of at least one connecting strip (22), and for this purpose are mounted on one side (24) of said strip (22), while said connecting strip (22) is attached with its other side (25) against the sley (1).

7. Device according to claim 6, characterized in that the connecting strip consists of a base (23) on one side (25) of which, opposite the side (24) to which the electrically conducting slides (14) are fixed, are electrical connections (26) in the form of a printed circuit, which connect the different sections (14A-14H) electrically with connection points (28).

8. Device according to claim 7, characterized in that electrical insulation (27) is applied over the connections (26).

9. Device according to any of claims 6 to 8, characterized in that the connecting strips (22) are fitted with a cable (17) and a plug (32).

10. Device according to any of claims 6 to 9, characterized in that the connecting strip or strips (22) are attached to the reed beam (6).

11. Device according to claim 2 or 3, characterized in that small elements (53) consisting of insulating material are placed on the transitions (52) between the different sections (14A-14H) of the discontinuous conducting slides.

12. Device according to any of the above claims, characterized in that the mounting device (15) which enables the nozzle valves (9) to be mounted along the sley (1) essentially consist of a mounting unit (33) in which a nozzle valve (9) can be mounted, and attachments (34) by means of which said mounting unit (33) can be mounted on the sley (1).

13. Device according to claim 12, characterized in that the attachments (34) are formed by at least one T-shaped longitudinal slot (39, 40) set into the sley (1), and at least one bolt or bolts (37, 38) which can operate with said slots (39, 40) and the mounting unit (33).

14. Device according to claim 13, characterized in that the slots (39, 40) are set into the reed beam (6).

15. Device according to any of claims 12 to 14, characterized in that the mounting unit (33) consists of a base (35) and a ring-shaped holder (36) in which a nozzle valve (9) with a nozzle (8) can be mounted.

16. Device according to any of claims 12 to 15, characterized in that the mounting unit (33) has a collar (41) which enables it to be positioned along the reed beam (6).

17. Device according to any of the above claims, characterized in that the contact elements consist of pins which can be pressed elastically in contact with the electrically conducting slides (14).

18. Device according to claim 17, characterized in that the contact elements (16) are integrated in a contact unit (43) consisting essentially of a holder (44) in which are fixed contact strips (45) one end (46) of which operates elastically on the sliding contact elements (16).

19. Device according to claim 18, characterized in that the end (48) of the contact strips (45) opposite the end (46) which operates on the contact elements (16) forms connecting tags (48) to which the electrical circuit of the nozzle valve (9) is connected.

20. Device according to claim 18 or 19, characterized in that the contact unit (43) is mounted in the mounting unit (33) for the nozzle valves (9) and/or is a fixed part of it.

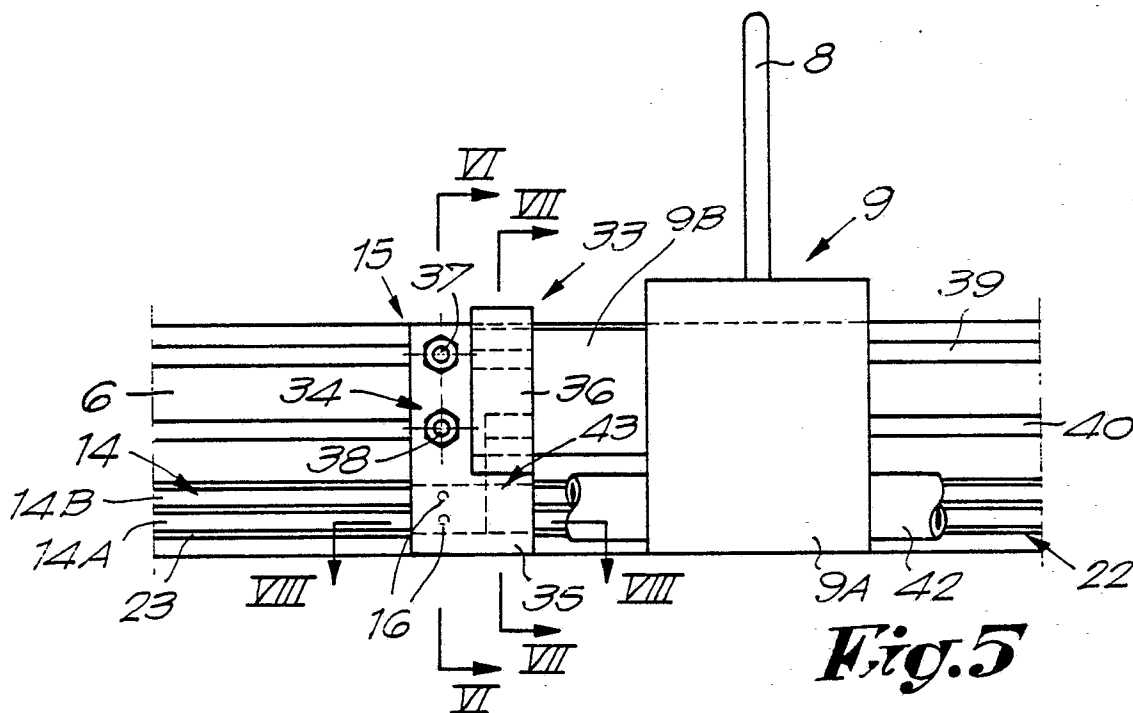
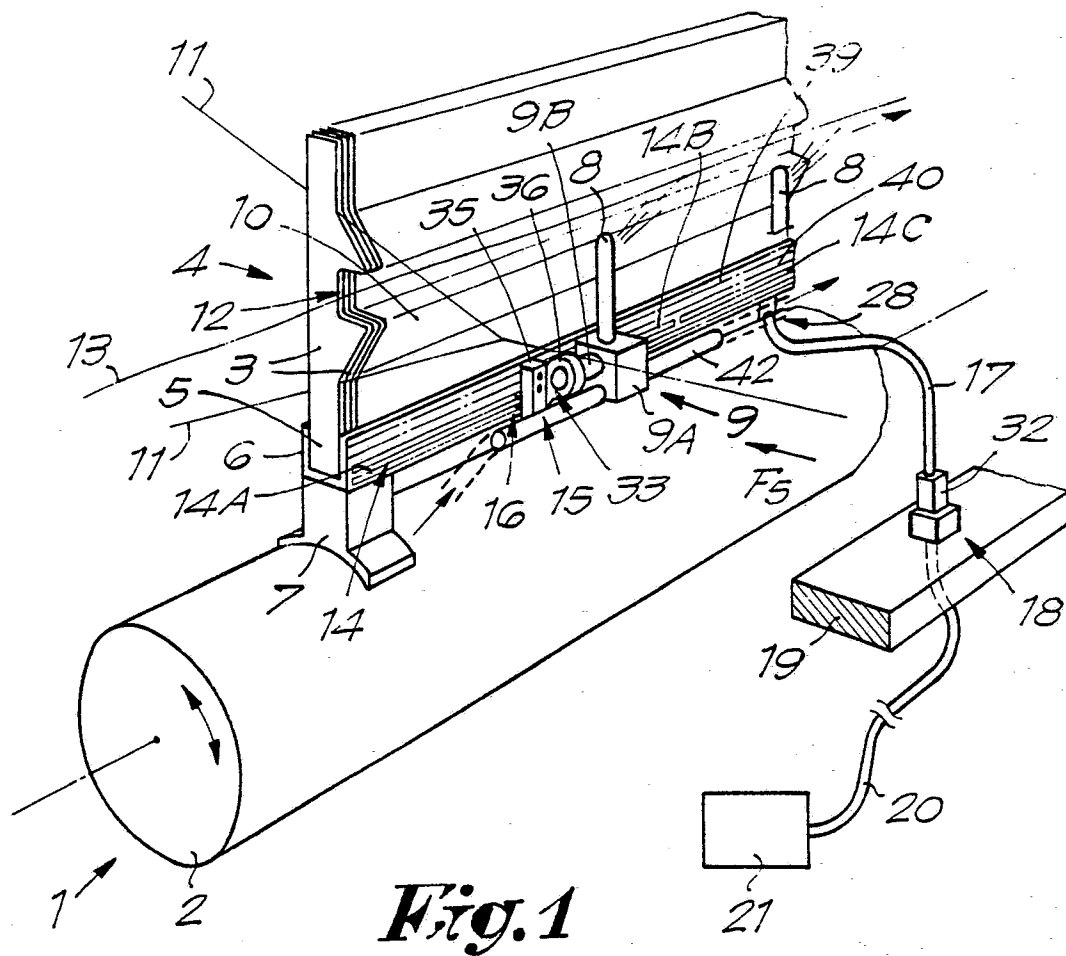
21. Device according to claim 20, characterized in that the mounting unit (33) has a recess (39) in which the conductors (50) which connect the contact elements (16) to the nozzle valve (9) are sunk, where said conductors (50) are embedded in a filler material (51).

22. Device according to any of the above claims, characterized in that the electrically conducting slides (14) are constructed in a modular fashion by means of connecting strips (22) of a particular length.

23. Connecting strip, which forms the conducting slides of the device according to claim 1, characterized in that it essentially consists of: a base (23) made of electrically insulating material; conducting slides (14) fitted on one side (24) of the base (23); and electrical connections (26) in the form of a printed circuit fitted on the opposite side (25) of the base (23), where said electrical connections (26) connect the different strip sections (14A-14H) to a number of connection points (28).

24. Mounting unit for a nozzle valve, as used in the device according to claim 1, characterized in that said mounting unit essentially consists of a base (35) which can fit on a sley (1), more particularly the reed beam (6) of the sley, and a ring-shaped holder (36) in which a nozzle valve (9) may be fitted.

25. Mounting unit according to claim 24, characterized in that said mounting unit (34) is fitted with a contact unit (43) consisting of: a holder (44); sliding contact elements (16) mounted in said holder (44); and contact strip elements (45) which can force the contact elements (16) elastically into a particular position.



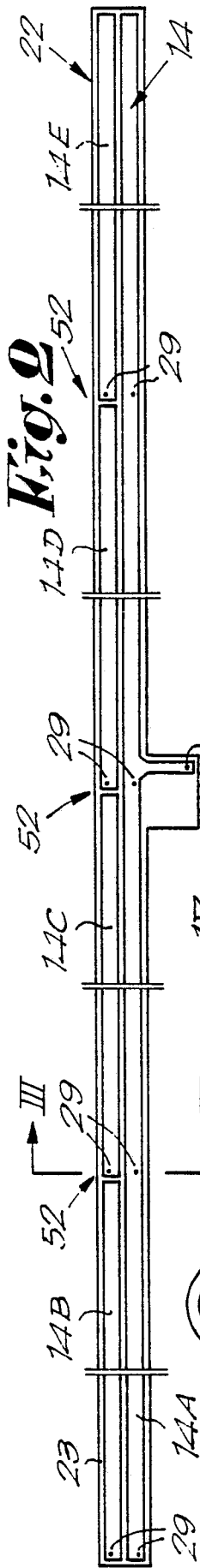


Fig. 2

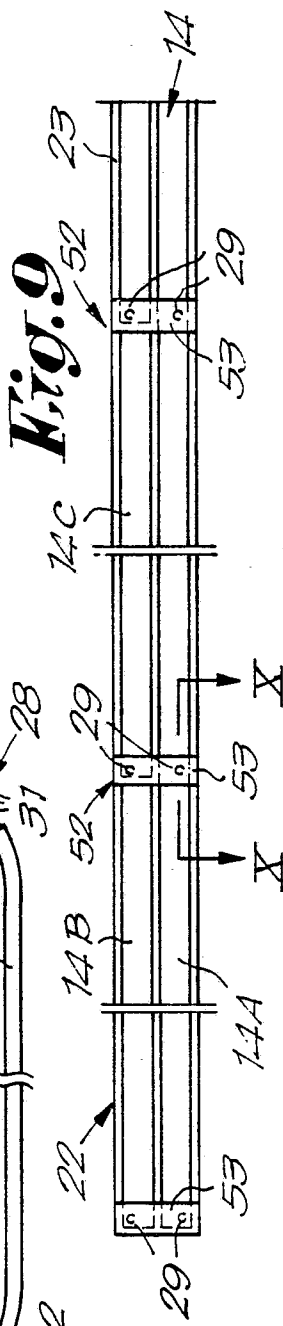


Fig. 9

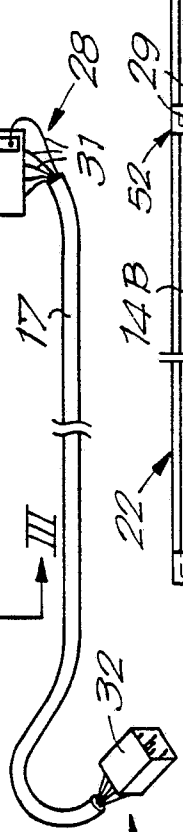


Fig. 3

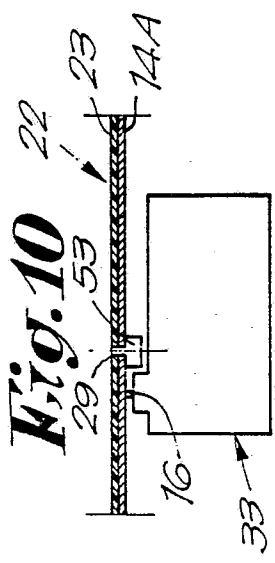


Fig. 10

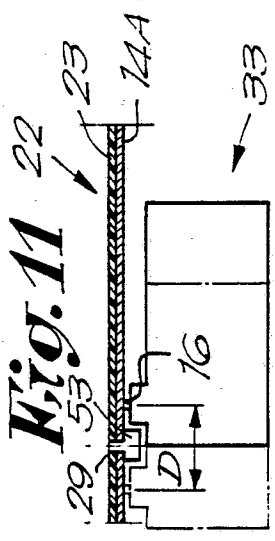


Fig. 11

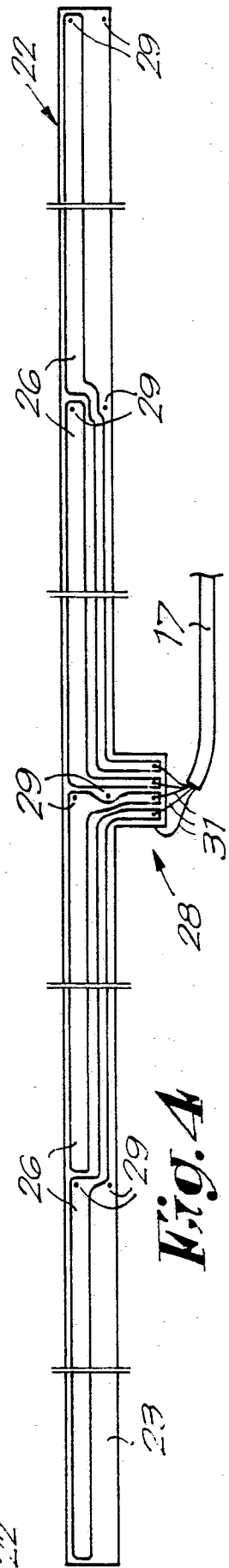
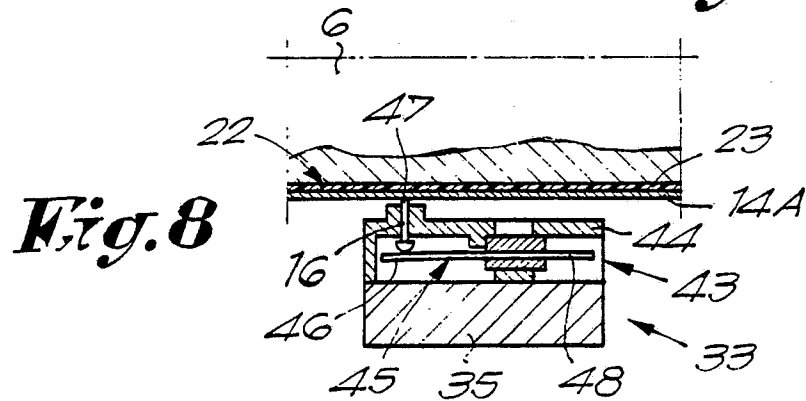
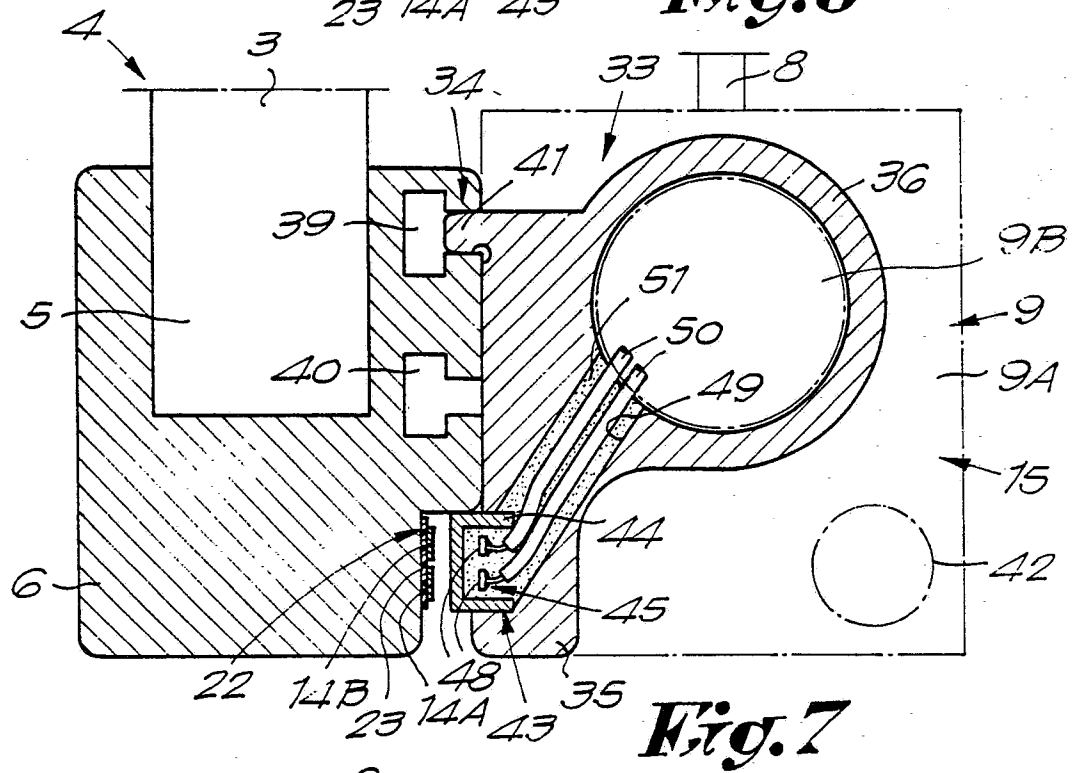
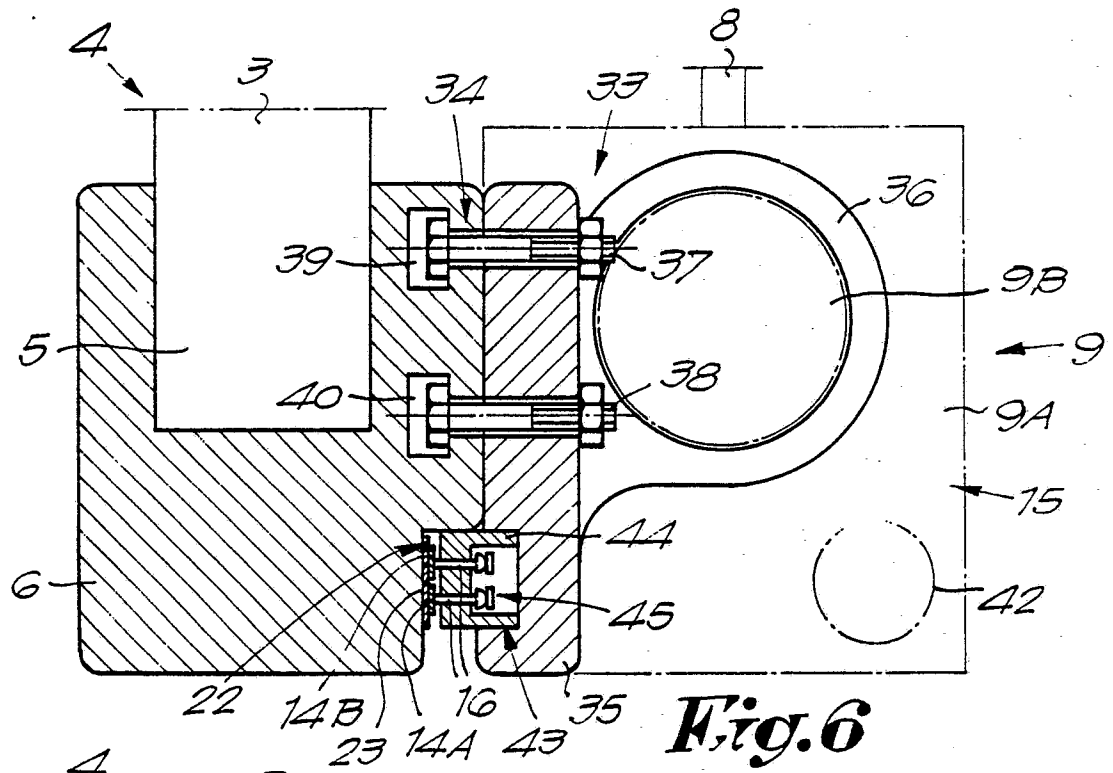
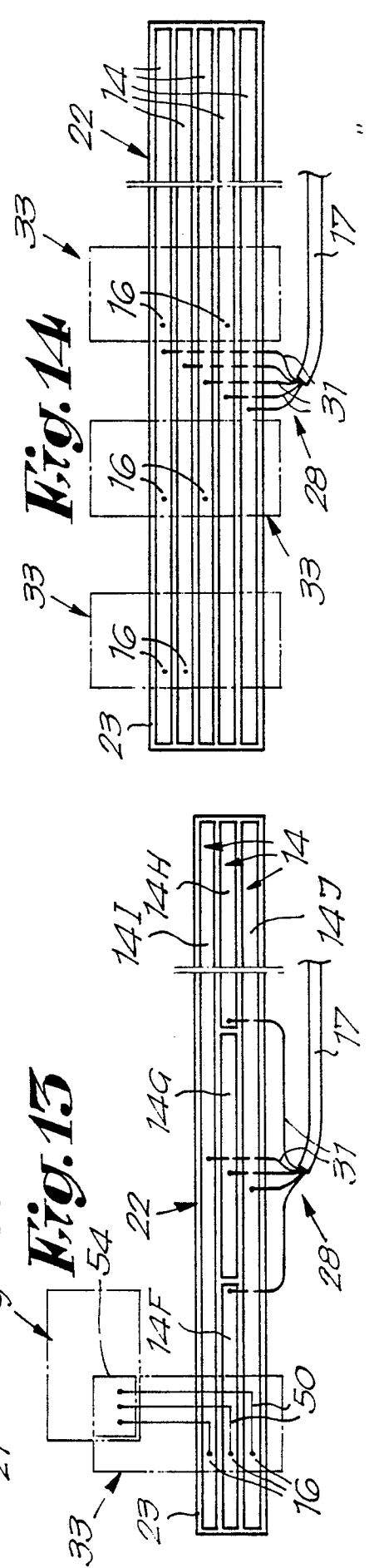
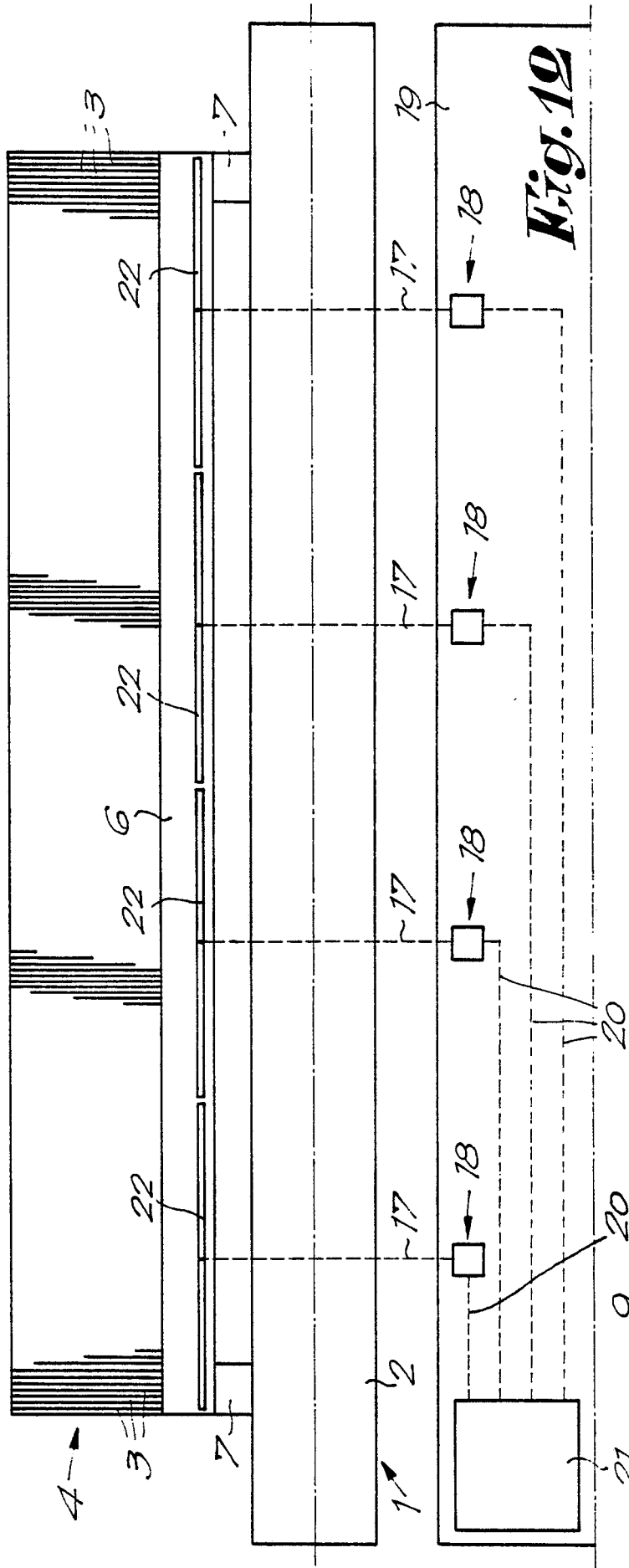


Fig. 4







European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 88 20 2320

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	EP-A-34576 (TSUDAKOMA) * claims 1, 12-14; figure 4 *	1,24	D03D47/30

A	FR-A-2149286 (LE HIR) * page 3, line 13 - page 4, line 27; claims 1-3 *	1-4,17, 19	

			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			D03D H05K H01R
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 2 FEBRUARY 1989	Examiner MEINDERS H.
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 I : document cited for other reasons & : member of the same patent family, corresponding document	