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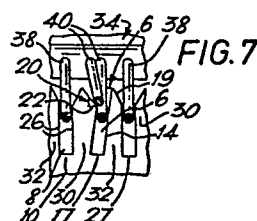
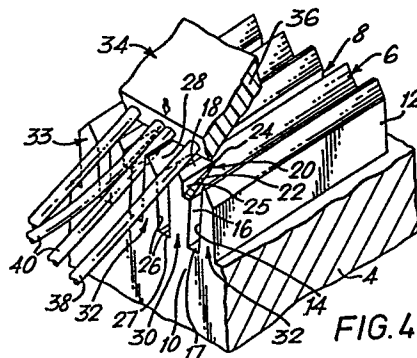
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54 Device for combing electrical conductors.

57 The device comprises a block (4) in which is formed a conductor receiving channel (6) having a conductor receiving mouth.

For combing a pair of closely juxtaposed conductors (40) of a flat cable (34) into superposed relationship in the channel (6), one side wall (16) thereof has a flared surface (18) providing the mouth, into which surface (18) opens a notch (20) which also opens into a forward face (10) of the block (4) and tapers inwardly of the block (4), the notch (20) having normally extending bottom and side surfaces (22 and 25), the depth of the bottom surface (22) decreasing in a direction away from the forward face (10) of the block (4). The bottom surface (22) of the notch (20) inhibits movement of one conductor (40) into the channel (6) until the other conductor (40) has been received therein.



A device for combing electrical conductors.

There is disclosed in GB-A-1,078,548, a device for combing electrical conductors, the device comprising a block in which is formed a conductor receiving channel defined by side walls, the channel extending from a forward face of the block towards a rearward face thereof and having a conductor receiving mouth.

In this known device, which is for combing the leads of a semi-conductor, the channel is of V-shaped cross-section and is intended to receive a single lead, similar channels being provided in the block each also for receiving a single lead.

The present invention is directed to the problem of combing a pair of juxtaposed, contiguous conductors so that they lie in superposed relationship in a common channel of a combing device, for example for insertion into a common slot of a slotted plate electrical terminal, according for example to US-A-3,950,062.

The problem is encountered, in particular, in relation to the combing of the conductors of flat multi-conductor transmission cables which are usually provided with pairs of juxtaposed, contiguous ground conductors, these pairs alternating with single signal conductors. In inserting the wires of such a contiguous pair into a common channel of a combing device, to lie in superposed relationship in the channel, it must be ensured that the conductors of the pair do not bind in the channel so as to impair their correct insertion thereinto.

According to the present invention therefore,

a combing device as defined in the first paragraph of this specification is characterised in that for combing a pair of closely juxtaposed conductors into superposed relationship in the channel, one of the side walls, which are otherwise parallel to one another, has a flared surface providing the conductor receiving mouth of the channel, into which surface opens a notch which also opens into the forward face of the block, the notch tapering inwardly of the flared surface and extending from the forward face of the block towards its rearward face, the notch being defined by a side surface, and a bottom ramp surface the depth of which decreases from the forward face of the block towards its rearward face.

The bottom ramp surface of the notch serves momentarily to inhibit one of the conductors from entering the channel after the insertion of the conductors into the mouth of the channel, in a direction transverse to the longitudinal axes of the wires (as described in detail below), until the other conductor has entered the channel. The conductors of the pair will not therefore bind in channel, which will normally be of a width, below its mouth, which is less than the sum of the diameters of the conductors of the pair so that the side walls of the channel support the conductors in their superposed relationship therein.

Preferably, as described in detail below, provision is made, where the combing device is provided with further wire receiving channels, for the channels all to be evenly spaced from one another, in accordance with the spacing between the conductors of the flat multi-conductor cable.

For a better understanding of the invention, reference will now be made by way of example to the accompanying drawings in which:-

Figures 1 to 3 are perspective views of a device, in the form of a template, for combing cable conductors, in association with a flat multi-conductor electrical cable, illustrating successive stages in combing the
5 conductors of the cable;

Figures 4 and 5 are enlarged fragmentary, perspective views of the template and cable, illustrating successive stages in the combing operation;

Figures 6 to 8 are enlarged, fragmentary, diagrammatic, front views of the template and cable, illustrating successive stages in the combing operation.
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The template, which is generally referenced 2, comprises a base block 4 formed with a row of parallel intermediate teeth 30 and 32 and end teeth 33, defining
15 first channels 6 each for receiving two wires, alternating with second channels 8 each for receiving one wire. The template 2 has a forward face 10 and a rear face 12.

Each channel 6 has a pair of parallel side walls
20 14 and 16 connected by a floor 17, the wall 14 being provided by one flank of a tooth 32 or 33 as the case may be and the wall 16 being provided by one flank of a tooth 30.

Each wall 16 has a conductor guiding, flared
25 surface 18 providing a mouth for the channel 6, in which surface 18 is formed a notch 20 tapering as seen in cross-section, inwardly of the tooth 30. The notch 20 is defined by a planar ramp bottom surface 22 extending from the face 10 of the template 2 and
30 diverging from the floor 17 in the direction of the end 12 of the template 2, as well as decreasing in width in that direction; and a planar side surface 25 extending normally of the surface 22 and also tapering in width in the same direction thereas. The surfaces
35 22 and 25 converge rearwardly of the template upto a

point 24 on the surface 18. The wall 14 of the channel 6 extends parallel to that part of wall 16 which lies between the surface 18 and floor 17 and is rectilinear throughout its height and length.

5 Each channel 8 has a pair of parallel side walls 26 defined by the opposite flanks of a rib 30 and a rib 32, or 33 as the case may be, and by a floor 27, these ribs having conductor guiding, oppositely flared surfaces 19 providing a mouth for the channel
10 8. The channels 6 and 8 are of the same width below their mouths.

 The teeth 30 thicken progressively, upto their notches 20, in order to accommodate these notches. The teeth 32 thicken towards their bases, for improved
15 strength, but are of overall smaller thickness than the teeth 30.

 The walls 26 extend normally of the block 4, the parallel portions of the walls 14 and 16 being angled, by a few degrees with respect to the walls
20 26, whereby the channels 6 are scewed towards the teeth 30, so that the floors 17 and 27 are constantly spaced from one another, despite the different cross-sectional shapes of the teeth 30 and 32. Consequentially, each floor 17 lies substantially in alignment with the
25 corresponding notch 20.

 The template 2 is intended for use with a flat, multi-conductor transmission cable 34 having an insulating sheath 36 which has been stripped back from the cable end to bare signal conductors 38 and ground
30 conductors 40 all of which are initially coplanar as shown in Figure 1, the conductors 40 being arranged in pairs of juxtaposed, contiguous conductors, as best seen in Figure 6, such pairs alternating with the conductors 38.

35 As shown in Figure 1, the cable 34 is initially

addressed to the template 2 from above, being lowered at an angle α (Figure 2) with respect thereto, so that the bared portions of the conductors 38 and 40 enter the mouths of the channels 8 and 6, respectively, guided by the surfaces 18 and 19. As shown in Figures 2, 4 and 6, a first conductor 40 of each pair first impinges against the bottom surface 22 of a respective notch 20 at the forward end thereof, being thereby momentarily inhibited from entering the corresponding channel 6. The pressure towards the template 2 is maintained on the cable 34 so that the first conductor 40 of each pair tends to be splayed away from the floor 17 of the channel 6, the second conductor 40 of the pair freely entering the channel 6.

The cable 34 is now drawn rearwardly, in the direction of the face 12 of the template 2, and is simultaneously lowered towards the template 2 so that the angle between the cable 34 and the template 2 is continuously reduced (see Figure 5), whereby each first conductor 40 is progressively and continuously lowered onto the full length of the bottom surface 22. When the cable 34 has been withdrawn sufficiently, the first conductor 40 of each pair approaches the point 24 on the surface 18 and rolls into the channel 6 (as shown in Figure 7) in superposition with the second conductor 40 of the pair, which is already in the channel 6. As the cable 34 is further withdrawn, both conductors 40 of each pair are lowered to the floor 17 of the corresponding channel 6 as shown in Figure 8. During the combing operation described above, each conductor 38 enters a channel 8 and is finally lowered to the floor 27 thereof, as shown in Figures 6 to 8. The fully inserted conductors 38 and 40 are evenly spaced from one another in the transverse direction of the channels 6 and 8.

In the course of the combing operation, the conductors 40 of each pair of relatively reoriented by 90° .

As will be apparent from Figure 6, the shape of the notch 20 is such that no horizontal component of motion is imparted to the first conductor 40 of the pair until it is rolled into the channel 6 as described above, after the second conductor 40 of the pair has penetrated into the channel 6 as shown in Figure 7; whereby the first and second conductors 40 of the pair cannot bind in the channel 6.

The flaring of the surfaces 18 and 19 ensures that the conductors are guided into the appropriate channels and allows for substantial tolerances in conductor gauge.

As will best be apparent from Figure 3, the conductors 38 and 40, when finally positioned in the channels 6 and 8, can be advanced, by advancing the cable 34, so that their ends project from the forward face 10 of template 4 for termination e.g. to electrical terminals.

The template 2 may be fitted to an electrical harness making apparatus (not shown), lugs 50 being provided on the template 2 for this purpose.

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Claims:

1. A device for combing electrical conductors (38 and 40), the device comprising a block (4) in which is formed a conductor receiving channel (6) defined by side walls (14 and 16), the channel (6) extending from a forward face (10) of the block (4) towards a rearward face (12) thereof and having a conductor receiving mouth; characterised in that for combing a pair of closely juxtaposed conductors (40) into superposed relationship in the channel (6), one (16) of the side walls (14 and 16), which are otherwise parallel to one another, has a flared surface (18) providing the conductor receiving mouth of the channel (6), into which surface (18) opens a notch (20) which also opens into the forward face (10) of the block (4), the notch (20) tapering inwardly of the flared surface (18) and extending from the forward face (10) of the block (4) towards its rearward face (12), the notch (20) being defined by a side surface (25), and a bottom ramp surface (22) the depth of which decreases from the forward face (10) of the block (4) towards its rearward face (12).
2. A device according to Claim 1, characterised in that bottom surface (22) of the notch (20) terminates, intermediate the forward and rear faces (10 and 12) of the block (4), at a point (24), on the flared surface (18).
3. A device according to Claim 1 or 2, characterised in that the side (25) and bottom (22) surfaces of the notch (20) are planar and extend normally of one another, the bottom surface (22) extending normally of the parallel portions of the side walls (14 and 16).
4. A device according to Claim 1, 2 or 3, characterised in that the side walls (14 and 16) of

the channel (6) are scewed in such a way that a floor (17) of the channel (6), connecting the side walls (14 and 16), is in substantial alignment with the notch (20).

5 5. A device according to any one of the preceding claims, characterised in that the channel has a base (17) connecting the side walls (14 and 16), the notch bottom surface (22) being parallel to the base (17).

10 6. A device according to any one of Claims 1 to 4, characterised in that the block (4) is formed on either side of the conductor receiving channel (6), with a further channel (8) extending alongside the conductor receiving channel (6), for receiving a single conductor (38), the conductor receiving channel (6) being separated from one of the further channels (8) by a first tooth (30) a flank of which provides the one side wall (16), the tooth (36) progressively increasing in thickness from its base upto the notch (20), the conductor receiving channel (6) being separated from the other further channel (8) by a second tooth (32) a flank of which provides the other side wall (14) of the conductor receiving channel (6), the second tooth (32) increasing in thickness towards its base, the side walls (14 and 16) of the conductor receiving channel (6) being scewed into the direction of the first tooth (30) so that floors (17 and 27) of all the channels (6 and 8) are evenly spaced from one another in the transverse direction of the channels (6 and 8).

20 7. A device according to Claim 6, characterised in that the overall thickness of the first tooth (30) is greater than that of the second tooth (32), the channels (6 and 8) being of equal width.

30 8. A device according to any one of the preceding claims, in combination with a pair of juxtaposed, contiguous electrical conductors (40); characterised
35 in that the width of the or each channel (6 or 8),

below its mouth, does not exceed the sum of the
diameters of the conductors (40) of the pair so that
when inserted into the channel (6 or 8), the
conductors (40) of the pair are supported in superposed
5 relationship by the side walls (14 and 16; or 26)
of the channel (6 or 8).

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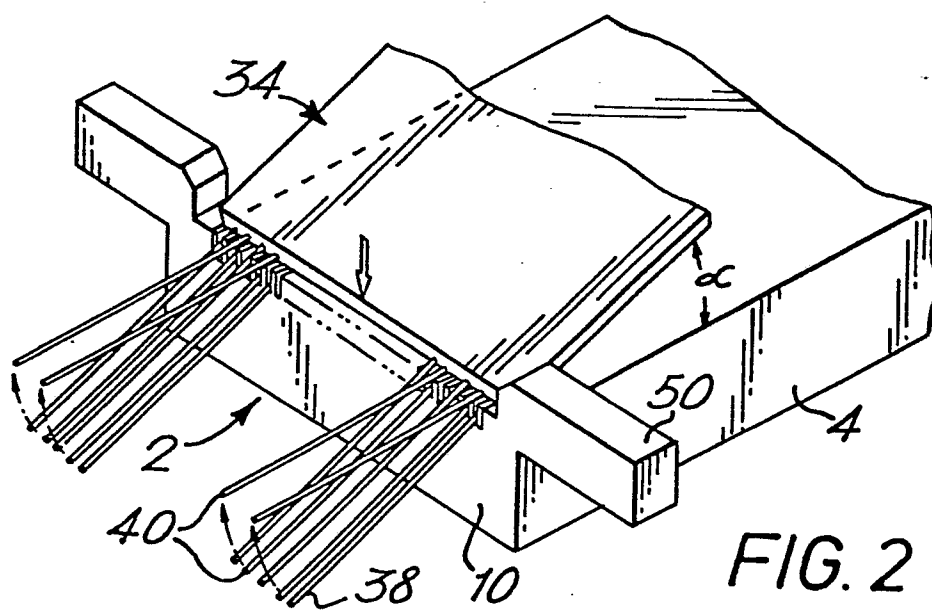
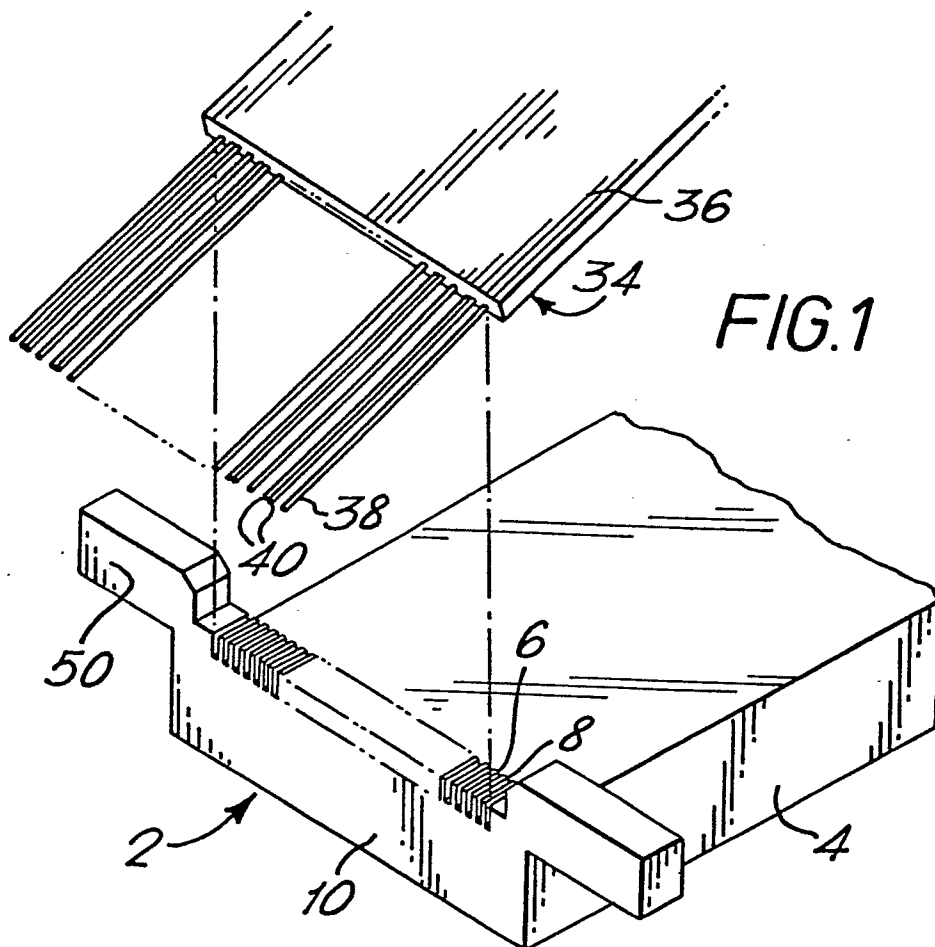
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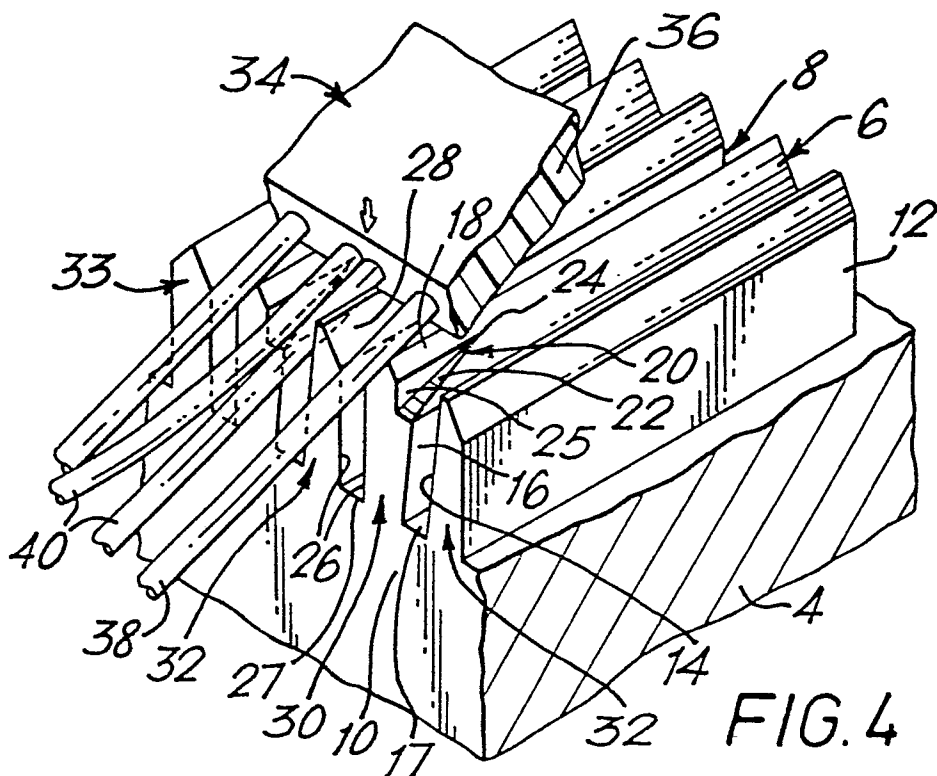
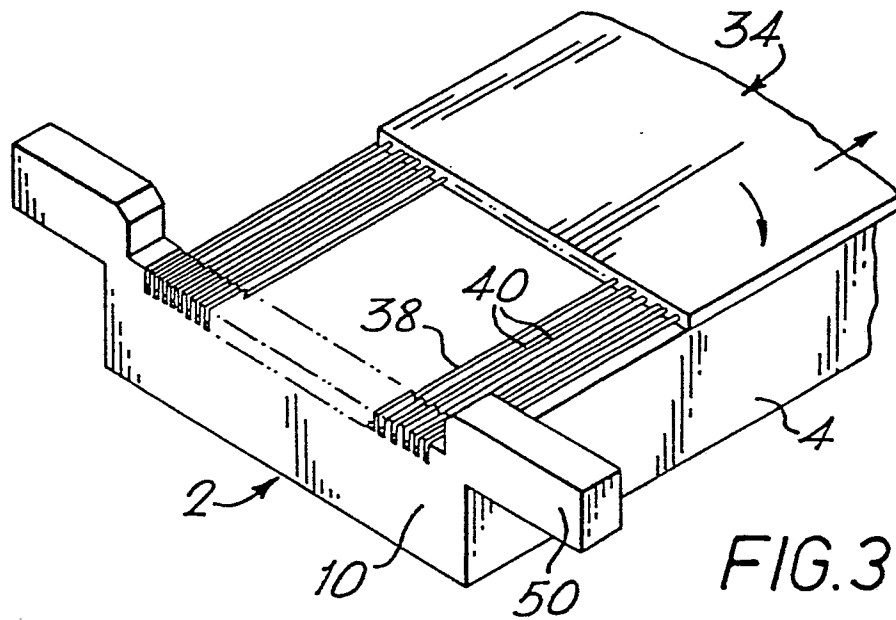
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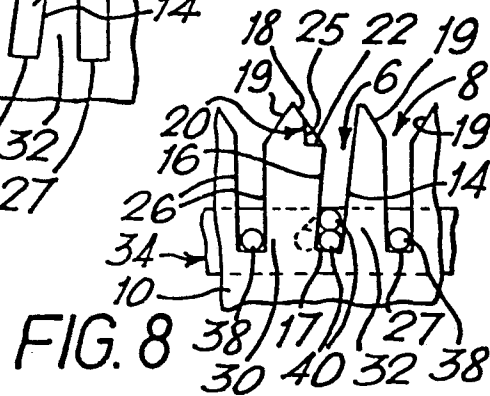
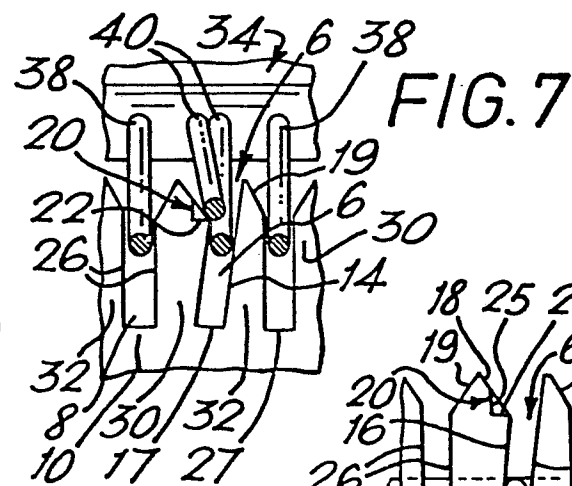
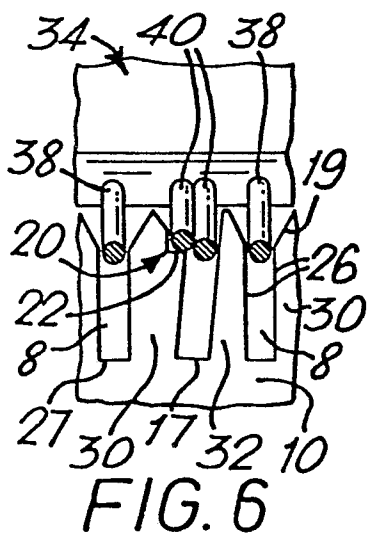
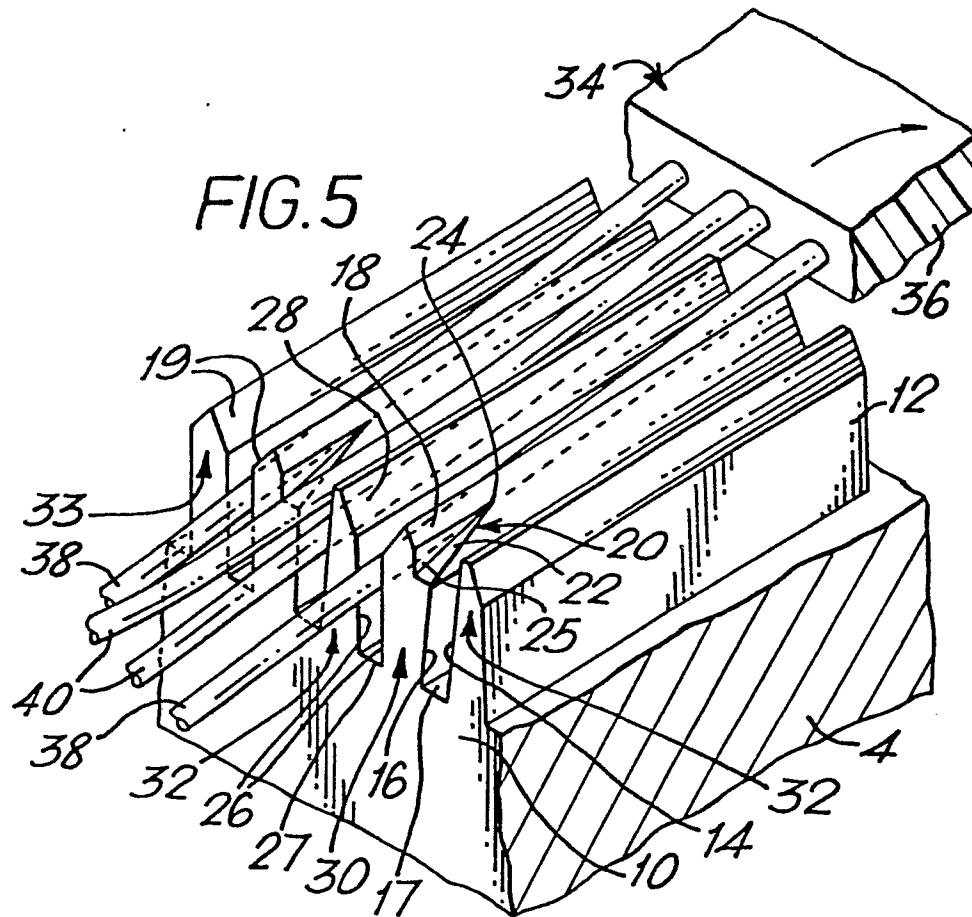
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DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
E	<u>EP - A1 - 0 030 788</u> (AMP) * page 2, line 24 to page 3, line 2; page 4, line 15 to page 6, line 24; fig. 1 to 5 * --	1,8	H 01 R 43/00 H 01 R 23/66
A	<u>US - A - 4 181 384</u> (DOLA et al.) * column 5, line 68 to column 7, line 27; fig. 2, 7 to 10 * --	1,8	TECHNICAL FIELDS SEARCHED (Int. Cl. ³) H 01 R 23/66 H 01 R 43/00 H 05 K 13/00
A	<u>EP - A1 - 0 001 685</u> (AMP) * page 8, line 6 to page 9, line 10; fig. 9, 10 * ----		CATEGORY OF CITED DOCUMENTS X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons &: member of the same patent family, corresponding document
X	The present search report has been drawn up for all claims		
Place of search	Date of completion of the search	Examiner	
Berlin	09-09-1981	HAHN	