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(54) Device for the sequential winding of at least two windings on a same coil body, particularly for coils of electric components and the like.

(57) The device for the sequential winding of at least two windings on a same coil body, particularly for coils of electric components and the like, with at least two different wire diameters. It is composed of a movable head (1) in which tubes (2a,2b) for the sliding of enamelled wires (3a,3b) for windings are inserted; the head (1) has, at each tube (2a,2b) and opposite to the side on which a coil (4) being processed is located, braking means (5a,5b) for the removable retention of the wires (3a,3b) upstream of the respective tube (2a,2b).

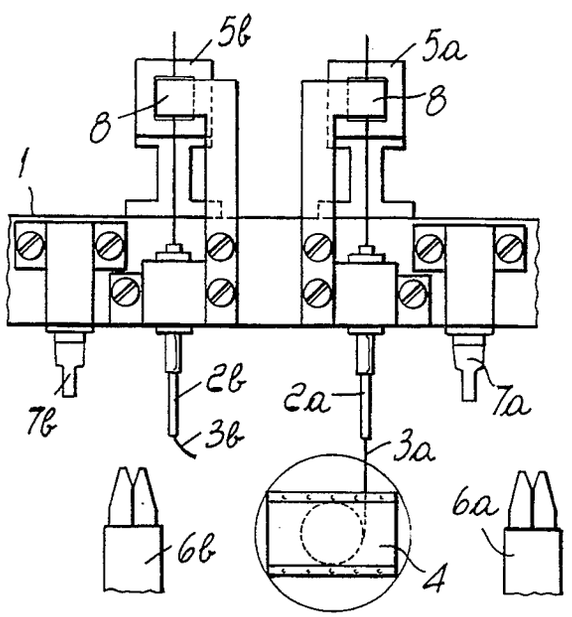

Fig. 1

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DEVICE FOR THE SEQUENTIAL WINDING OF AT LEAST TWO WINDINGS ON A SAME COIL BODY, PARTICULARLY FOR COILS OF ELECTRIC COMPONENTS AND THE LIKE

The present invention relates to a device for the sequential winding of at least two windings on a same coil body, particularly for coils of electric components and the like.

As known, multiple sequential windings with wires of different diameters on a same coil are currently performed by means of multi-spindle machines which usually have different constructive solutions but can be summarized in two groups.

A first group has a movable head on which tubes are fixed; an enamelled wire for windings slides and is guided in each of said tubes. The wire being wound is fixed to the rotating coil, whereas the idle wires are fixed on appropriate pins arranged adjacent to the coil, since wire tensioners, arranged upstream of said tubes, keep their tension constant.

The other group has a plurality of mutually independent blocks and a wire slides in each of said blocks. While one wire is being wound, the blocks which bear the other wires are waiting to operate and are not accommodated on the support of the block being processed.

One of the greatest problems encountered by the first group relates to the friction between the end of the tube and the respective wire. The movements of the head in fact cause rubbing between the wire and the tube which can cause wear and damage to the insulating enamel applied to the wire or the removal thereof and, in the worst cases, the breakage of the wire itself.

The second group instead entails a complicated and expensive construction on one hand and lengthening of the working cycles on the other, since it is more complicated in changing from one wire to the other, or in the relative movements among the different heads.

The aim of the present invention is to obviate the disadvantages described above in known types of multiple sequential winding devices by providing a device for the sequential winding of at least two windings on a same coil body, particularly for coils of electric components and the like, which eliminates the unwanted friction and/or rubbing between the wire and the tube during the steps of the winding of the other wire.

Within the scope of the above described aim, a particular object of the present invention is to provide a sequential winding device which has a relatively simple mechanical constructive structure.

A further object of the present invention is to provide a sequential winding device which reduces or keeps substantially unchanged the times of the operating cycles of the machines currently in use.

Not least object of the present invention is to provide a sequential winding device which has a modest cost.

This aim, the objects mentioned and others which will become apparent hereinafter are achieved by a device for the sequential winding of at least two windings on a same coil body, particularly for coils of electric components and the like, according to the invention, composed of a movable head in which tubes for the sliding of enamelled wires for windings are inserted, characterized in that it comprises, at each of said tubes and opposite to the side on which a coil being processed is located, braking means for the removable retention of said wires upstream of the respective tube, clamps for gripping and cutting the wire being advantageously located to the sides of said coil and in front of the ends of said tubes from which free ends of said wires protrude.

Further characteristics and advantages of the invention will become apparent from the description of a preferred but not exclusive embodiment of a sequential winding device according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a front elevation view of a sequential winding device according to the invention in a first step of the working cycle;

figure 2 is a lateral elevation view of a sequential winding device according to the invention;

figure 3 is a front elevation view of a sequential winding device according to the invention in a second step of the working cycle;

figure 4 is a front elevation view of a sequential winding device according to the invention in a third step of the working cycle;

figure 5 is a front elevation view of a sequential winding device according to the invention in a fourth step of the working cycle;

figure 6 is a front elevation view of a sequential winding device according to the invention in a fifth step of the working cycle; and

figure 7 is a front elevation view of a sequential winding device according to the invention in a sixth step of the working cycle.

With reference to figures 1 and 2, a device for the sequential winding of a plurality of windings is composed of a movable head 1 in which, for example, two tubes 2a and 2b for the sliding of enamelled wires 3a and 3b for windings are inserted. Braking means 5a and 5b are provided at each tube 2a and 2b, opposite to the side on which a coil 4 being processed is located, to removably retain the wires 3 upstream of the respective tube

2.

Clamps 6a and 6b for gripping the wire are arranged to the sides of the coil 4 and in front of the ends of the tubes 2 from which the free ends of the wires 3 protrude.

Rotating devices 7a and 7b for cutting the wire are located laterally with respect to the tubes 2 and on the side of the head 1 which faces the coil 4.

Each braking means 5a and 5b is composed of an anvil 8 which has a recess 9 and of a hammer 10. The hammer 10 has a raised portion 11 the shape whereof is adapted to insert in the recess 9. The coupling between the raised portion 11 and the recess 9, wherebetween the wire 3 slides when the brake is open, locks the wire upstream of the coiling section when the brake is closed.

The automatic operation of the sequential winding device is explained in its different steps with reference to figure 1 and to figures 3 to 7.

In all of these figures there is a movable head 1 with two tubes 2a and 2b, each with the related brake 5a and 5b and the wires 3a and 3b, which has two clamps 6a and 6b arranged to the sides of the coil 4 and wire cutting devices 7a and 7b.

Figure 1 illustrates the execution of a winding. The coil 4 rotates, and the wire 3 is wound thereon. The brake 5b blocks the wires 3b within the tube 2b. The free end of the wire 3b protrudes from the tube 2b into the processing section.

In figure 3, the head, with its movements, fixes the wire 3a to a terminal of the coil 4, then the rotating device 7a cuts said wire 3a after it has been blocked by the brake 5a.

The head 1 is then moved, as shown in Figure 4, keeping both wires 3a and 3b locked, i.e. keeping both brakes 5a and 5b closed.

The clamp 6b grips the wire 3b, figure 5, and the brake 5b is opened, allowing the wire 3b to slide freely within the tube 2b and, after fixing said wire to the related terminal of the coil 4, figure 6, the winding of the wire 3b on the coil 4 begins. Figure 7 illustrates this last step. At this time the brake 5a is closed, locking the wire 3a, whereas the brake 5b is open, allowing the free sliding of the wire 3b inside the tube 2b.

At the end of the winding, after fixing the wire 3b to the related terminal, the wire is cut and the above described cycle is resumed.

The above described operating steps involve all components of the device according to the invention, and the commands for the opening, closing, rotation and movement of the various components are transmitted mechanically, electromechanically and electronically.

The invention thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the invention concept. All the details may furthermore be replaced with other technically equivalent elements.

In practice, the materials employed, as well as the dimensions, may be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims, and accordingly such reference signs do not have an limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Device for the sequential winding of at least two windings on a same coil body, particularly for coils of electric components and the like, with at least two different wire diameters, which comprises a movable head (1) which has tubes (2a,2b) for the sliding of enamelled wires (3a,3b) for windings, characterized in that it comprises, at each of said tubes (2a,2b) and opposite to the side on which a coil (4) being processed is located, braking means (5a,5b) for the removable retention of said wires (3a,3b) upstream of the respective tube (2a,2b).

2. Sequential winding device, according to claim 1, characterized in that it comprises wire gripping clamps (6a,6b) arranged to the sides of said coil (4) and in front of the ends of said tubes (2a,2b) from which free ends of said wires (3a,3b) protrude.

3. Sequential winding device, according to claim 1, characterized in that it comprises, on the surface of said movable head (1) and adjacent to said tubes (2a,2b), rotating cutting devices (7a,7b) adapted to cut said wires (3a,3b).

4. Sequential winding device, according to one or more of the preceding claims, characterized in that said braking means (5a,5b) each comprise an anvil (8) and a hammer (10) which face one another.

5. Sequential winding device, according to one or more of the preceding claims, characterized in that said anvil (8) has a recess (9) and said hammer (10) has a raised portion (11) which is adapted to enter said recess and lock said wire which passes between said hammer and said anvil.

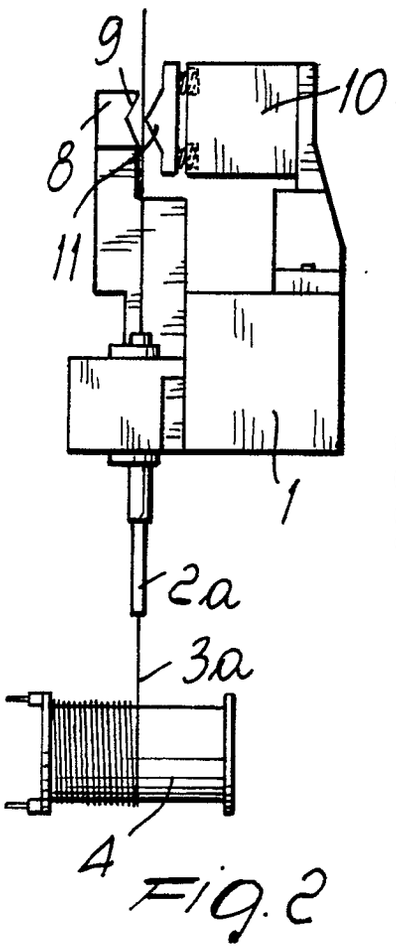

Fig. 2

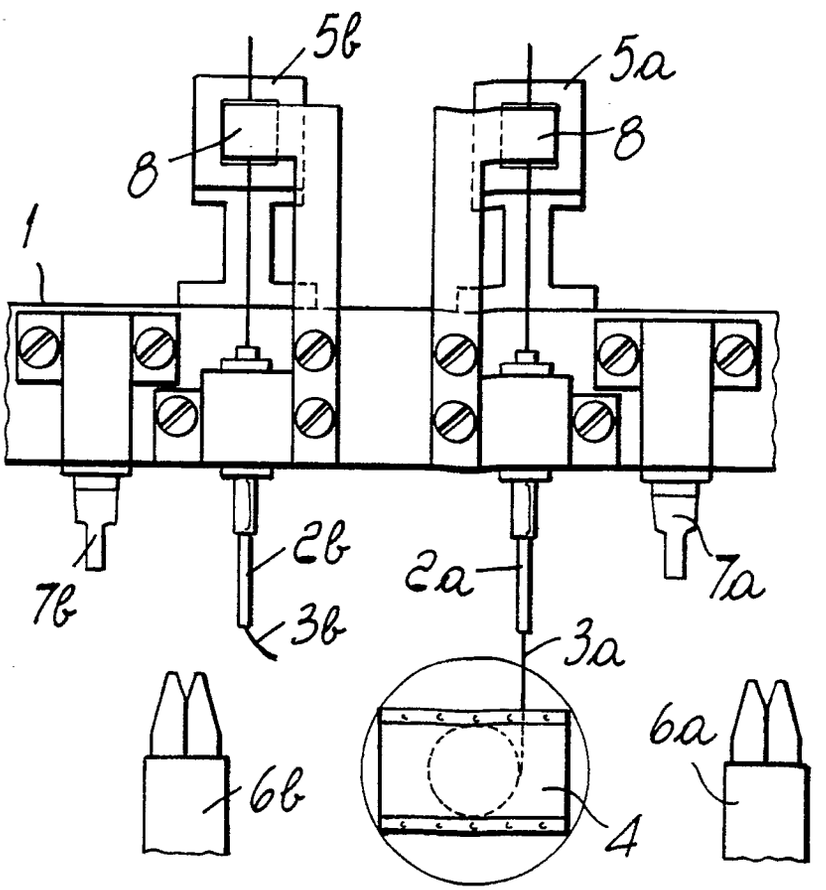

Fig. 1

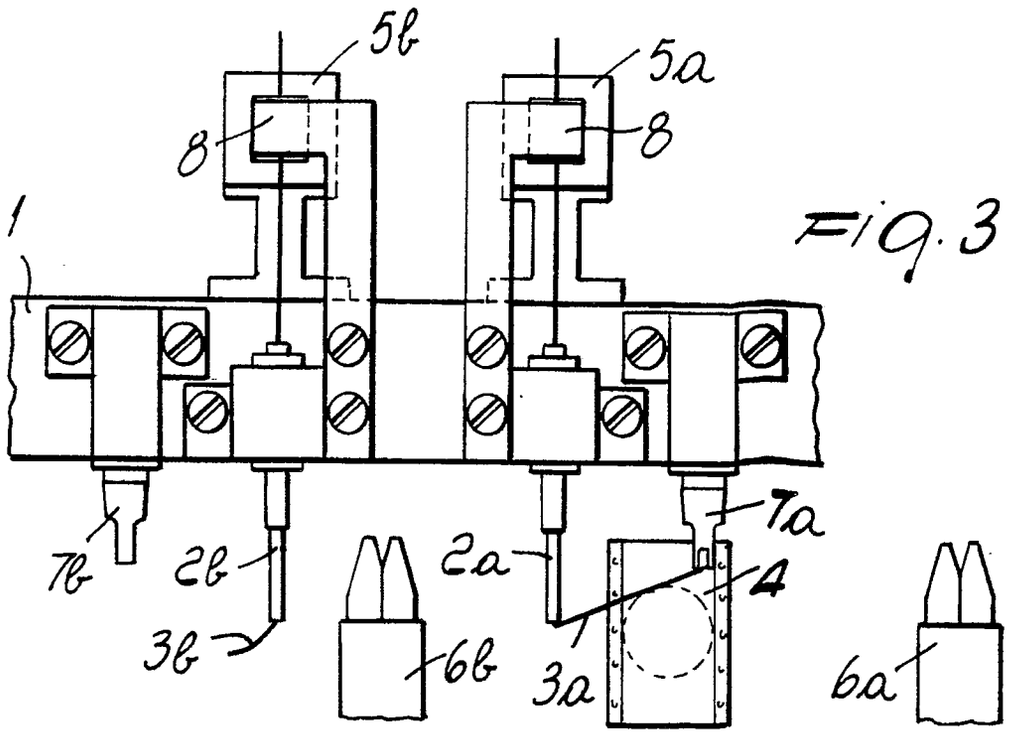

Fig. 3

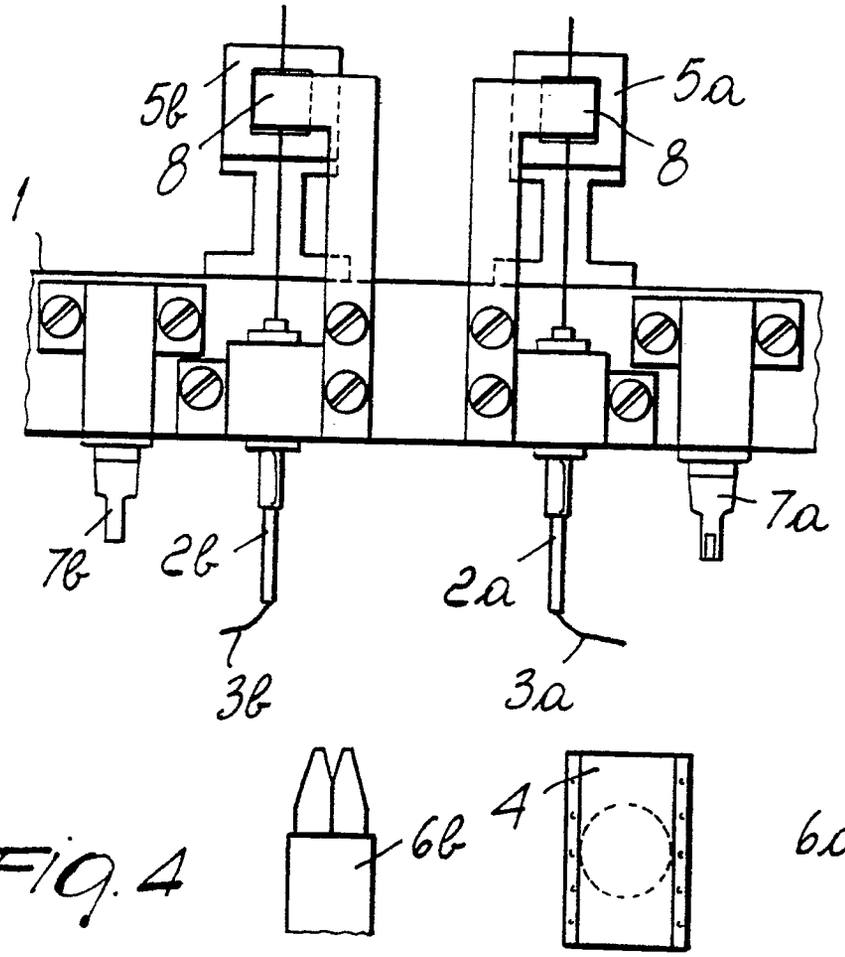

FIG. 4

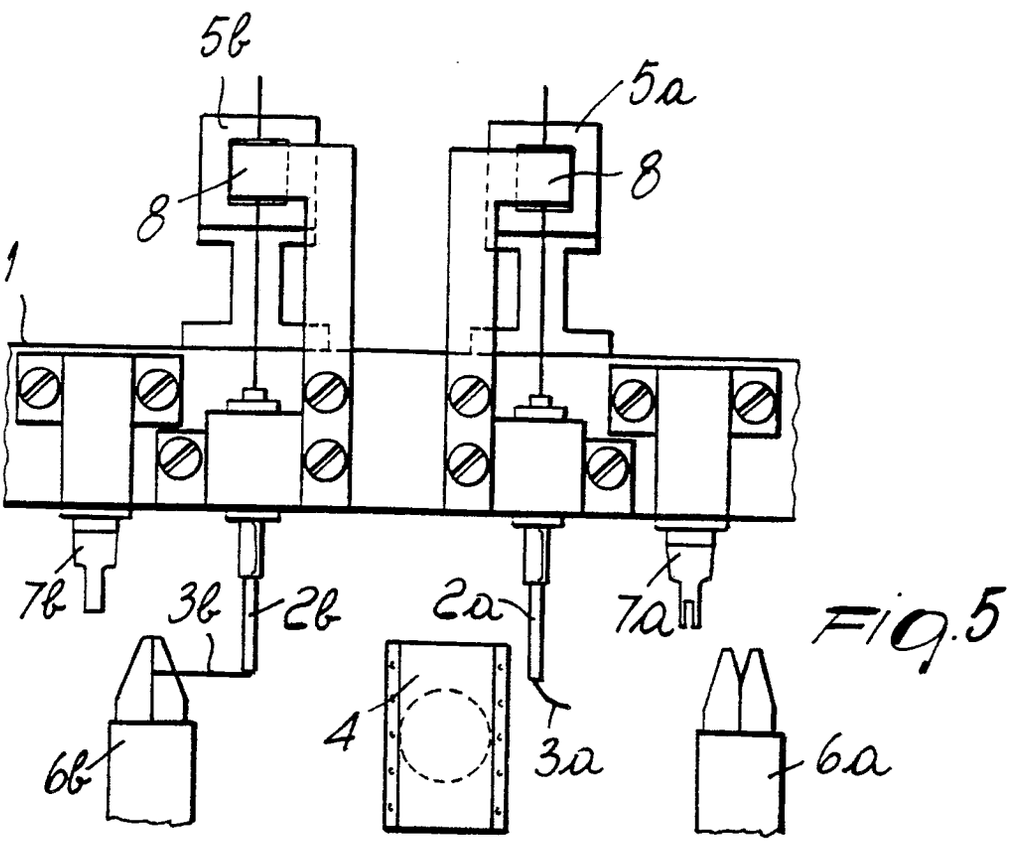

FIG. 5

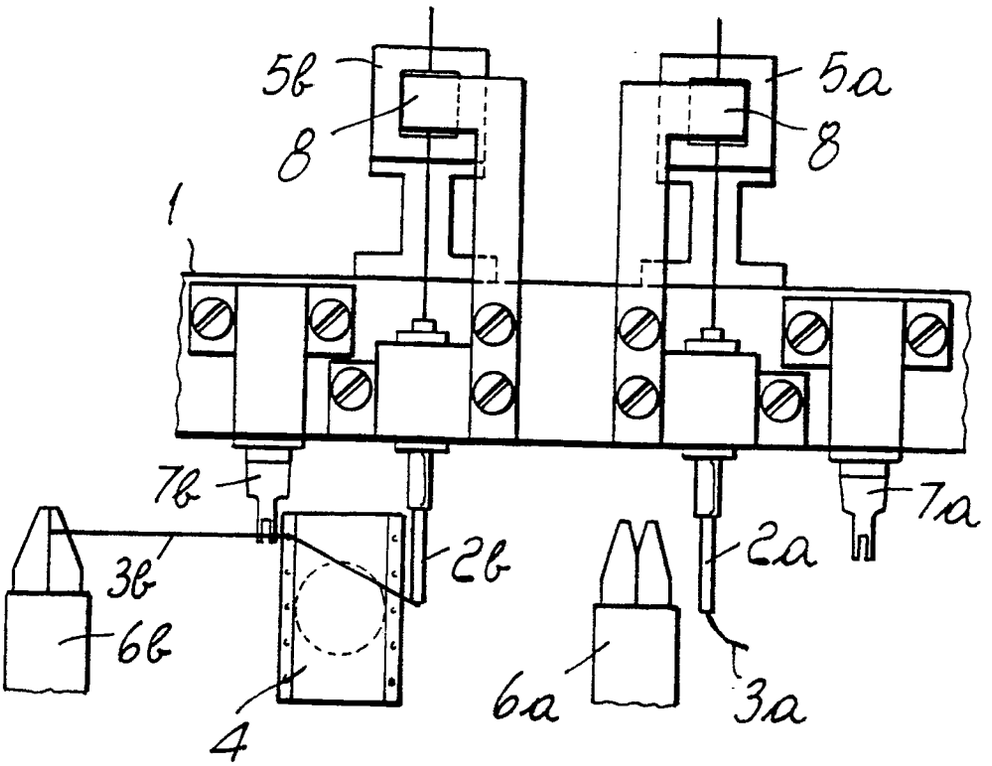

Fig. 6

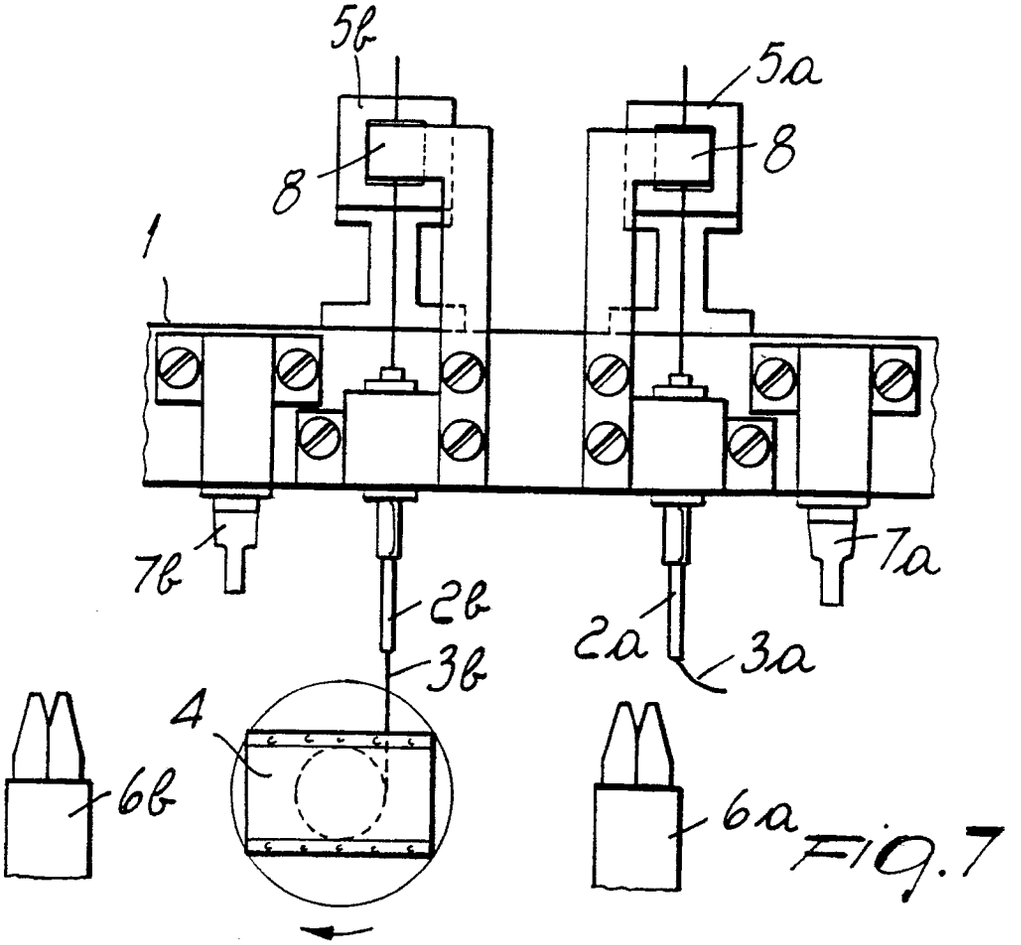

Fig. 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 12 0225

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.5)
X	DE-A-3 609 896 (SIEMENS AKTIENGESELLSCHAFT) * column 2, lines 39 - 64 *	1	H 01 F 41/06
A	DE-A-2 434 573 (BLAUPUNKT-WERKE GMBH) * page 13, paragraph 1 - page 17, paragraph 1 *	2,3	
A	DE-A-1 914 946 (METEOR AG) * page 9, line 14 - page 10, line 3 *	4,5	
A	DE-A-3 145 179 (SIEMENS AKTIENGESELLSCHAFT)		
A	PATENT ABSTRACTS OF JAPAN vol. 13, no. 352 (E-801)(3700) 08 August 1989, & JP-A-1 112718 (MATSUSHITA ELECTRIC IND.CO.,LTD.) * the whole document *		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

H 01 F

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	04 February 91	VANHULLE R.

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
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