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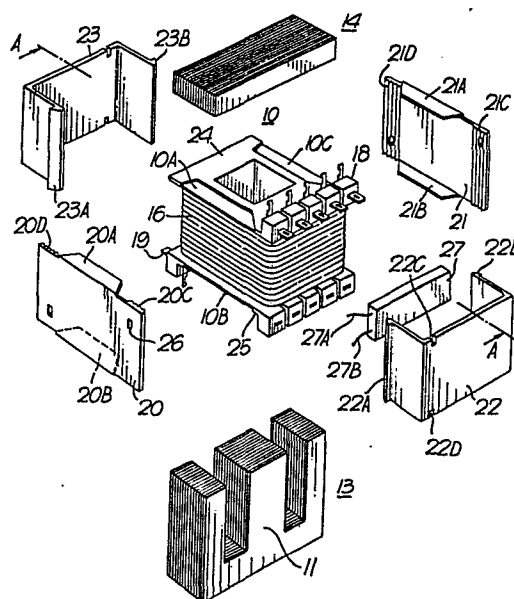
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### Wound electrical components.

A wound electrical component such as a transformer or a choke comprises a bobbin 10 on which the winding 16 or windings is/are wound. The outer surface of winding 16 is protected by insulated shielding members 20, 21, 22 and 23, the members 20 and 21 being retained in position by the side limbs of a magnetic core 13, 14 of 'E' and 'I' laminations. In order to protect the winding 16 or windings on the bobbin 10 or other components connected thereto a thermal fuse 27 is provided which is held in position against the outer face of winding 16 by shielding member 22. The member 22 is 'U' shaped and the side limbs have teeth or barbs 22A, 22B which engage in grooves 20C, 21C provided on the inner faces of the shielding members 20, 21 respectively. The other shielding member 23 is similarly held in position in members 20, 21. Such a component does away with the need for a bobbin to have a pocket to house the thermal fuse with its attendant disadvantages whilst the same bobbin 10 and associated components can be used for wound components when a thermal fuse is not required.

Fig. 1.



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# "WOUND ELECTRICAL COMPONENTS"

The present invention relates to a wound electrical component comprising a bobbin of moulded plastics material, a winding carried upon the bobbin, two or more shielding members of moulded plastics material engaged with one  
5 another and/or with the bobbin to shield the winding, and a thermally responsive element mounted in proximity to the winding.

Wound electrical components of the type described in the opening paragraph are known and comprise chokes,  
10 transformers and auto-transformers. Such components commonly incorporate, in the body member of the bobbin, a pocket or recess to house the thermally responsive element such that, in the assembled component, the element lies in the pocket or recess in the bobbin beneath the winding or  
15 windings carried by the bobbin, the element being accessible in the assembled component. The thermally responsive element may be a thermal fuse, a thermal cut-out or a device which changes its resistance with temperature and is commonly connected in series with the winding to disconnect  
20 the winding from an associated circuit or reduce the current through the winding. Where the component is a transformer the element is often connected to the primary winding to disconnect the power supply to or reduce the current through the winding in response to an increase in  
25 the temperature of the transformer winding, indicating a fault in, or an overload of, the transformer. Shielding members are commonly provided to enclose the winding to reduce tracking between the magnetic core and the winding or windings and to meet other electrical safety requirements.

30 The prior art arrangement has two principal disadvantages.

Firstly, a special bobbin must be provided if the component is required to incorporate such an element and secondly, the space provided for housing the element increases the peripheral length of the bobbin, increasing the length, and thus the cost, and electrical resistance, of the winding.

It is an object of the present invention to provide wound electrical components in which the disadvantages of the prior art arrangements are at least mitigated.

The invention provides a wound electrical component comprising a bobbin of moulded plastics material, a winding carried upon the bobbin, two or more shielding members of moulded plastics material engaged with one another and/or with the bobbin to shield the winding, and a thermally responsive element mounted in proximity to the winding, characterized in that the said element lies in contact with the winding and is retained in position by at least one of the said shielding members.

The thermally responsive element preferably lies between the outer winding layer of the winding and the said at least one of the shielding members.

In one construction the winding may be superimposed upon another winding upon the bobbin, the windings being coupled to form a transformer. In another construction the bobbin may be axially divided into two sections, one section bearing the winding and the other section bearing another winding, said windings being coupled to form a transformer.

In yet a further construction the bobbin and a further bobbin may be mounted side by side and the further bobbin bearing another winding, said windings being coupled to form a transformer.

The winding may be the primary or a secondary winding of the transformer.

A wound electrical component according to the invention

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has the advantage that it simplifies manufacture by removing the need to provide a bobbin specially adapted to accommodate a thermal fuse. A further advantage is that it also enables such components incorporating a thermal fuse to be manufactured more cheaply and be more efficient than hitherto as the space occupied by the thermally responsive element in prior art constructions caused an increase in the peripheral dimension of the bobbin and thus an increase in the length, cost and electrical resistance, of the winding or windings as previously mentioned.

The invention will now be further described by way of example with reference to the accompanying drawings of which:

Figure 1 is an exploded view of a single bobbin wound electrical component according to the invention;

Figure 2 shows a cross-section of the assembled component of Figure 1 along the line A-A looking in the direction of the arrows;

Figure 3 is an exploded view of a double-bobbin transformer according to the invention;

Figure 4 shows a cross-section of the assembled transformer of Figure 3 along the line B-B looking in the direction of the arrows;

Figure 5 is an exploded view of a twin-section bobbin transformer according to the invention; and

Figure 6 shows a cross-section of the assembled transformer of Figure 5 along the line C-C looking in the direction of the arrows.

Referring to Figures 1 and 2 of the drawings, a bobbin 10 of moulded plastics material is mounted upon the central limb 11 of a laminated magnetic core comprising E-members 13 and I-members 14. Bobbin 10 when incorporated in a transformer is wound with a primary winding 15 and an overlying secondary winding 16, the windings being appropriately insulated and separated by an electrically insulating separator 17, and terminated on tag strips 18 and 19

respectively for external connection. Where the bobbin 10 is incorporated in a choke only one winding will be provided, suitably terminated.

5 The outer face of secondary winding 16 or the sole winding for a choke is shielded by four electrically insulating shielding members 20, 21, 22 and 23. Members 20 and 21 locate upon the wound bobbin 10 prior to assembly with the core by engagement of the tongues 20A, 20B and 21A, 21B respectively within corresponding recesses 10A, 10B and 10C, 10D in the outer faces of the end cheeks 24 and 25 of bobbin 10. Members 22 and 23 are 'U' shaped, the side limbs of which engage with members 20 and 21 by engagement of an elongate teeth or barbs 22A, 22B and 23A, 23B respectively provided on the outer ends of the side limbs in grooves 20C, 21C and 20D, 21D provided on the inner faces of members 20 and 21.

The side limbs of the 'U' shaped members 22 and 23 are resilient in a direction generally parallel to the joining limbs of members 22 and 23 and the grooves 20C, 20D of member 20 and 21C, 21D of member 21 are angled to permit ready engagement of the members 22 and 23, but not disengagement unless one of the side limbs is deflected out of engagement by insertion of a suitable tool through an aperture such as 26 in member 20.

25 A thermal fuse 27 which may be positioned once the insulating members 20 and 21 are held in position by the magnetic core is held in direct physical contact with the external surface of secondary or sole winding 16 by member 22 due to the teeth or barbs 22A, 22B engaging a corresponding pair of the grooves 20C, 21C appropriate to the winding depth or "fill" of bobbin 10, to hold thermal fuse 27 tightly in position. Leads 27A, 27B of thermal fuse 27 are brought out for connection into an external circuit through notches 22C, 22D of member 22.

35 Referring to Figures 3 and 4 of the drawings, the

invention is shown applied to a construction of transformer in which two identical bobbins 30 and 32 of moulded plastics material are mounted side by side upon the central limb 33 of the transformer's magnetic core again comprising

5 E and I laminated members 29 and 31 respectively. Bobbin 30 carries the primary winding 34 of the transformer and bobbin 32 the secondary winding 35.

The construction of the electrically insulating shielding members 36, 37, 38 and 39 is generally similar  
10 to those described in relation to Figures 1 and 2 of the drawings. However as one external face of winding 34 is shielded by a flange 40 integral with bobbin 32 and an external face of winding 35 is shielded by a similar integral flange 41 of bobbin 32 the width of the 'U' shaped  
15 members 38 and 39 is reduced as compared for that of the corresponding members 22 and 23 shown in Figures 1 and 2.

A thermal fuse 42 is mounted in direct physical contact with an external face of the primary winding 34 and retained in position by shielding member 38 engaging between shielding  
20 members 36 and 37 which are held in position once the bobbins 30 and 32 have been assembled on the magnetic core. The method of engagement of the 'U' shaped members 38 and 39 with the other insulating members 36 and 37 is the same as that for the corresponding members of Figures 1  
25 and 2, namely the elongate teeth or barbs 38A, 38B and 39A, 39B are retained in associated grooves 36C, 36D and 37C, 37D. Besides the tongues 36A, 36B (not shown) and 37A, 37B, the members 36 and 37 are additionally provided with intermediate flanges 36E and 37E respectively which  
30 locate between the bobbins 30 and 32. As the 'U' shaped members 38, 39 only enter portions of the members 36, 37 between the flanges 36E, 37E and an edge, the grooves 36C, 36D and 37C, 37D need not cover the full width of the members 36, 37.

Referring to Figures 5 and 6 of the drawings the invention is there shown applied to a transformer in which a bobbin 50 of moulded plastics material is provided having two axially-spaced apart sections 51 and 52, separated by an integral partition wall 53 having a peripheral slot 54. The primary winding 55 of the transformer is wound upon section 51 and the secondary winding 56 upon section 52.

The construction and assembly of shielding members 57, 58, 59 and 60 is generally similar to those described in relation to Figures 3 and 4 of the drawings except that the intermediate flanges 61 and 62 of members 57 and 58 are extended at right angles as shown as are the walls of the members over approximately half their width. The flanges 61 and 62 engage in the peripheral slot 54 of partition wall 53 when members 57 and 58 are assembled upon bobbin 50.

Thermal fuse 63 is mounted in direct physical contact with an external face of the primary winding 55 and retained in position by shielding member 59 engaged between shielding members 57 and 58 in the same manner as previously described.

It will be appreciated that in the embodiments described the same shielding members are employed irrespective of whether a thermal fuse is to be incorporated into a given wound component, enabling a fuse to be added, in some cases, as a matter of choice.

Modifications may be made within the scope of the invention. For example two shielding members only may be employed to protect the winding or windings, one or both of which may serve to retain the thermal fuse in contact with one such winding.

Whilst in the embodiments described in relation to the accompanying drawings the shielding members urge the thermal fuse (or other form of thermally operated protection device) in contact with the associated winding are of

'U' shape, such a shape is not essential and other forms or shapes of shielding members may readily be used. In such an alternative arrangement the shielding members which urge the thermal fuse in contact with the winding might be substantially flat with slots provided adjacent the edges of these members. These slots would co-operate with tongues extended from the other shielding members, the tongues being grooved (either on the inner or outer face) such that when the tongues are inserted in the slots a slot edge engages with the grooves on an associated tongue.

In all the embodiments described the bobbins and shielding members may advantageously be injection moulded of glass filled mylon although other plastic materials commonly used for the manufacture of transformer bobbins may also be used for the realisation of a transformer according to the present invention.

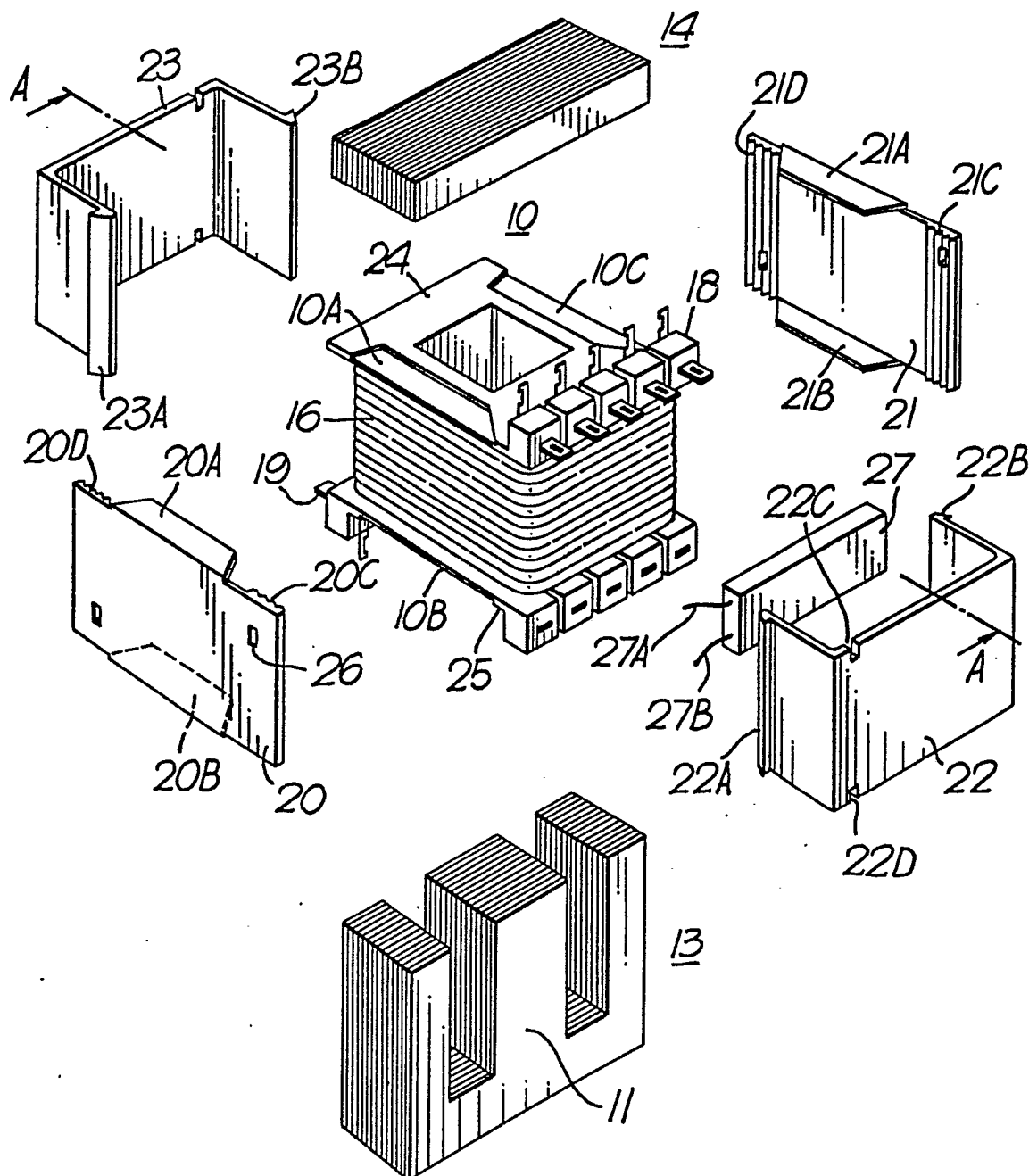
Direct contact between the surface of the winding and the thermal fuse enables the thermal fuse to respond more rapidly to potentially dangerous rises in temperature of the winding, providing a more speedy protection for the wound component and associated circuits in the event of a fault condition or overload occurring.



CLAIMS:-

1. A wound electrical component comprising a bobbin of moulded plastics material, a winding carried upon the bobbin, two or more shielding members of moulded plastics material engaged with one another and/or with the bobbin to shield the winding, and a thermally responsive element mounted in proximity to the winding, characterized in that the said element lies in contact with the winding and is retained in position by at least one of the said shielding members.
2. A wound electrical component as claimed in Claim 1 in which the thermally responsive element lies between the outer winding layer of the winding and the said at least one of the shielding members.
3. A component as claimed in Claim 1 or 2 in which the winding is superimposed upon another winding upon the bobbin, said windings being coupled to form a transformer.
4. A component as claimed in Claim 1 or 2 in which the bobbin is axially divided into two sections, one section bearing the winding and the other section bearing another winding, said windings being coupled to form a transformer.
5. A component as claimed in Claim 1 or 2 in which the bobbin and a further bobbin are mounted side by side and the further bobbin bears another winding, said windings being coupled to form a transformer.
6. A component as claimed in any preceding claim in which the winding is a transformer primary winding.
7. A component as claimed in any one of the preceding Claims 1 to 5 inclusive in which the winding is a transformer secondary winding.

Fig. 1.



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Fig. 2.

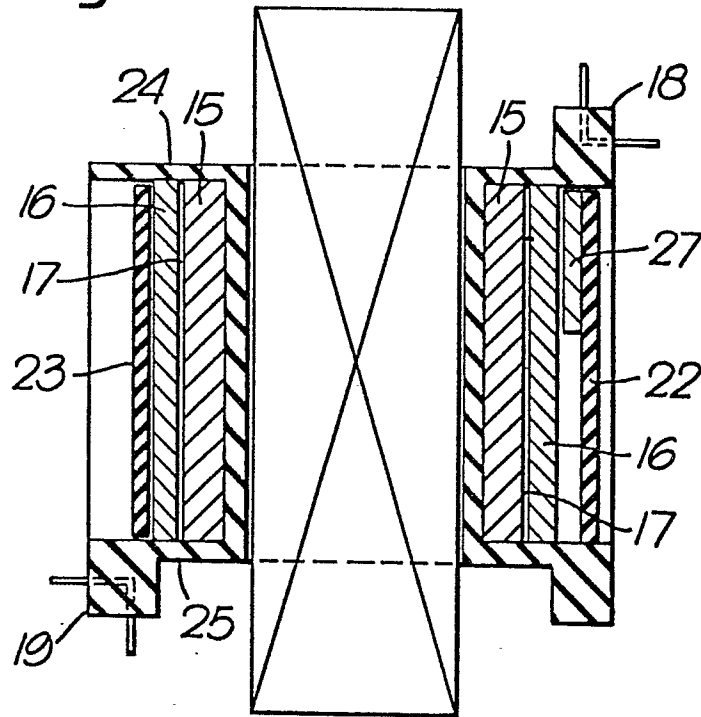
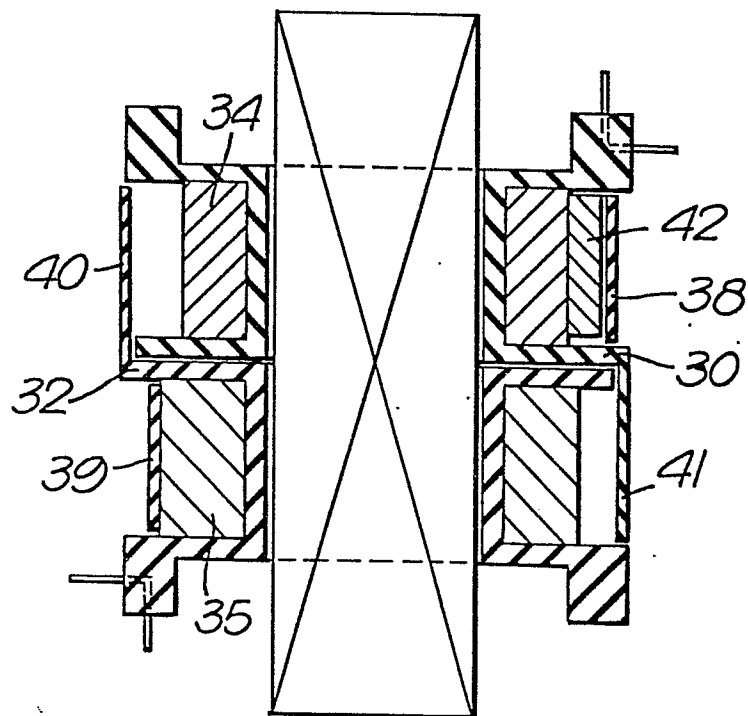


Fig. 4.



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Fig. 3.

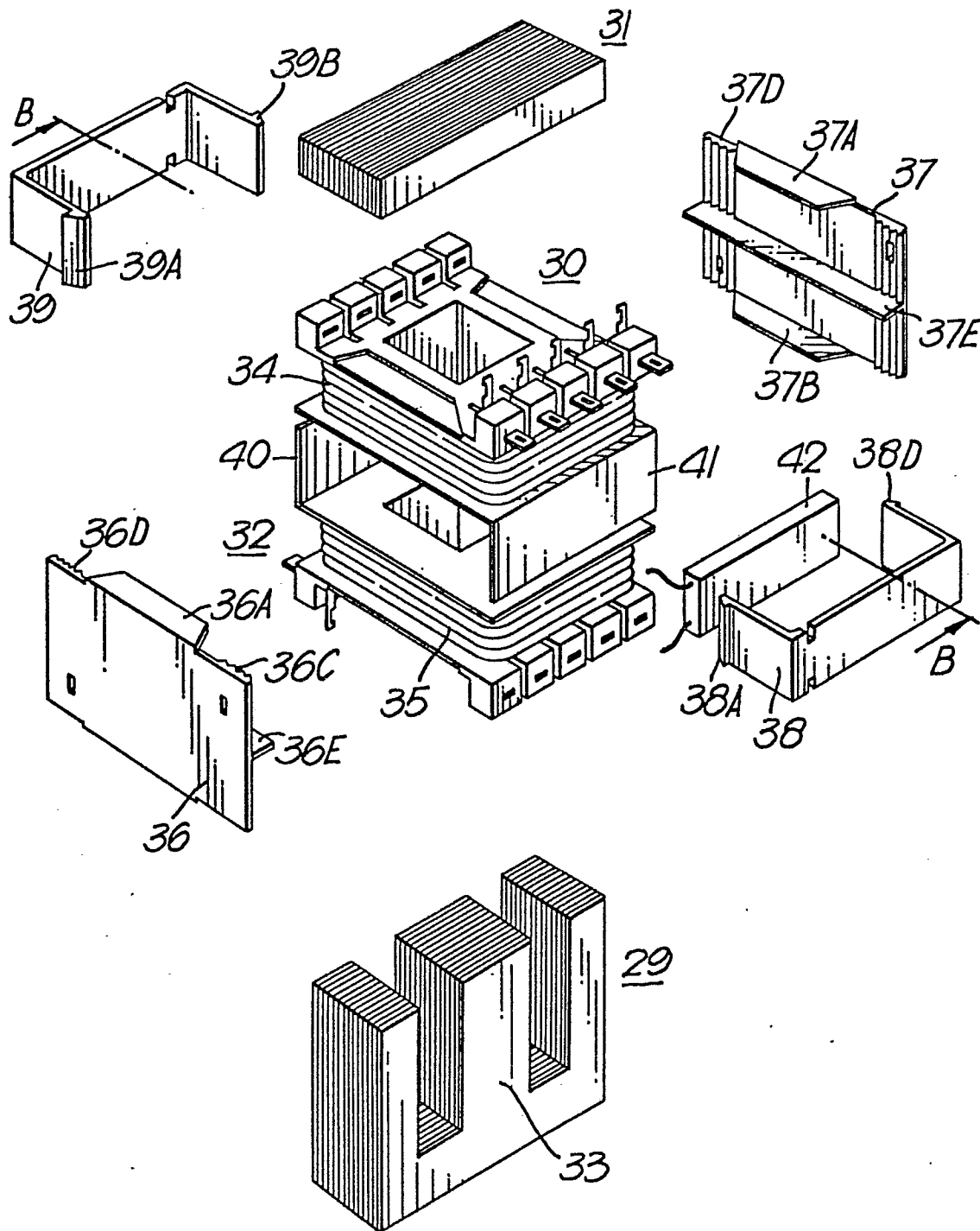


Fig. 5.

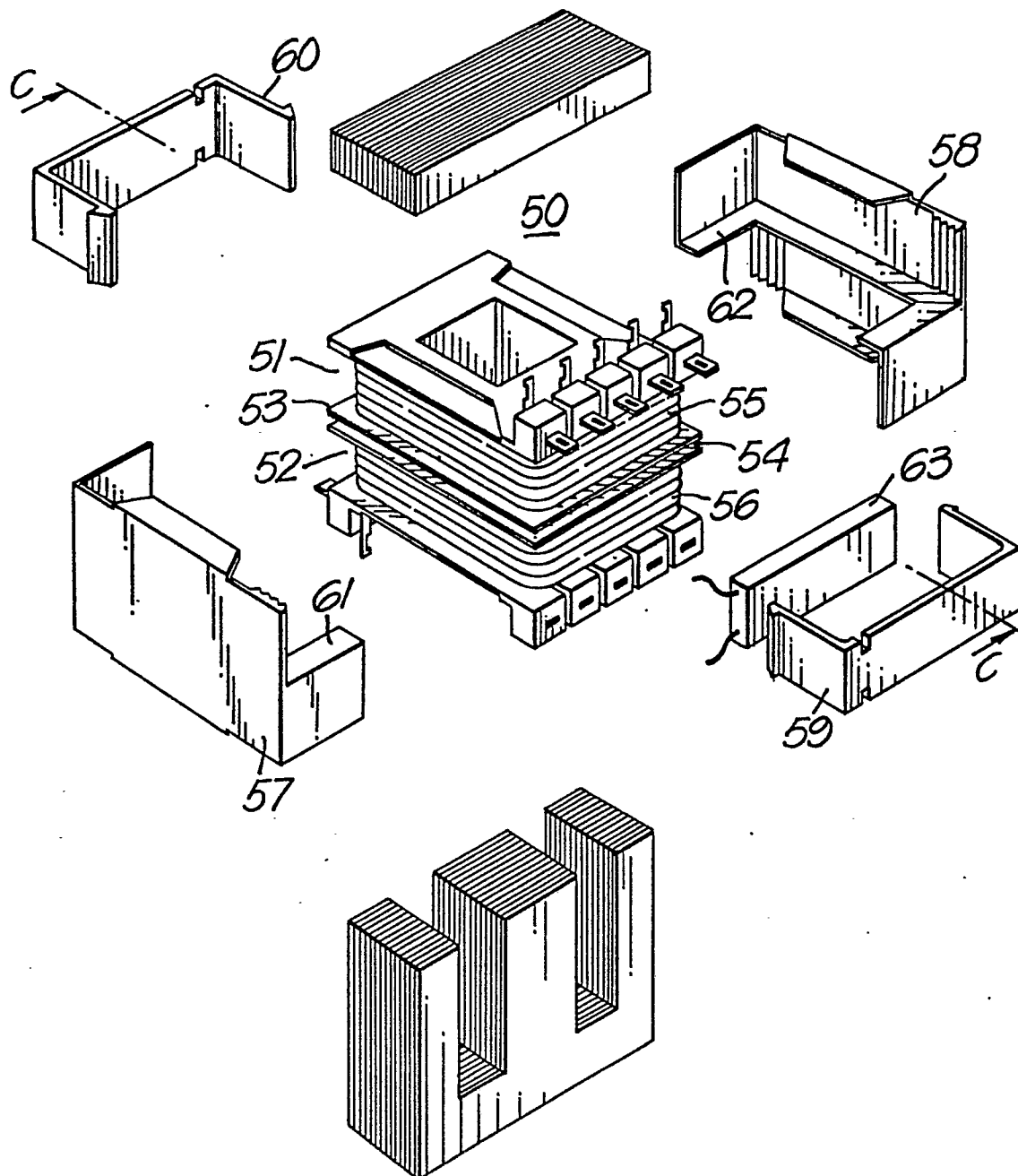
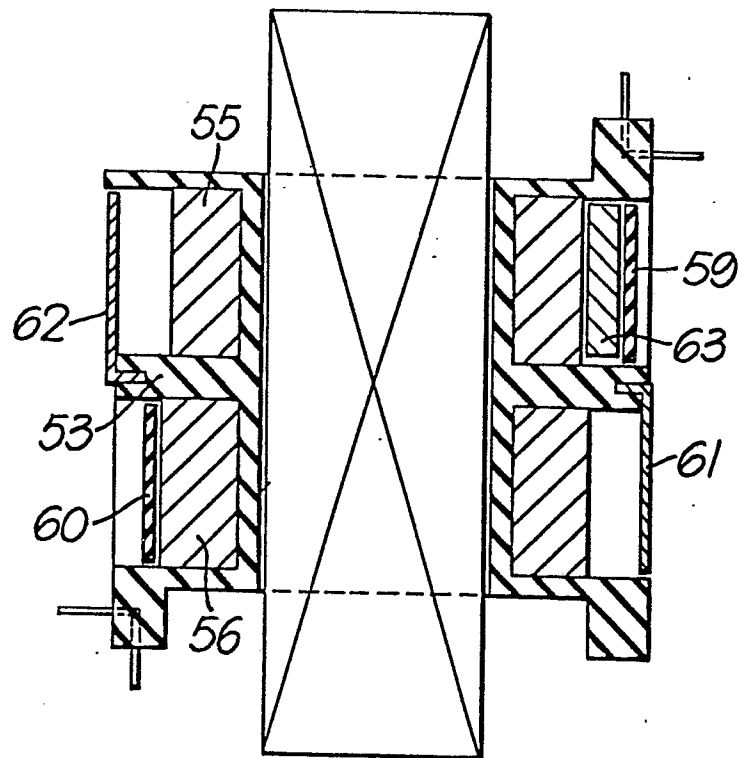


Fig. 6.





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# EUROPEAN SEARCH REPORT

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Application number

EP 81 20 0536

| DOCUMENTS CONSIDERED TO BE RELEVANT                        |                                                                                                                |                                                | CLASSIFICATION OF THE APPLICATION (Int. Cl.)                                                                                                                                                                                                                               |
|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Category                                                   | Citation of document with indication, where appropriate, of relevant passages                                  | Relevant to claim                              |                                                                                                                                                                                                                                                                            |
|                                                            | <u>US - A - 4 112 405</u> (M. JOSEPH)<br>* Column 3, lines 14-41 *<br>--                                       | 1                                              | H 01 F 27/40<br>5/02                                                                                                                                                                                                                                                       |
|                                                            | <u>GB - A - 1 195 699</u> (GROSS, SON & CAMPBELL)<br>* Page 2, lines 9-41 *<br>--                              | 1-3,7                                          |                                                                                                                                                                                                                                                                            |
|                                                            | <u>US - A - 2 956 210</u> (A.F. DORMEYER)<br>* Column 2, lines 36-72; column 3, lines 1-57 *<br>--             | 1,2                                            | TECHNICAL FIELDS<br>SEARCHED (Int. Cl.)                                                                                                                                                                                                                                    |
|                                                            | <u>US - A - 3 173 059</u> (ADVANCE TRANSFORMER COMP.)<br>* Column 2, lines 50-72; column 3, lines 1-46 *<br>-- | 1,6                                            | H 01 F 27/40<br>5/02                                                                                                                                                                                                                                                       |
|                                                            | <u>US - A - 3 691 425</u> (CERTRON CORP.)<br>* Figures *<br>--                                                 | 4                                              |                                                                                                                                                                                                                                                                            |
|                                                            | <u>GB - A - 1 392 495</u> (KABUSHIKI KAISHA TAMURA SEISAKUSHO)<br>* Figures *<br>--                            | 5                                              | CATEGORY OF<br>CITED DOCUMENTS                                                                                                                                                                                                                                             |
| A                                                          | <u>US - A - 3 675 081</u> (GENERAL ELECTRIC)                                                                   |                                                | X: particularly relevant<br>A: technological background<br>O: non-written disclosure<br>P: intermediate document<br>T: theory or principle underlying the invention<br>E: conflicting application<br>D: document cited in the application<br>L: citation for other reasons |
| A                                                          | <u>GB - A - 1 169 743</u> (ASSOCIATED ENGINEERING LTD.)<br>-----                                               |                                                |                                                                                                                                                                                                                                                                            |
| The present search report has been drawn up for all claims |                                                                                                                |                                                | &: member of the same patent family, corresponding document                                                                                                                                                                                                                |
| Place of search<br>The Hague                               |                                                                                                                | Date of completion of the search<br>09-09-1981 | Examiner<br>VANHULLE                                                                                                                                                                                                                                                       |