

12 **EUROPEAN PATENT APPLICATION**

21 Application number: 82300963.4

51 Int. Cl.³: **B 21 D 11/06**
B 21 D 7/02

22 Date of filing: 25.02.82

30 Priority: 26.02.81 GB 8106067
03.11.81 GB 8133073

43 Date of publication of application:
08.09.82 Bulletin 82/36

84 Designated Contracting States:
AT BE DE FR IT NL

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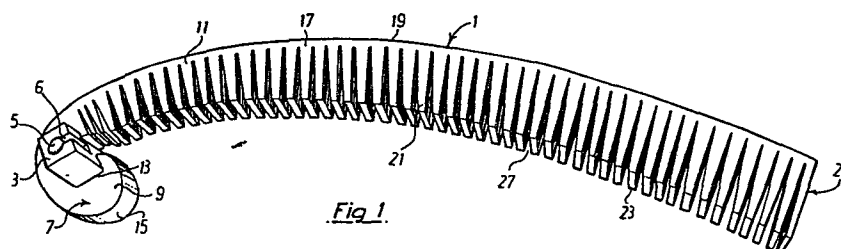
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54 A jig for use in bending strip, bar, pipe or the like material.

57 In decorative metal work it is frequently required to produce scrolls but to date the apparatus for doing that is expensive and requires considerable skill on the part of the user.

The present invention sets out to provide a simple means of forming scrolls and comprises a jig having a central boss 3, a first material support member 5, contiguous with the boss and having a predetermined outer curvature and a flexible elongate support member 7, contiguous with

the first material support member. The flexible support member is rubber or plastics and has a continuous outer periphery defining a spine 17 and a discontinuous inner edge formed by wedge shaped teeth 21 which permit the spine in use to be wrapped around the first material support such that the former is trapped between successive convolutions of the strip material.



DESCRIPTION"A JIG FOR USE IN BENDING STRIP, BAR, PIPE OR THE LIKE
MATERIAL"

5 The present invention relates to a jig for
use in bending strip, bar, pipe or the like material
and in particular for forming scrolls.

In decorative metallic work, such as "wrought iron"
work, utilising cold working materials such as
aluminium or steel strip or bar the need to form
10 scrolls or spirals and indeed curves of an intricate
nature presents numerous difficulties to the operator
in particular to the unskilled amateur.

Traditionally scrolls were produced using an
anvil, the metal being curved around the horn of the
15 anvil forming a three dimensional tapering spiral, which
is subsequently reduced to a two dimensional scroll.
Such an operation requires considerable skill, but once
mastered enables scrolls of varying curvatures to be
produced. However, few amateurs possess an anvil or
20 suitable stakes and these items are expensive.

In an attempt to simplify the production of
scrolls in the interest of the amateur jigs having a
predetermined three dimensional curvature have been
produced. Whilst these simplify the scroll making
25 process it is still necessary to reduce the spiral
formed on the jig to two dimensions, and in addition
the curvature is predetermined and cannot be easily
changed. But more importantly the manufacture of such
jigs involves casting, in the case of a metal jig, and
30 this is necessarily expensive. The jig could be
machined from the solid but this would be both complic-
ated and expensive.

It is an object of the present invention to provide a jig which can be made more economically and which enables two dimensional scrolls to be manufactured comparatively easily.

5 According to the present invention there is provided a jig for bending strip, bar, pipe or the like material comprising a first support member whose outer periphery has a predetermined curvature and which, in use, abuts the inner surface of the material to be
10 bent, a flexible elongate support member which is adapted to be folded around the first support member, and a location boss having an aperture for receiving a part of the material to be bent whereby, in use, the material to be bent is disposed at least between the first support
15 member and the flexible elongate support member.

 In one embodiment the jig is used for forming bends of substantially constant curvature in pipes and the first support member has a convex curvature. The edge of the first support member carries a semi-
20 circular recess for accommodating the inner half of the pipe whilst the flexible elongate support member also has a semi-circular recess for accommodating the outer half of the pipe. The pipe is thus supported externally of the point at which bending takes place.

25 The jig is preferably made of a plastics or hard rubber and the flexible elongate support member comprises an outer spine extending from the first support member and having a plurality of wedge shaped teeth extending from the spine to define at their free ends an inner
30 support surface.

 According to a preferred embodiment there is provided a jig for use in the formation of scrolls, comprising a location boss adapted for locating an end of the scroll material, a first material support

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member, contiguous with the boss, whose outer periphery has a predetermined curvature, and a flexible elongate material support member, contiguous with the first material support member, which
5 diverges in width toward its free end and which is adapted to be wrapped around at least the first material support member.

In use during the formation of the scroll the flexible support member of the jig is interposed
10 between successive turns of the scroll material. The scroll is subsequently removed from the jig.

Preferably the flexible elongate material support member comprises a plastics or rubber material having a spine forming a continuous radially outer edge
15 and a plurality of wedge shaped teeth extending from the spine to define a discontinuous radially inner edge. Wedge shaped apertures between adjacent teeth, permit the elongate material support member to be wrapped around the first material support member.
20 Preferably the first material support member and the flexible elongate material support member are formed from one piece of plastics material.

Alternatively the flexible support may be in the form of a tapered spring.

25 The present invention will now be described further, by way of example only with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of the jig according to the invention;

30 Figure 2 is a simplified plan view of the jig in use.

Figure 3 is a cross section of a second embodiment of the invention;

Figure 4 is a section on line IV-IV of Figure 3, and

Figure 5 is a perspective view of apparatus for forming scrolls using the jig according to the invention.

5 The jig, generally indicated as 1, has a central elongate boss 3 which may conveniently be square in cross-section and made from metal e.g. mild steel. The boss 3 has a bore 5 running in the axial direction and a slot 6 also running in the axial direction and which
10 intersects with the bore 5. The slot is preferably aligned with the axis of the boss whereas the bore is off centre.

A former 7 comprises a first material support member 9 and a flexible elongate material support member
15 11 made from one piece of plastics material.

The first support member 9 has an aperture 13 which is adapted to fit around and engage with the central boss 3. The former has a thickness which is approximately one quarter the length of the central boss and the purpose
20 of this will be described further hereinbelow. A radially outer peripheral edge 15 of the support member 9 is curved by a predetermined amount so that the curvature gradually decreases as the distance from a central point increases and whose shape corresponds with the shape required for
25 the innermost end of the scroll to be formed.

A spine 17 of the flexible elongate support member 11 defines a continuous radially outer edge 19 which is contiguous with the radially outermost edge 15 of the first support 9. A plurality of wedge
30 shaped teeth 21 depend from the spine 17 and define a discontinuous radially inner edge 23. The length of the teeth 21 increases towards the free end 25 of the support member 9. Wedge shaped apertures 27

are defined between the adjacent teeth 21 and these permit the bending of the support 9 along the length of the spine 17.

5 The former may be made from a hard but flexible rubber as an alternative to being a plastics material.

10 In use, according to one method, the unslotted portion of the central boss 3 is clamped in a vice or otherwise rigidly located against turning. One end of a strip of material to be formed into a scroll is inserted into the slot 6 and clamped in position by inserting a tapered rod into the bore 5. Having been located onto the central boss 3 the material is bent around the peripheral edge 15 of the first support member 9. When the straight strip of material is first inserted into the slot in the central boss the flexible elongate support member has to be deflected clockwise in the drawing to permit the material to project from the central boss. Bending of the strip can be achieved by applying pressure of the flexible support member 11 thus deflecting it anticlockwise, in the illustration, or by bending the strip directly. In either case the flexible elongate support member 11 can be wrapped around the central boss 3 so as to overlies the strip of metal bent around the periphery of the first support member 9. Thus when it is required to produce a scroll having more than one turn, the outer periphery 19 of the flexible support 11 formed by the spine 17 serves as the former around which the second turn of the scroll is bent. Thus the former is interposed between successive turns of the scroll. The length of the former determines the possible number of turns of the scroll whilst the length of the teeth determine the distance between the successive turns and the curvature of the scroll.

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In another method, the apparatus for which is illustrated in Figure 5, the central boss 3 is pivotably attached to a support frame or base plate 21.

5 A lever arm for example a spanner is fitted onto the central boss 3 to rotate it and the former about the axis. The support frame 21 carries an upstanding bar 23, preferably circular in cross-section and having a larger diameter flanged head 24, which is spaced from the spigot. The material to be bent is located in the slot 6 in the
10 central boss 3 whilst a part of the material remote from the central boss engages with the upstanding bar 23. Upon rotation of the central boss 3, and hence the former 7, the material is caused to bend around the first support member and then around the flexible support
15 member. During the bending operation the flexible support member is wrapped around the first support member with the first turn of the material interposed therebetween and the scroll is so formed.

In the preferred embodiment the spine of the
20 scroll former has a plurality of spaced apart index marks 27 conveniently in the form of numbers. A datum line 25 is marked on the base plate 21. In use a predetermined size of scroll is formed by rotating the central boss 3 and hence the former thus bending the
25 strip, until the number corresponds to the size of scroll required is aligned with the datum line 25.

In this way accurately dimensioned scrolls may be formed. Thus a strip of material of the required length can be formed with accurately dimensioned scrolls
30 at either end, thus ensuring that the completed multi-scroll piece corresponds in shape to that required in the overall design to be fabricated.

In the preferred construction of Figure 5 the first material supporting member comprises a pair
35 of flanges 31 having a predetermined curvature and

made of metal to resist the higher forces imposed on the jig when bending around such a small radius. The flexible support member is a rubber or plastics material and is reduced in width at one end 33 so
5 that it fits between the flanges 31. The end 33 is bonded to the central boss 6.

Depending on the width of the material, the former 7 is positioned axially on the central boss 3 so as to be symmetrically disposed about the centre
10 of the strip of material.

Typically the material to be formed into a scroll is a cold working metal, e.g. steel or aluminium, although copper and brass would be equally suitable. However, the apparatus may be used also with a
15 thermo-plastics material.

It will be seen that a jig in accordance with the invention enables two dimensional scrolls to be produced without having to first make a three dimensional tapered spiral. In an improvement a circular
20 flat plate is fitted into the central boss 3 so as to ensure that the scroll, as it is being formed, does not deviate from one plane.

Another embodiment of the invention is illustrated in Figs. 3 and 4. This embodiment is intended for
25 bending circular material, and in particular thin walled pipes such as micro-bore copper tube as used in domestic heating systems. The apparatus comprises a former 31 having a first inner support member 33 and a flexible elongate outer support member 35. The inner support
30 member 33 has an outer peripheral edge 37 which is convex and which extends through approximately 180°. The edge 37 has a semi-circular recess 49 which is of an appropriate size to accommodate a predetermined diameter of pipe.

The flexible outer support member 35 comprises a flexible spine 39 having projection therefrom, in the direction of the inner support member 33 a plurality of wedge shaped teeth 41 which converge in width
5 towards their free end, wedge shaped cut-outs 43 being defined between the adjacent teeth 41 when the spine 39 is in its free state. The cut-outs 43 permit the spine to be wrapped around the inner support member 33 such that when so wrapped the free
10 ends of the teeth form a continuous concave inner peripheral edge 45. The ends of the teeth have formed therein a semi-circular recess 51 which accommodates the outer half of the pipe to be bent. The former has an aperture 47 into which an end or
15 part of the pipe to be bent is received for location purposes. The former has a central boss by means of which it can be located or clamped during bending.

The recesses 49, 51 in the inner and flexible support member 33, 35 ensure that the outer surface
20 of the pipe is supported at the point of bending and this prevents the pipe from collapsing. The former may be made from a hard, non-spongy plastics or rubber material, but which will bend along the spine 39. Alternatively the former 31 may be made from
25 metal in which case the flexible outer support member may comprise a plurality of links which are pivotally interconnected.

Where a hard plastics or rubber is used the edges on either side of the semi-circular recess may
30 be in the form of a metallic flange which serves as reinforcement to prevent spreading of the pipe during bending.

In use the pipe is located into the aperture and is bent by applying hand pressure to the outer support 35. For heavier gauge pipes the former may be rotated about a spigot by a lever so that the outer
5 edge of the support 35 i.e. the spine 39, engages an upstanding bar whereby the pipe and the flexible support 35 are wrapped around the inner support 33.

Pipes of different diameters may be bent using jigs having correctly dimensioned recesses. Alternat-
10 ively one jig may be provided with a number of different sized recesses disposed side by side to accommodate different sizes of pipes. Different curvatures may be formed by using jigs having a different shape of inner support member. In an alternative, inner support
15 members having different curvatures may be releasably attached to the jig so that different curvatures may be produced using the jig.

The flexible former may also take the form of a tapered spring. The jig may be modified to enable
20 hexagonal or rectangular shapes to be produced. This might best be achieved by changing the shape of the first support member. Where the former is a rubber material it may be provided with a fibre reinforcement.

25 Advantageously the jig according to the embodiment of Figs. 3 and 4 may be used in place of conventional pipe bending, which is expensive, and in place of the spring inserts which are not always reliable in operation.

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CLAIMS

1. A jig for bending strip, bar, pipe or the like material characterised by a first material support member (9, 33) whose outer periphery (15, 31, 37) has a predetermined curvature and which, in use, abuts the inner surface of the material to be bent, a flexible elongate support member (11, 35) which is adapted to be wrapped around the first support member, and a location boss (3) having an aperture (6, 47) for receiving a part of the material to be bent, in use, the material to be bent being disposed at least between surfaces of the first support member (9, 33) and the flexible elongate support member (11, 35).

2. A jig as claimed in claim 1, for use in the formation of scrolls characterised in that the first material support member (9) is contiguous with the location boss and that the elongate material support member (11) is contiguous with the first material support member (9) and diverges in width towards its free end (25).

3. A jig as claimed in claim 1, characterised in that the elongate material support member (11, 35) is a plastics or rubber material having a continuous outer edge or spine (17, 39) and a plurality of wedge shaped teeth (21, 41) extending from the spine to define a discontinuous inner edge (23).

4. A jig as claimed in claim 3, characterised in that wedge shaped apertures (27, 43) between the adjacent teeth (21, 41) permit the elongate material support member (11, 35) to be wrapped around the first material support member.

5. A jig as claimed in claims 2, 3 or 4, characterised in that the elongate material support member (11) is bonded to the boss (3) or the first material support member (9).

6. A jig as claimed in any preceding claim, characterised in that the curvature of the first material support

member is defined by a metallic flange (31).

7. A jig as claimed in claim 6, characterised in that the metallic flange (31) has a spiral curvature.

5 8. A jig as claimed in any preceding claim, characterised in that the boss (3) has a slot (6) for receiving the end of the material to be bent.

10 9. A jig as claimed in any preceding claim, characterised in that the boss (3) is pivotally secured to a base plate (21) and the base plate is provided with a reaction lug (23) spaced from the boss against which the material to be bent engages during formation of the scroll.

15 10. A jig as claimed in claim 9, characterised in that a lever co-operates with the boss (3) for rotation of the boss.

20 11. A jig as claimed in any preceding claim, characterised in that at least the flexible elongate support member (7) has index marks (27) spaced along the outer periphery for use in determining the size of scroll to be formed.

12. A jig as claimed in claim 11, when appendent to claims 8 or 9, characterised in that the index mark is aligned, in use, with a datum line (25) on the base plate (21).

25 13. A jig as claimed in claim 1 or any of claims 3 to 6 when appendent to claim 1, for forming bends of substantially constant curvature characterised in that the first support member (33) has a convex curvature and the elongate support member comprises an outer spine (39) and a plurality of wedge shaped teeth (41) which
30 define at their free ends an inner support surface.

14. A jig as claimed in claim 13, for bending pipes characterised in that the edge (37) of the first support member (33) has formed therein a semi-circular recess
35 (49) for accommodating the inner half of the pipe to be bent and the outer half of the pipe is accommodated in

a semicircular recess formed in the ends of the teeth (41).

15. A method of forming a scroll using a jig as claimed in any of the preceding claims 1 to 12, characterised by inserting one end of a strip of material to be bent into a recess (6) in a location boss (3), contacting the strip of material with the outer periphery (15, 31) of a first support member (9) having a predetermined curvature, and wrapping the strip around same, contacting the strip with the outer surface (19) of the flexible elongate material support member (11), causing the flexible support member (11) to wrap around the first support member (9) so that the flexible support member (11) is interposed between successive convolutions of the strip.
16. A method as claimed in claim 15, characterised in that the strip to be bent engages a reaction lug (23) carried by a mounting plate (21) and the strip is contacted with the scroll former (7) by rotating the boss (6) by means of a lever.
17. A method as claimed in claim 16, characterised in that the boss (6) is rotated until a datum line (25) on the base plate (21) is aligned with a selected one of several index marks (27) carried by the flexible elongate member (11) of the scroll former so forming a scroll of a particular size.

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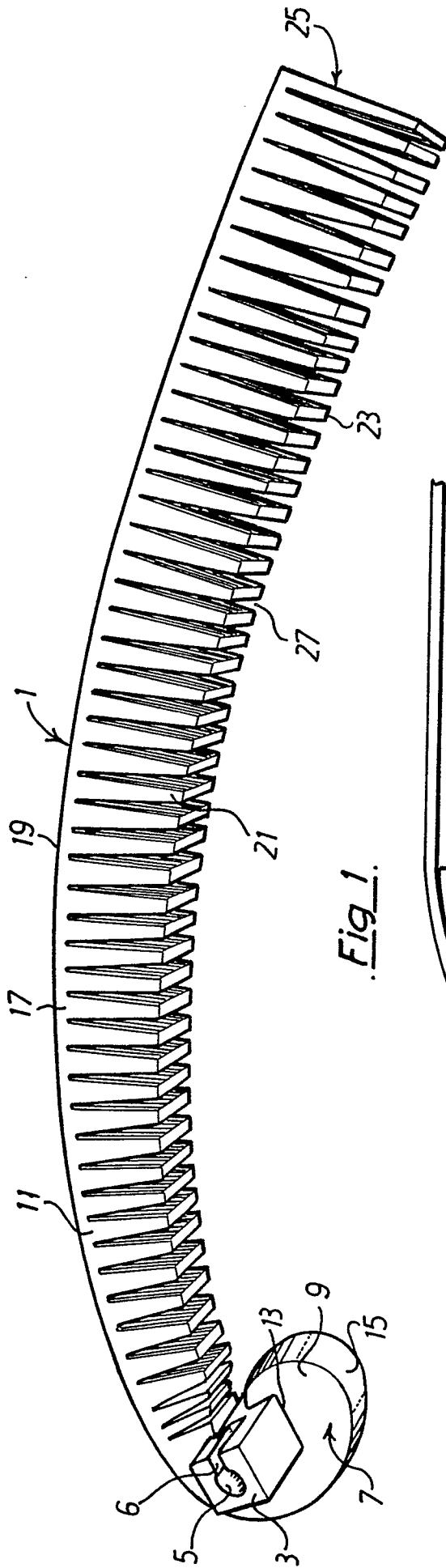


Fig. 1.

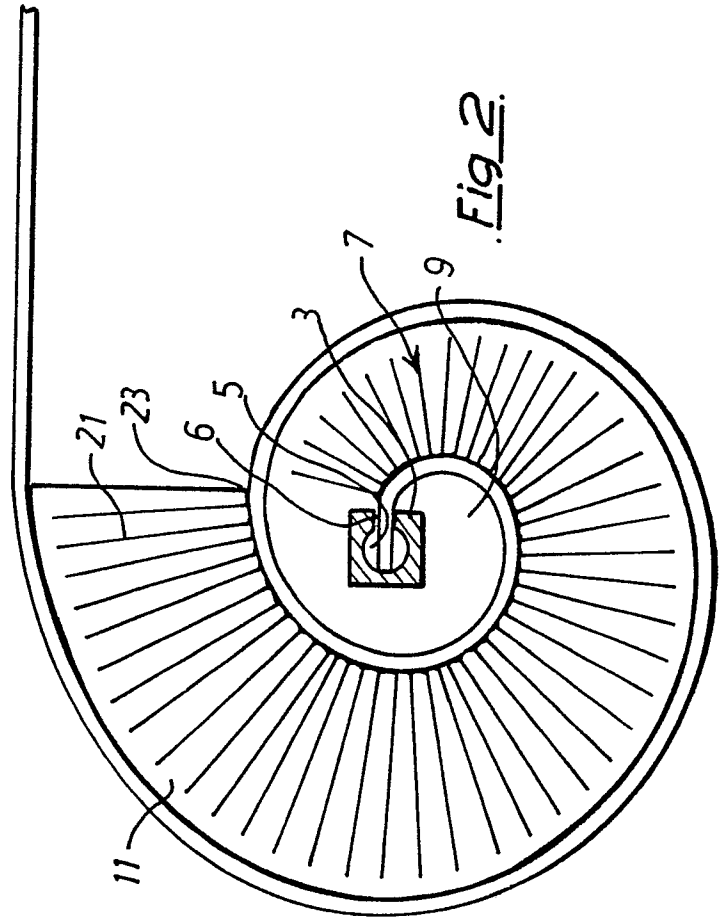
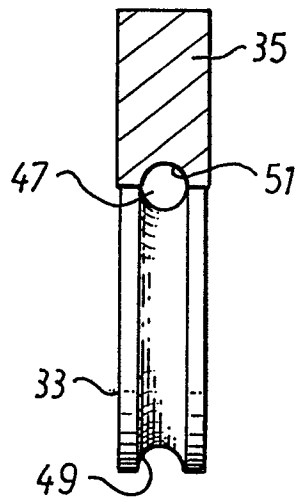
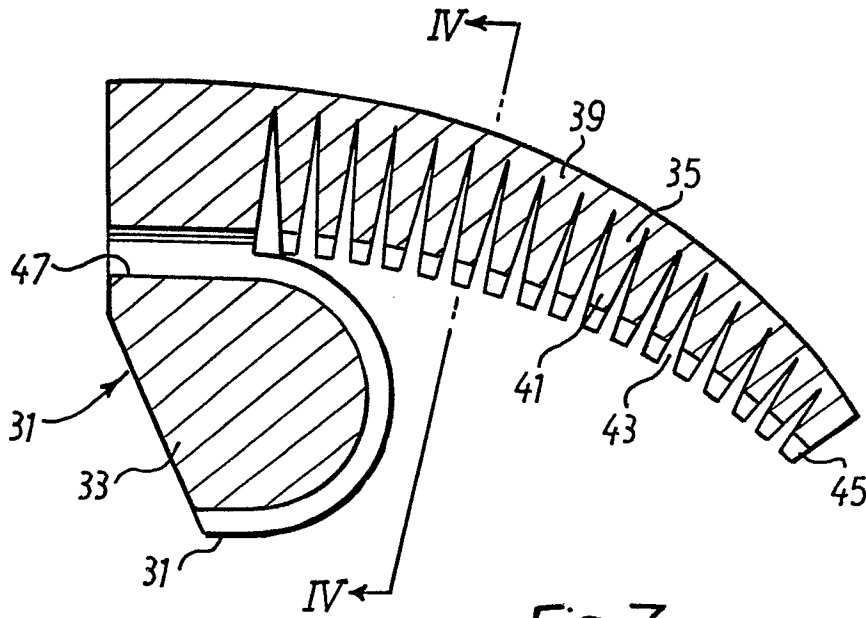


Fig. 2.

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