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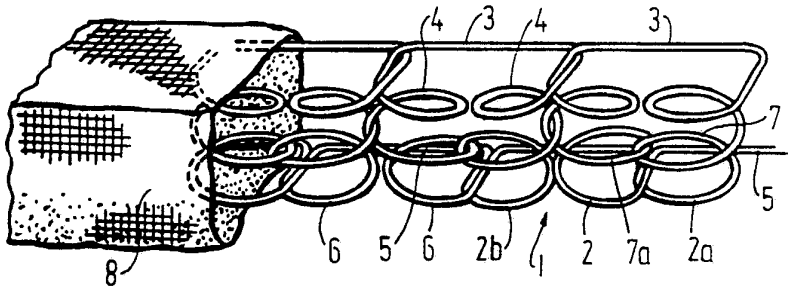

(57) Abstract

A spring unit for use in making spring interiors for articles of furniture comprising a continuous coil spring (1) sheathed in a sleeve or envelope (8) of strong yet flexible material. One or more spring units (15, 19) may be used to make the spring interior, the, or each spring unit (15, 16) being so arranged such that lengths of spring unit (15, 16) are disposed side by side with the longitudinal axes of the springs generally parallel with one another and with the upper and lower coils of the springs lying, respectively, in an upper and lower plane.

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DESCRIPTION

SPRING UNITS FOR MATTRESSES AND THE LIKE

The present invention relates to spring units for use in mattresses, spring upholstered furniture and the like, and to apparatus for manufacturing said spring units. The present invention also relates to a spring interior comprised of a plurality of said spring units. The present invention further relates to an article of spring upholstered furniture comprised of one or more of said spring interiors.

One well known type of spring interior is comprised of a plurality of discrete coil springs, each of which is sewn into a respective one of a plurality of elongate pockets formed in a length of calico or similar purpose material. The axes of the springs lie generally parallel with one another such that a band of springs is formed, with the upper and lower coils of the springs defining the upper and lower faces of the band. A spring interior can be fabricated from the band of springs in either one of two ways. Firstly, a plurality of bands of springs may be disposed side by side and adjacent rows clipped, stitched, glued or otherwise joined together to form a spring interior of the desired size. Alternatively, a single band of springs may be folded back and forth on itself to form a zigzag pattern of rows, whereupon adjacent rows are, again, joined together.

This type of spring interior is commonly referred to as a pocketed spring interior owing to the fact that each spring is contained within a respective pocket of calico material. It is generally acknowledged that pocketed spring interiors have a unique and particular luxurious feel to them, and mattresses comprised of pocketed spring interiors are said to have a feeling of softness about them, without lacking spring resilience. However one describes the feel of a pocketed spring interior it is certainly the case that they command a high price. This can be attributed to the considerable amount of time and labour which is involved in their manufacture, together with the fact that the method of fabrication and assembly of pocketed spring interiors does not readily lend itself to automation; each spring is individually stitched into its own pocket and bands of springs are then arranged in rows to be joined together.

As well as being comparatively expensive pocketed spring interiors have certain inherent disadvantages associated with them. To accommodate the load on each spring the springs may need to be made of relatively heavy gauge spring wire. In addition, because the springs are completed unsupported, except by the pocket of material in which each is contained, they suffer from instability and a tendency to become dislocated. This problem can be minimised by keeping the springs very close together, but this leads to one spring interfering

with its immediate neighbours, and because a higher spring count is necessary further adds to the high cost of pocketed spring interiors.

Another well known type of spring interior comprises a plurality of bands of continuous coil springs disposed side by side and interconnected by a plurality of helical wires, bands, rings or the like. Each band of continuous coil springs comprises a single length of wire in which a plurality of individual coil springs is formed. Each spring is wound in the opposite direction to the springs immediately adjacent to it in the band and is joined thereto by wire links which are formed by straight extensions of the upper and lower coil of each spring. Each coil spring is coupled with the next by having an intermediate coil thereof interlaced with the corresponding coil of the adjacent spring. When bands of continuous coil springs are assembled together to form a spring interior they are disposed side by side with the longitudinal axes of the springs generally parallel with one another and the upper and lower coils of each spring in an upper and lower plane, respectively.

Although this type of spring interior does not suffer from "cupping" to the same extent as a pocketed spring interior and provides good overall support, it lacks the flexibility and soft, yet resilient feel of a pocketed spring interior. This can be attributed to the interconnected mesh of springs which comprise the spring

interior. As will be readily appreciated the continuous coil springs are not only joined together along each row, but are also interlinked between adjacent rows. This reduces the ability of each spring to act independently when supporting a load and, instead, there is a tendency for the springs to be pulled towards the point of heaviest loading.

It is an object of the present invention to provide a novel spring unit.

It is another object of the present invention to provide apparatus for manufacturing these spring units.

It is yet another object of the present invention to provide a spring interior comprising one or more of these spring units which obviates or substantially mitigates the problems and disadvantages associated with the conventional spring interiors referred to hereinabove, whilst retaining their advantages.

It is still another object of the present invention to provide an article of spring upholstered furniture comprised of one or more of these spring interiors.

According to a first aspect of the present invention there is provided a spring unit comprising a continuous coil spring contained within a sleeve of strong, yet flexible material.

The sleeve of material may be comprised of virtually any strong yet flexible material, though for preference it is comprised of calico. The sleeve of material may be

loosely fitting or an exact fit or it can be so tight as to lightly compress the springs. To this end the sleeve of material may be either in-elastic or elastic as required. The sleeve of material may be formed separately and the continuous coil spring threaded through it, or the sleeve may be formed by wrapping one or more sheets of material around the continuous coil springs.

Where the continuous coil spring is threaded through the sleeve the sleeve is conveniently carried on a tubular former through which the continuous coil spring is drawn. As the continuous coil spring is drawn out through the tubular former it entrains the sleeve with it and draws the sleeve off the tubular former around it. In order to facilitate entry of the continuous coil spring into the sleeve or envelope the springs comprising the continuous coil spring may be compressed before entry into the sleeve or envelope.

Where the sleeve is formed by wrapping one or more sheets of material around the continuous coil spring, both the sheets of material and the continuous coil spring are conveniently fed together through a former device which directs the edges of the sheets around the continuous coil spring, thereby enveloping the continuous coil spring in the sheet of material. The edges of the sheet or sheets are then joined together by stitching, gluing, heat welding or the

like to complete the sleeve. Alternatively, the continuous coil spring may be sandwiched between two sheets of material the edges of which are then joined together to complete the sleeve of material around the continuous coil spring.

The term "continuous coil spring" is understood to mean a plurality of coil springs connected in series to form a band or continuous length of coil springs. The coil springs in each band are conveniently fabricated from a single length of sire and each spring is connected to its immediate neighbour by a wire link formed by an extension of the upper or lower coil thereof. To facilitate fabrication each spring is wound in the opposite direction to its immediate neighbour in the band, though the springs can all be wound in the same direction is so required. As an alternative to fabricating each band of coil springs from a single length of wire, each coil spring may be formed separately and connected to its immediate neighbour in the band by rings, bands, wire links or the like.

According to a second aspect of the present invention there is provided a spring interior comprising a plurality of lengths of spring unit according to the first aspect of the present invention, the lengths of spring unit being disposed side by side with the longitudinal axes of the springs generally parallel with one another and the upper and lower coils of each spring

lying in an upper and lower plane respectively.

In a first embodiment the said plurality of lengths of spring unit disposed side by side are formed by repeatedly folding a single length of spring unit back and forth on itself such that a generally zigzag shaped configuration is defined. Alternatively, a single length of spring unit can be wound round on itself in a spiral to form the spring interior.

In a second embodiment the spring interior is comprised of a plurality of discrete lengths of spring unit disposed side by side.

The said plurality of lengths of spring unit disposed side by side may be connected or joined together by a variety of means. In this respect, the coil springs from adjacent lengths of spring unit may be linked together and/or the sleeves of material may be joined together. The coil springs may be joined together by means of, for example, hog rings and/or stitches which pass through the sleeves of material. The sleeves may be joined together by, for example, welding, stitching or gluing. Other linking means and/or joining techniques may also be employed as will be readily apparent to those skilled in the art. Additionally, the said plurality of lengths of spring unit may be contained within an outer casing or envelope.

In yet another embodiment of the spring interior a plurality of lengths of continuous coil spring, formed

either from discrete lengths of continuous coil spring, or from a single length of continuous coil spring repeatedly folded back and forth on itself are sandwiched between two sheets of material, the two sheets being joined together between adjacent lengths of continuous coil spring, thereby enclosing each length of continuous coil spring in a respective sleeve of material. It will be appreciated that the two sheets of material may be joined together with the continuous coil springs in situ therebetween, or, in the alternative, the continuous coil springs may be introduced into the sleeves in a separate operation.

As will be readily appreciated in the third embodiment of the spring interior described immediately above adjacent lengths of sleeved continuous coil spring are joined together by the material between adjacent sleeve. However, this conection may still be supplemented by a variety of connecting means, including hog rings and/or stitching linking the coils of adjacent lengths of continuous coil springs, and stitching, gluing and/or welding together of adjacent sleeves.

Preferably, the spring interior comprises an additional length of spring unit in accordance with the first aspect of the present invention which extends around the perimeter of the said plurality of spring units disposed side by side, thereby defining a border therearound.

Preferably, the spring interior is secured to and supported by a peripheral frame. This peripheral frame may comprise a pair of steel bands or wires each of which encircles the spring units comprising the spring interior and lies in the same plane as a respective main face of the spring interior.

Owing to the unique construction of the spring interior of the present invention its performance cannot be directly compared with either conventional pocketed spring interiors or conventional continuous coil spring interiors. Nevertheless, it has been found to have a feel approaching that of a conventional pocketed spring interior, whilst retaining the benefits of a conventional continuous coil spring interior.

By enclosing each length of continuous coil spring in its own sleeve and isolating it from adjacent lengths of continuous coil spring the coils in each length of continuous coil spring are allowed to move independently of those in the adjacent lengths of continuous coil spring. This at least mitigates the tendency of conventional continuous coil spring interiors to pull the spring matrix towards the point of heaviest load. It also results in very much less noise from the coils as they move relative to one another under load as compared with conventional continuous coil spring interiors.

The large number of springs per unit area which is made possible by the use of continuous coil springs

allows light gauge wire to be used which is relatively easy to work. Additionally, the use of continuous coil springs, each enclosed within its own sleeve, makes assembly of the spring interior a relatively simple matter which is readily suited to automation. Further, the link wire between adjacent coils in each length of continuous coil spring provides an additional torsion spring and helps to prevent "cupping" from occurring.

According to a third aspect of the present invention there is provided an article of upholstered furniture comprising one or more spring interiors according to the second aspect of the present invention.

Though by no means an exhaustive list the term "article of upholstered furniture" may be taken to include mattresses for beds, spring upholstered cushions, whether formed separately or as an integral part of the article of upholstered furniture, seat squabs, back rests, arm rests, head rests, headboards for beds and the like.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 shows a perspective view of a spring unit according to the first aspect of the present invention;

Fig. 2 shows a schematic view of a first apparatus for enveloping a band of coil springs in a cloth sleeve;

Fig. 3 shows a schematic view of a second apparatus

for enveloping a band of coil springs in a cloth sleeve;

Fig. 4 shows a diagrammatic plan view of a first spring interior embodying the second aspect of the present invention;

Fig. 5 shows a diagramatic plan view of a second spring interior embodying the second aspect of the present invention;

Fig. 6 shows a section through a spring interior embodying the second aspect of the present invention and employing a plurality of integrally formed sleeves;

Fig. 7 shows a schematic view of an apparatus for simultaneously enveloping each of a plurality of lengths of continuous coil spring in a respective sleeve and producing a spring interior as shown in Fig. 6; and

Fig. 8 shows a diagramatic view of a mattress comprising a pair of spring interiors according to the second aspect of the present invention in which the exterior upholstery has been partially cut away.

Referring to Fig. 1 of the accompanying drawings there is shown a spring unit embodying the present invention comprising a single band of continuous coil springs 1 which is formed from a length of spring wire shaped to form a plurality of indiviual coil springs 2. Each spring 2 is wound in the opposite direction to its two immediate neighbours in the abnd and is joined to one adjacent spring 2a by a wire link 3 which forms an integral extension of the upper coils 4 of the two

springs 2, 2a and to the other adjacent spring 2b by a wire link 5 which forms an integral extension of the lower coils 6 of the two springs 2, 2b. Each spring 2 is coupled to the spring 2 adjacent to it by having one intermediate coil 7 thereof interlaced with the corresponding intermediate coil 8 of the next spring.

The continuous coil spring described hereinabove is of conventional construction, but it should be understood that the spring unit according to the present invention is not intended to be limited to this particular configuration and can comprise continuous coil springs of any configuration. For example, successive coil springs in a band need not be wound in the opposite direction, but can all be wound in the same direction if so required. Furthermore, each coil spring can be formed separately and connected to its immediate neighbour in the band by rings, bands, wire links or the like.

The band of continuous coil springs 1 is enveloped or sheathed within a sleeve of calico material 8 which is closed at both ends to complete the spring unit according to the present invention. The sleeve of material may be loosely fitting or an exact fit or it can be so tight as to lightly compress the springs. To this end the sleeve of material may be either in-elastic or elastic as required. One or a plurality of spring units embodying the present invention can be assembled to form a spring interior as will be described later hereinbelow.

Two methods of enveloping the continuous coil spring 1 in the sleeve of calico material 8 will now be described:-

In a first such method, which is illustrated with reference to Fig. 2 of the accompanying drawings, a separately formed sleeve of calico material 8 is carried on a tubular former 9 and the band of continuous coil spring 1 is wound onto a reel 10. The free end of the band 1 is drawn off the reel 10, through one end of the tubular former 9 and out the other end. As the band 1 passes through the tubular former 9 it draws off the sleeve of calico material from the tubular former 9 and entrains it around itself. Although not shown the free end of the enveloped band of continuous coil spring may be wound onto a second reel for use later. Once enough of the band 1 has been covered with the calico sleeve 8, both are cut and the open ends of the calico sleeve 8 stitched together.

In an alternative method, illustrated with reference to Fig. 3 of the accompanying drawings, a continuous sheet of calico material 11 is carried on a reel 12 and the band 1 is wound on a reel 10. The free ends of the calico material 11 and of the band 1 are drawn through a V-shaped former 13 which serves to direct the sides of the sheet 11 up and around the band 1. Above the V-shaped former 13 is a stitching machine 14 which simultaneously draws the sides of the calico material 11

together and stitches them together. Thus, the band 1 is covered in a sleeve of calico material 8.

As with the method of manufacture described with reference to Fig. 2, once the required length of band 1 has been covered with the calico sleeve 8, the band 1 may be cut to length and the open ends of the sleeve 8 stitched together.

Although the techniques illustrated with reference to Figs. 2 and 3 both show the band 1 being drawn from a reel 10, it will be appreciated that both techniques may also be applied to the band 1 as it comes off the coil forming and coil interlacing equipment.

Referring now to Fig. 4 of the accompanying drawings there is shown a diagramatic plan view of a spring interior emboyding the second aspect of the present invention in which a plurality of discrete lengths of the spring unit 15 described with reference to Fig. 1 are disposed side by side. Adjacent lengths 15 are connected together by hog rings 16, each of which serves to connect a spring 2 from one length 15 to the neighbouring spring 2 in the adjacent length 15. Around the perimeter of the spring interior, opposite the upper and lower main faces thereof, there is provided a peripheral frame 17 which provides support for, and rigidity to, the edges of the spring interior. Each frame 17 is connected to the spring interior by means of short strips of metal 18 each of which is connected between the frame 17 and an

adjacent spring 2 of the spring interior.

As will be readily appreciated from Fig. 4 the spring interior is, in the conventional sense, neither a continuous coil spring interior, nor a pocketed coil spring interior. However, it retains features of both types. Specifically, the independent movement allowed between the coil springs 2 in adjacent lengths 15 of the spring unit according to the first aspect of the present invention avoids the tendency of conventional continuous coil spring interiors to pull the spring matrix towards the point of heaviest load. This ensures much more uniform and even support for the load and results in greater comfort for a person resting on the spring interior. Moreoever, because each length of continuous coil spring is isolated from its neighbour by the sleeve of calico material there is much less spring noise as the springs 2 in adjacent lengths move relative to one another.

The spring interior of the present invention still makes use of continuous coil springs, and as such manufacture of the spring interior is very much quicker, simpler and less costly than with conventional pocketed coil spring interior where each coil must be separately secured into its own pocket in the spring interior. Additionally, the large number of coil springs per unit area in a continuous coil spring interior means that the gauge of spring wire used can be reduced without

significantly affecting the performance of the spring interior.

Referring now to Fig. 5 there is shown a diagramatic plan view of an alternative spring interior embodying the second aspect of the present invention. In this embodiment a single length 19 of the spring unit described with reference to Fig. 1 is folded back and forth on itself several times to form a plurality of rows disposed side by side. As in the previous embodiment of Fig. 4 adjacent rows are connected together by means of hog clips 18. A further length 19a of the spring unit described with reference to Fog. 1 is wrapped around the perimeter of the spring interior to finish the edge off. As in the spring interior described with reference to Fig. 4 a peripheral frame 17 is provided opposite the top and bottom main faces of the spring interior to provide support for and rigidity to the edges of the spring interior.

Referring now to Fig. 6 of the accompanying drawings there is shown yet another spring interior embodying the second aspect of the present invention in which two facing sheets 20 and 21 of calico material are stitched together at spaced intervals 22 along their width. The stitching extends the full length of the sheets 20 and 21, and as such defines a plurality of elongate sleeves 23. Within each sleeve 23 there is contained a discrete length of continuous coil spring 24. To complete the

spring interior the open ends of the sleeve 23 are stitched together.

It will be understood that the two sheets of material may be stitched together with the continuous coil springs 24 in-situ therebetween using, for example, a multi-needle quilting machine or multi-head sewing machine, as shown in Fig. 7. With reference to Fig. 7 there is shown a plurality of reels 25, each of which carries a band of continuous coil spring 26. Above and below the reels 25 there is provided a roll 26, 27 of calico material 28, the width of each of which is slightly greater than that of the spring interior to be produced. Positioned in front of the reels 25 and the rolls 26 is a multi-head sewing machine 29 comprising a plurality of sewing heads 30.

In use, the bands of continuous coil spring 26 are drawn from the reels 25 and are sandwiched between the calico material 28 drawn from the upper and lower rolls 26, 27. This sandwich of material 28 and bands 26 is then drawn through the multi-head sewing machine 29 which is so configured that a sewing head 30 passes along each side of the bands 26 and stitches together the upper and lower sheets of calico material 28. Thus, each band 26 is enclosed within a respective sheath 31 of calico material 28. After production the resultant spring interior can be cut to size and the open ends of the sheaths 31 stitched together.

As an alternative to the above method of manufacture, the two sheets 20 and 21 may be stitched together separately and the continuous coil springs 24 introduced into the sleeves 23 in a separate operation using, for example, a plurality of tubular formers to support each sleeve whilst a length of continuous coil spring 24 is introduced therein as described hereinabove with reference to Fig. 2.

Referring now to Fig. 7 of the accompanying drawings there is shown a mattress 32 comprising two spring interiors 33, 34 embodying the present invention which are separated from each other by a layer of wool padding material 35 and covered with a suitable covering material 36.

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CLAIMS

1) A spring unit comprising a continuous coil spring (1), as hereinbefore defined, sheathed within a sleeve or envelope of strong, yet flexible material (8).

2) A spring unit according to Claim 1, wherein the sleeve or envelope (8) is comprised of calico.

3) A spring unit according to Claim 1 or 2, wherein the springs of the continuous coil spring (1) are lightly compressed by the sleeve or envelope (8).

4) A spring unit according to Claim 1, 2 or 3, wherein the sleeve or envelope (8) is preformed prior to the insertion therein of the continuous coil spring (1).

5) A spring unit according to Claim 1, 2 or 3, wherein the sleeve or envelope (8) is formed by wrapping one or more sheets of material around the continuous coil spring and joining together the edges thereof.

6) A spring interior comprising a plurality of spring units (15) according to any preceeding claim, the spring units (15) being disposed side by side with the longitudinal axes of the springs generally parallel with one another and with the upper and lower coils thereof lying, respectively, in an upper and lower plane.

7) A spring interior comprising at least one spring unit (19) according to any one of Claims 1 to 5, the spring unit (19) being folded at intervals along its length such that adjacent lengths of the spring unit (19)

are disposed side by side with the longitudinal axes of the springs generally parallel with one another and with the upper and lower coils thereof lying, respectively, in an upper and lower plane.

8) A spring interior according to Claim 6 or 7, wherein the springs from adjacent lengths of spring unit (15, 19) are connected to one another.

9) A spring interior according to Claim 6, 7 or 8, wherein the sleeve or envelope (8) of each length of spring unit (15, 19) is joined or connected to the sleeve of each immediately adjacent length of spring unit (15, 19).

10) A spring interior according to Claim 9, wherein a plurality of lengths of continuous coil spring (24) are sandwiched between two sheets (20, 21) of material, the two sheets (20, 21) being joined together on each side of each length of continuous coil spring (24), thereby enclosing each length of continuous coil spring 24 in a respective sleeve or envelope of material.

11) A spring interior according to any one of Claims 6 to 10, wherein a frame (17) is provided around the periphery thereof and the spring units (15, 19), comprising the spring interior are secured to and supported by the frame (17).

12) An article of upholstered furniture comprising at least one spring interior according to any one of Claims 6 to 11.

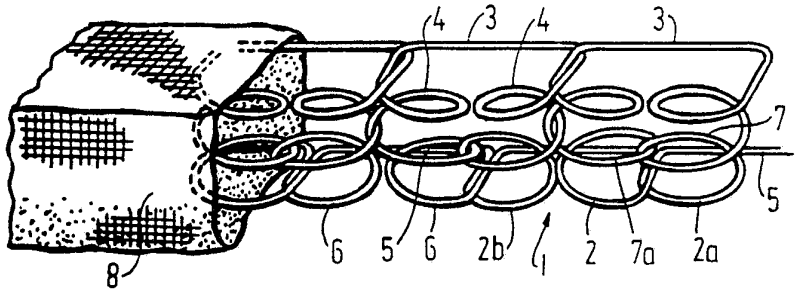

FIG.1

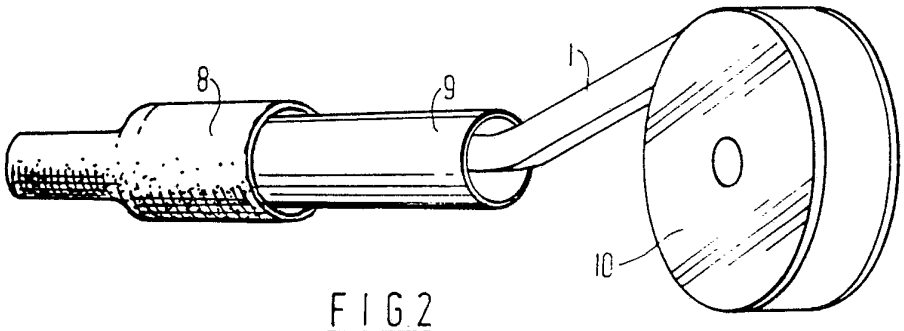

FIG 2

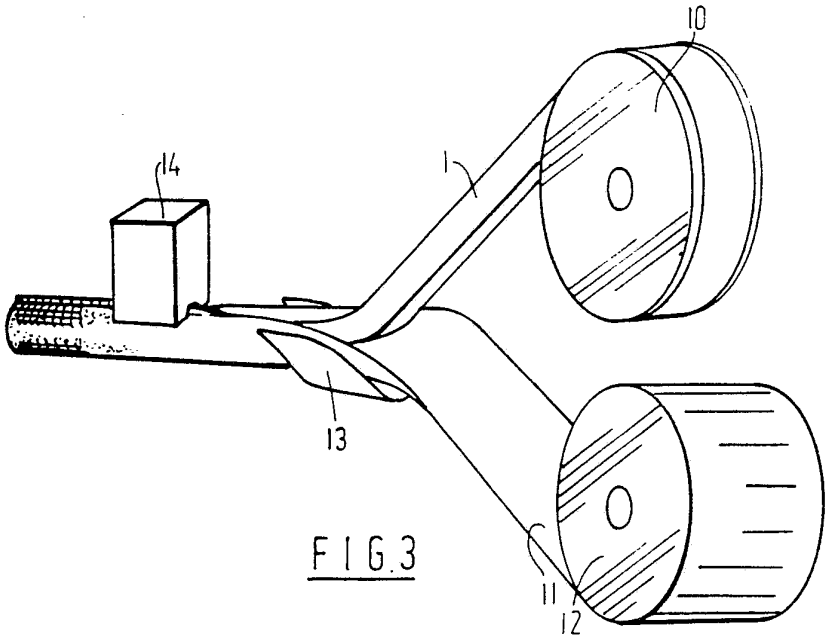

FIG.3

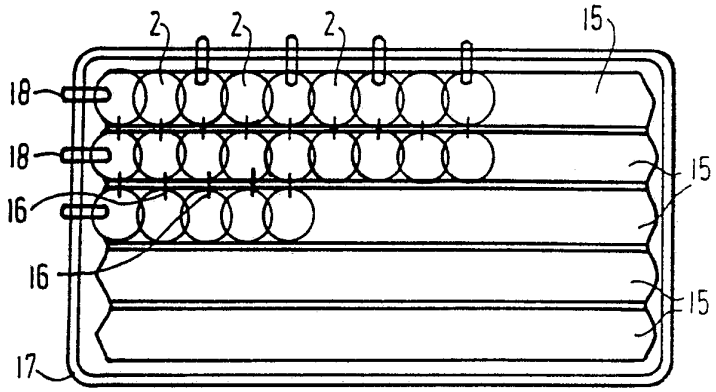

FIG.4

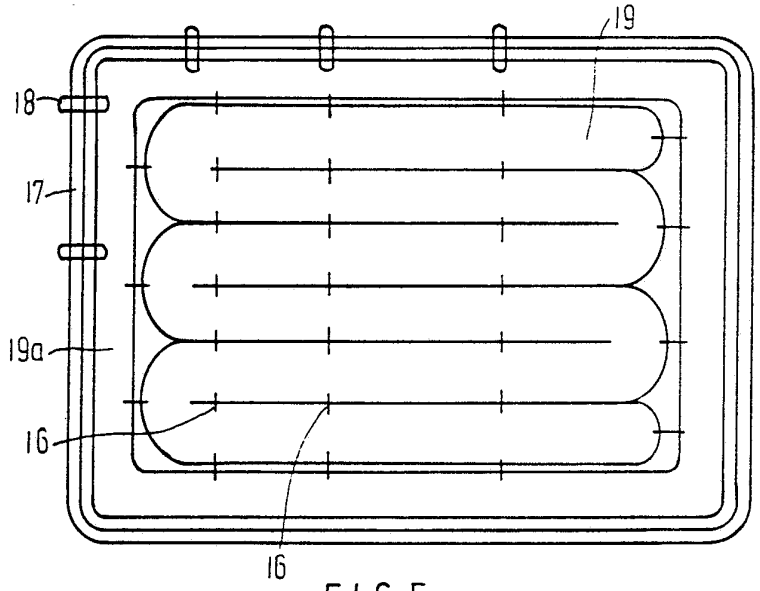

FIG.5

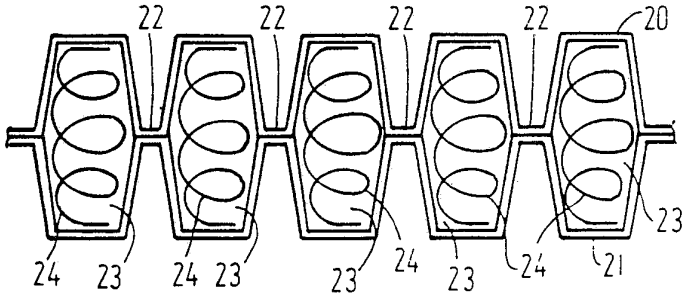

FIG 6

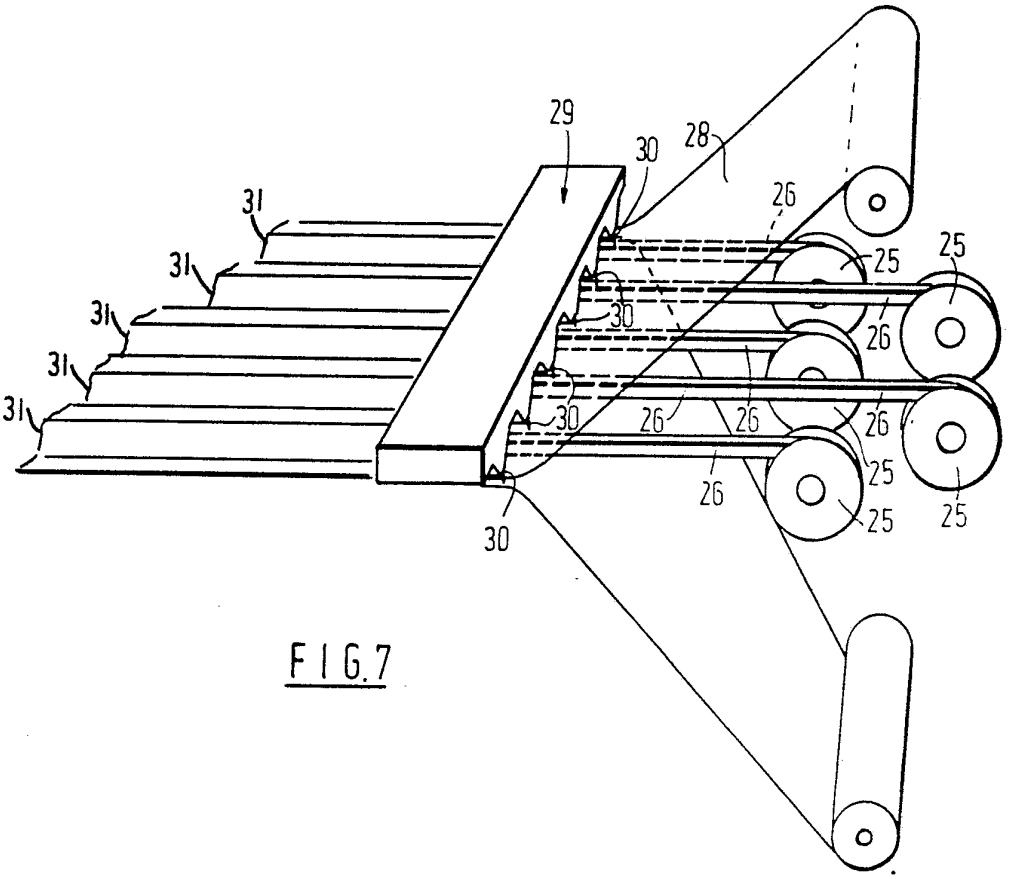
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FIG.7

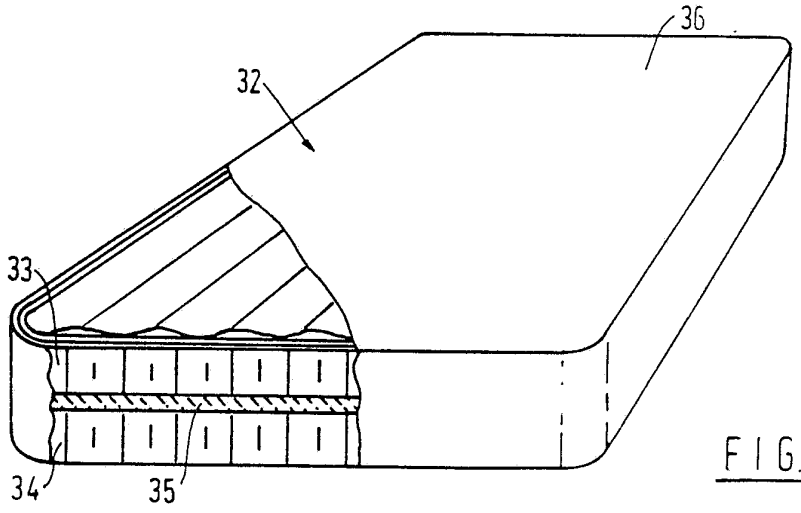
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FIG.8

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 89/00889

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[5]: A 47 C 27/06

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC[5]	A 47 C, B 68 G

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X	BE, A, 703642 (BERTRAND FAURE) 1 February 1968 see the whole document	1,2,4,6,9, 10,12
Y	--	3,8,11
Y	US, A, 1406051 (MARCUS) 7 February 1922 see claims 2,3	3
Y	-- US, A, 3082438 (NACHMANN) 26 March 1963 see figures 1-3	8,11
A	-- GB, A, 657558 (JOHANSEN) 19 September 1951 see figures	7
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* Special categories of cited documents: [10]

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
6th October 1989	13. 11. 89
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	T.K. WILLIS

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. GB 8900889 SA 30558

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 30/10/89
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
BE-A- 703642	01-02-68	None	
US-A- 1406051		None	
US-A- 3082438		None	
GB-A- 657558		None	