



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 0 833 772 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:

14.11.2001 Bulletin 2001/46

(21) Application number: **96918383.9**

(22) Date of filing: **06.06.1996**

(51) Int Cl.7: **B65B 5/02**, B68G 9/00

(86) International application number:
PCT/US96/09700

(87) International publication number:
WO 96/40557 (19.12.1996 Gazette 1996/55)

(54) **METHOD FOR FORMING STRINGS OF POCKETED SPRINGS**

VERFAHREN ZUM HERSTELLEN VON IN REIHEN ANGEORDNETEN TASCHENFEDERN

PROCEDE DE FORMATION DE SUITES DE RESSORTS ENVELOPPES

(84) Designated Contracting States:
**AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC
NL PT SE**

(30) Priority: **07.06.1995 US 478915**

(43) Date of publication of application:
08.04.1998 Bulletin 1998/15

(73) Proprietor: **SIMMONS COMPANY**
Atlanta, Georgia 30328-5369 (US)

(72) Inventor: **ST. CLAIR, Albert, Ronald**
Lilburn, GA 30247 (US)

(74) Representative: **Bakkum, Ruben Joseph**
van Exter Polak & Charlouis B.V.,
P.O. Box 3241
2280 GE Rijswijk (NL)

(56) References cited:
US-A- 1 950 186 **US-A- 2 093 531**
US-A- 2 647 671 **US-A- 3 668 816**
US-A- 4 439 977 **US-A- 4 854 023**
US-A- 5 438 718

EP 0 833 772 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The present invention relates to a method of forming a string of coil springs wherein each of the coil springs is enclosed within an individual fabric pocket having flat overlapping longitudinally extending side flaps, the method comprising the steps of:

- a) folding an elongated web of fabric a first time to create a longitudinally extending first flap and folding said web of fabric a second time to create a second longitudinally extending flap which overlaps said first flap laterally, thereby defining a fabric tube having a flap side and a back side with said second flap on said flap side laterally overlapping said first flap on said flap side;
- b) forming transverse seams in said fabric tube between the coil springs to create discrete, individual pockets to accommodate said coil springs
- c) forming a laterally extending opening in said tube with said second flap on said flap side of said tube being displaced from overlapping relationship with said first flap on said flap side of said tube;
- d) inserting a compressed coil spring into the opening between the first and second flaps on the flap side of the tube.

[0002] Such a method is known from US-A-2,093,531. Herein an apparatus is disclosed with which an operator can compress a spring and insert this spring into a preformed pocket in a tube of fabric by transversely fitting such a pocket over two projecting lips, and by operating a handle and a pedal. This is a manual operation.

[0003] Numerous techniques have evolved for constructing mattresses, cushions and the like. One such technique which has gained wide acceptance is known as Marshall construction. In this construction, an inner-spring assembly comprises the core of the mattress or cushion and is manufactured from a plurality of springs, each individually encapsulated in a pocket of suitable fabric. The pockets of springs are preferably joined together in a spring of predetermined length and are arranged in a closely packed array all with their longitudinal axes parallel one to another and with their ends defining a plane. In mattress construction, this array of pocketed springs is typically covered with a quilted foam and fabric pad thereby providing a sleeping surface.

[0004] Strings of pocketed coil springs have been manufactured in different ways. In an early method of manufacture, a suitable fabric was folded in half lengthwise and stitched transversely at regular intervals to define pockets into which springs were inserted. This method has largely been replaced in more recent times by a method which uses heat sensitive fabric and ultrasonic welding techniques instead of stitching. An example of strings of pocketed coil springs manufactured by this latter method is disclosed in U.S. Patent No.

4,234,983, issued to Stumpf and assigned to the common assignee herein. As disclosed in U.S. Patent No. 4,234,983, a string of pocketed coils is formed by ultrasonically welding the coils into discrete pockets by first folding a heat sensitive fabric in half lengthwise and applying welds transversely to the longitudinal axis of the fabric. Once the coil springs are inserted into the pockets, the pockets are welded closed along a seam running lengthwise of the coil string adjacent one end of the springs.

[0005] A disadvantage of strings of coil springs of the foregoing construction is that the seam running lengthwise of the coil string creates two flaps of excess fabric material at one end of the pocketed springs. Some excess material is necessary along the seam to provide for proper alignment of the string in manufacture and assure adequate strength of the associated welds. However, when the string of coils is arranged to define an innerspring mattress or cushion core, the excess material projecting outwardly of the springs creates a false firmness which is known in the art as "false loft", beneath the outer surface pad of the mattress or cushion. This false loft condition can cause undesirable and objectionable body depressions to form when a user lays on a mattress or cushion.

[0006] Attempts have been made to eliminate false loft by constructing a string of coil springs having a flat overlap side seam instead of a top seam. A machine for constructing such coil strings is disclosed, for example in U.S. Patent No. 4,986,518, also issued to Stumpf and assigned to the common assignee herein. However, such a machine has a complicated elevator mechanism for spring insertion which has proven to be unreliable under manufacturing conditions.

[0007] Accordingly, it has been found to be desirable to provide mattress or cushion constructions in which the innerspring assembly is enclosed within pockets having flat overlap side seams. In particular, it has been found to be desirable to provide such mattress or cushion constructions which do not exhibit false loft by virtue of excess pocketing material adjacent the ends of the coils. Furthermore, it has been found to be desirable to provide coil string assemblies for innerspring constructions which use less pocketing fabric material than has been required in previously known constructions.

[0008] Still further, it has been found to be desirable to provide apparatus for constructing pocketed coil strings which are housed within pockets having flat overlap seams. Such apparatus has been found to be effective, efficient and reliable in use and is structured to be readily retrofitted with existing prior art equipment at an economical cost.

[0009] The present invention improves over the prior art by providing a new method for constructing strings of fabric pocketed coils with the pockets having flat overlap side seams. Thereto, the method is characterised as is described in the characterising clause of claim 1. Preferred embodiments of the method are described in

the dependent claims. The apparatus for carrying out the method includes a fabric in-feed station wherein a fabric web is twice folded to define a tube having a first flap which overlaps a second flap on one side of the tube. In the apparatus, this tube is advanced to a next station at which a deflector separates the overlapped flaps. A coil inserter is then disposed between the separated flaps and a vertically compressed coil spring is inserted horizontally into an open side of the tube. The fabric tube with the compressed coil therein is next advanced to a second deflector which realigns the flaps in overlapping relation. At a next station an anvil supports the overlapping flaps whereupon the flaps are spot welded together. At the next station, transverse seams are welded between the coil springs creating a discrete, individual pocket for each coil. At a final station, a beater assembly strikes the pocketed compressed coils to rotate them in their pockets and allow them to expand longitudinally.

[0010] The foregoing and other novel features of the invention will become apparent upon a reading of the following detailed description taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a perspective view of a prior art mattress partially broken away to show a conventional inner-spring construction;

FIG. 2 is a fragmentary side view of the prior art innerspring shown in FIG. 1;

FIG. 3 is a partial perspective view of a fabric in-feed station of an apparatus for carrying out of the method in accordance with the present invention;

FIG. 4 is another partial perspective view of the in-feed station of FIG. 3 showing fabric being folded therein;

FIG. 5 is a schematic end view of a fabric tube constructed in accordance with the present invention;

FIG. 6 is a schematic end view of a first deflector station of an apparatus for carrying out the method in accordance with the present invention illustrating a stage in the inventive process wherein the flaps on a fabric tube are separated to expedite subsequent insertion of coil springs therein;

FIG. 7 is a schematic view of a spring insertion station in accordance with the method of the present invention illustrating a stage in the inventive process wherein a spring, in an uncompressed state, is positioned prior to insertion into a fabric tube;

FIG. 8 is a schematic view of the spring insertion station of FIG. 7 showing the spring in a fully compressed state for insertion into a fabric flap;

FIG. 9 is a further schematic view of the spring insertion station of FIG. 7 with the apparatus aligned for insertion of the fully compressed spring into the fabric tube;

FIG. 10 is a schematic view of the spring insertion station of FIG. 7 showing the spring inserted into the fabric tube;

FIG. 11 is a schematic view of a second deflector station of an apparatus for carrying out the method in accordance with the present invention illustrating a stage in the inventive process wherein the flaps on the fabric tube are returned to their original overlapped condition after spring insertion;

FIG. 12 is a schematic view illustrating the next processing stage in accordance with the present invention wherein the flaps on the fabric tube are positioned for processing after insertion of a spring therein;

FIG. 13 is a schematic view of a first welding station of an apparatus for carrying out the method in accordance with the present invention illustrating a stage in the inventive process wherein the flaps on the fabric tube are lap sealed;

FIG. 14 is a schematic view of a second welding station of an apparatus for carrying out the method in accordance with the present invention illustrating a stage in the inventive process wherein discrete fabric pockets with coil springs encapsulated therein;

FIG. 15 is a schematic view of a drive station of an apparatus for carrying out the method in accordance with the present invention illustrating a mechanism for drawing the fabric tube through the apparatus for processing;

FIG. 16 is a schematic view of a final forming station of an apparatus for carrying out the method in accordance with the present invention illustrating a mechanism for properly orienting the spring within a fabric pocket; and

FIG. 17 is a fragmentary side view of a string of pocketed coils constructed in accordance with the present invention.

[0011] Referring now to the drawings, and initially to FIG. 1, a mattress assembly of a type well-known in the art is designated generally by reference numeral 10 and includes an innerspring core assembly 12 of the so-called Marshall construction. The core 12 includes a string 14 of coils 16 within fabric pockets 18 arranged in a closely packed array having a generally rectangular shape in plan. For purposes of the present disclosure, the term coils may be used interchangeably with springs or coil springs. The coils 16 are all oriented with their longitudinal axes parallel to each other and with their ends all lying in a common plane. A suitable cover 19 is provided for the innerspring core 12 and is typically made of a quilted foam and/or fabric material defining a sleeping surface.

[0012] Referring now to FIG. 2, a portion of the prior art string 14 of coils 16 enclosed within fabric pockets 18 is illustrated in side view and comprises a web of fabric 20 which is essentially folded in half lengthwise. The fabric is preferably heat sensitive and is formed into a series of spaced pockets by transverse welds 22. The welds 22 define webs 24 connecting the pockets to form

a string 14 which can be of any preselected length. Because the fabric 20 is folded in half, a seam 26 is welded across the upper edge of the string 14, as viewed in FIG. 2, in order to close the pocket. This forms a pair of flaps 28, only one of which can be seen, running lengthwise of the string 14 above the plane defined by the upper ends of the coils 16. The flaps 28 are necessary to space the welds of the seam 26 inwardly of the edges of the fabric 20 and thereby assure adequate strength of the seam 26, as well as to provide for proper alignment of the string 14 in manufacture.

[0013] Turning now to FIGS. 3 and 4, a portion of an apparatus for carrying out the method of constructing strings of pocketed coil springs 16 in accordance with the invention is designated generally by the reference numeral 30. As described hereinafter, the apparatus will be discussed in terms of its progressive sequences of operation, in the so-called apparatus direction, beginning with the portion 30 which is a pocket material in-feed station.

[0014] At the in-feed station 30, a web of heat sensitive fabric 32 is fed into the apparatus across a diamond-shaped folding plate 34. Preferably, the fabric 32 is of a non-woven polypropylene composition, for example, of a type sold under the trade name DUON. A guide bar 35 extends over the top of the fabric 32 in spaced relation to the folding plate 34 to assure that the fabric 32 will lay flat on the plate 34. Adjustable guide bars 36 are positioned along opposite edges of the fabric web 32 to properly align the fabric 32 for folding. The fabric 32 travels over edges 38 of the folding plate 34 which converge to a point 40. Beneath the plate 34 and extending from a frame member 42 are a pair of closely spaced parallel guide bars 44. The guide bars 44 are aligned with the point 40 of the folding plate and have a mounting structure which includes spring tensioning means (not shown) to urge them into closely spaced relation. The fabric 32 passes between the guide bars 44 and a first fold 46 in the fabric 32 is created defining a first flap which will be consistently designated hereinafter as flap A.

[0015] The web of fabric 32 next passes around an idler roller 48 which extends from and is journaled for rotation on the frame 42. As best seen in FIG. 4, the fabric 32 then passes around a second roller 50. This roller is journaled on a frame member (not shown) which is disposed opposite to and spaced from frame 42. The roller 50 extends only a portion of the width of the folded fabric 32 creating a loose edge 52 of fabric 32 which passes around free end 54 of the second roller 50. A smoothly rounded hook member 56 extends from the frame 42 in proximity with the end 54 of the roller 50 and engages the loose edge 52 of fabric 32 causing the edge 52 to reversely turn over the web 32 and form a second fold 58. The second fold 58 creates a second flap which will be designated consistently hereinafter as flap B. The web 32 which has now been twice folded then passes over a third roller 60 which is journaled for

rotation on the frame 42 and the web 32 exits the fabric in-feed station 30 in an essentially horizontal orientation.

[0016] The configuration of the fabric 32 after it leaves the in-feed station 30 is shown schematically in FIG. 5. The fabric 32 is formed into a fabric tube 33, preferably having an essentially flat tubular shape with flap A folded over a back portion 62 at first fold 46 and flap B folded over back portion 62 at second fold 58. In a preferred form, flap A is approximately six inches in width while flap B is approximately three inches in width. Also, flap B preferably overlaps flap A by approximately one-half inch. It can be appreciated that the width of flap A can be predetermined by the adjustable lateral alignment of the fabric web 32 with respect to the point 40 of the folding plate 34. Moreover, the width of flap B can be predetermined by the suitable positioning of the second roller 50 and associated hook member 56.

[0017] The fabric tube 33 advances next to a first deflector station shown schematically in FIG. 6 and designated generally by the reference numeral 64. A deflector arm 66 has a free end portion 68 which is configured for insertion beneath flap B and separates flap B from its overlapped relation with flap A. It will be understood by those skilled in the art that while not shown in FIG. 6 or subsequent figures, an apparatus for carrying out the method of the present invention includes a suitable elongated table or plate for supporting the back side 62 of the fabric tube 33 throughout successive steps in the assembly process.

[0018] Next, the fabric tube 33 advances to a coil insertion station shown in FIG. 7 and designated generally by the reference numeral 70. A coil inserter assembly is designated as 72 and includes an upper plate 74 and a lower plate 76 arranged parallel to one another and spaced from one another by approximately three-eighths of an inch. Upper plate 74 has a circular opening 78 which is dimensioned to permit a coil spring 16 to pass through it and be supported on the lower plate 76 with the longitudinal axis of the spring 16 oriented vertically. It is to be noted that the spring 16 is transported to the inserter 72 in a fully extended state by any suitable transport means (not shown) and is positioned under a compressor 80 which is in vertical alignment with the opening 78 in the upper plate 74. The condition of the fabric tube 33 at this point is such that flap B is positioned to pass underneath the lower plate 76 of the inserter 72 while flap A passes under a support plate 82 and has edge portion 84 supported on the upper plate 74 of the inserter 72. The edge portion 84 of flap A is pressed firmly to the plate 74 by a tensioned roller 86.

[0019] In FIG. 8, the spring 16 is shown in a compressed state upon activation of the compressor 80. FIG. 9 shows the next step of the coil insertion process wherein the fabric tube 33 is advanced in a manner such that edge portion 84 of flap A moves into registry with an air cylinder 88. Coil insertion is completed in the schematic view of FIG. 10 which shows ram 90 of the

air cylinder 88 activated to hold the edge portion 84 of flap A firmly to upper inserter plate 74 while reciprocating air operated inserter bar 92 moves the compressed coil 16 horizontally from the compressor 80 to a position beneath flap A.

[0020] Once coil insertion is completed, the fabric tube 33 advances with the compressed coil 16 under support plate 82 to a second deflector station designated generally as 94 in FIG. 11. At this station 94, a second deflector arm 96 has a free end portion 98 which engages and lifts flap B to its original overlapped condition with respect to flap A.

[0021] FIG. 12 illustrates apparatus 100 for performing the next step in the process of this invention wherein the fabric tube 33 is received by an anvil 102. The anvil 102 may be supported by plate 82 and includes a first upper arm 104 over which flap B passes. Flap B is pressed firmly into contact with arm 104 by a second tensioned roller 106. In this step of the process, flap A passes under the first anvil arm 104 and over the top of a second lower arm 108, which is suspended in a cantilevered manner from first arm 104. The anvil 102 is designed so that lower arm 108 also projects horizontally in the apparatus direction from beneath upper arm 104.

[0022] Turning now to FIG. 13, a first welding station is designated generally by the reference numeral 110 and includes an ultrasonic spot welding horn 112. At this station 110, the fabric tube 33 has passed the upper arm 104 of the anvil 102 whereupon flap B returns to overlapped engagement with flap A, the two flaps being supported by lower arm 108 of the anvil 102. The welding horn 112 is next activated to place a spot weld on the lap between flap A and flap B, whereby a lap seal is formed.

[0023] In FIG. 14, a second welding station is designated by the reference numeral 114 and includes a second welding horn 116 which is oriented transversely to the fabric tube 33. In a manner well-known in the art, this second welding horn 116 is designed to form a linear series of spaced welds between the upper and lower sides of the fabric tube 33 intermediate successive coils 16 thereby forming a string 14 of discrete fabric pockets 18 with individual spring coils 16 encapsulated within each pocket.

[0024] FIG. 15 illustrates schematically a drive station 120 of the apparatus which comprises a pair of parallel closely spaced rollers 122 and 124. The rollers 122 and 124 are so tensioned together that they serve to draw the fabric tube 33 through the apparatus from the in-feed station 30 through all subsequent processing stations of the apparatus. A suitable recess 126 is formed in one of the rollers 122 or 124 so that the coil springs 16 can pass freely between the rollers 122 and 124.

[0025] A final forming station is shown schematically in FIG. 16 and designated generally by the reference numeral 130. At this station 130 a rotating beater assembly 132 is provided with resilient arms 134 for striking the fabric tube 33 in the area of the pocketed coil

springs 16. This striking action of the beater 132 causes the coil springs 16 to rotate ninety degrees within their pockets and to expand from their compressed state to an extended state, thereby filling the pocket 18.

[0026] It can now be appreciated that the apparatus for carrying out the method of the present invention is highly efficient and effective for constructing strings of pocketed coil springs which have a seal formed along a side thereof instead of having a seal adjacent to the ends of the springs. A string of fabric pocketed coils 136 constructed with the present method is illustrated in side view in FIG. 17. As seen therein, a flat overlap side seam 138 eliminates the two upper flaps 28 of the prior art string 14 shown in FIG. 2. Thus, the coil string 136 is highly desirable for use in a mattress innerspring assembly in that it eliminates objectionable false loft. It can also be appreciated that because the side seam 138 may overlap by only about one-half inch or so, savings in fabric 32 can be achieved over the prior art constructions which have two excess flaps 28. Further, the apparatus for carrying out the method of the present invention may be readily configured from existing known equipment with the addition and/or replacement of a few parts and subassemblies. Accordingly, the invention lends itself to highly economical retrofitting of equipment currently in use.

Claims

1. A method of forming a string of coil springs (136) wherein each of the coil springs (16) is enclosed within an individual fabric pocket (18) having flat overlapping longitudinally extending side flaps (138), the method comprising the steps of:

- a) folding an elongated web of fabric (32) a first time to create a longitudinally extending first flap (A) and folding said web of fabric (32) a second time to create a second longitudinally extending flap (B) which overlaps said first flap (A) laterally, thereby defining a fabric tube (33) having a flap side and a back side with said second flap (B) on said flap side laterally overlapping said first flap (A) on said flap side;
- b) forming transverse seams in said fabric tube (33) to create discrete, individual pockets (18) for accommodating said coil springs (16);
- c) forming a laterally extending opening in said tube (33) with said second flap (B) on said flap side of said tube (33) being displaced from overlapping relationship with said first flap (A) on said flap side of said tube (33);
- d) inserting a compressed coil spring (16) into the opening between the first (A) and second (B) flaps on the flap side of the tube (33),

characterized in that the method comprises

the following steps in the order indicated:

- step a)
- step c)
- step c) being performed by conveying said fabric tube (33) longitudinally across a first deflector member (66, 68) in a manner such that said first deflector member (66, 68) causes said second flap (B) to deflect away from overlapping relationship with said first flap (A) as said fabric tube (33) is conveyed across said first deflector member (66, 68);
- step d);
- conveying said fabric tube (33) across a second deflector member (96, 98) in a manner such that said second deflector member (96, 98) causes said second flap (B) to be realigned into laterally overlapping relationship with said first flap (A) as said fabric tube (33) is conveyed longitudinally across said second deflector member (96,98);
- interconnecting said laterally overlapping first (A) and second (B) flaps to form a lap seal therebetween; and
- step b).

2. The method of claim 1 **characterized in that** said first flap (A) is created by passing said web of fabric (32) over edges of a diamond-shaped folding plate (34).
3. The method of claim 1 **characterized in that** said second flap (B) is created by reversely turning an edge of said web (32) around a hook member (56).
4. The method of claim 1 **characterized in that** said coil spring (16) is compressed along an axis oriented at right angles to the longitudinal axis of said fabric tube (33), and said coil spring (16) is inserted transversely to the longitudinal axis of said fabric tube (33).
5. The method of claim 1 **characterized in that** the method includes the further step of rotating said compressed coil spring (16) within said pocket (18) to allow said coil spring to expand within said pocket.

Patentansprüche

1. Verfahren zur Ausbildung einer Reihe (136) von Schraubenfedern, bei welcher jede Schraubenfeder (16) in einer einzelnen Tasche (18) einer Textilware eingeschlossen ist, die flache, überlappende, längsverlaufende Seitenklappen (138) hat, wobei das Verfahren aus den Stufen besteht:

- a) Halten einer länglichen Warenbahn (32) ein erstes Mal zur Schaffung einer längsverlaufenden ersten Klappe (A) und Falten der Warenbahn (32) ein zweites Mal zur Schaffung einer zweiten, längs verlaufenden Klappe (B), welche die erste Klappe (A) seitlich überlappt, um dadurch eine Warenröhre (33) zu bilden, die eine Klappenseite und eine Rückseite aufweist und bei welcher die zweite Klappe (B) an der Klappenseite die erste Klappe (A) an der Klappenseite seitlich überlappt;
- b) Ausbildung von Quersäumen in der Warenröhre (33) zur Schaffung von diskreten, einzelnen Taschen (18) zur Aufnahme der Schraubenfedern (16);
- c) Ausbildung einer seitlich verlaufenden Öffnung in der Röhre (33), wobei die zweite Klappe (B) an der Klappenseite der Röhre (33) von der überlappenden Beziehung mit der ersten Klappe (A) an der Klappenseite der Röhre (33) versetzt wird;
- d) Einfügung einer zusammengedrückten Schraubenfeder (16) in die Öffnung zwischen der ersten (A) und der zweiten (B) Klappe an der Klappenseite der Röhre (33)

dadurch gekennzeichnet, daß das Verfahren aus den folgenden Stufen in der angegebenen Reihenfolge besteht:

- Stufe a)
 - Stufe c)
 - wobei die Stufe c) ausgeführt wird, indem die Warenröhre (33) in Längsrichtung quer über einen ersten Ablenkkörper (66, 68) in einer solchen Art und Weise überführt wird, daß dieser erste Ablenkkörper (66, 68) die zweite Klappe (B) von der überlappenden Beziehung mit der ersten Klappe (A) weglenkt, während die Warenröhre (33) quer über den ersten Ablenkkörper (66, 68) überführt wird;
 - Stufe d);
 - Überführung der Warenröhre (33) quer über einen zweiten Ablenkkörper (96, 98) in einer solchen Art und Weise, daß der zweite Ablenkkörper (96, 98) die zweite Klappe (B) wieder für eine seitlich überlappende Beziehung mit der ersten Klappe (A) ausrichtet, während die Warenröhre (33) in Längsrichtung quer über den zweiten Ablenkkörper (96, 98) überführt wird;
 - wechselseitiges Verbinden der seitlich überlappenden ersten (A) und zweiten (B) Klappen, um zwischen ihnen eine Überlappungsdichtung auszubilden; und
 - Stufe b).
2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, daß** die erste Klappe (A) durch eine

Überführung der Warenbahn (32) über Kanten einer diamantförmigen Faltungsplatte (34) erzeugt wird.

3. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, daß** die zweite Klappe (B) durch ein Rückwärtswenden eines Randes der Bahn (32) um einen Hakenkörper (56) herum erzeugt wird. 5
4. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, daß** die Schraubenfeder (16) entlang einer Achse zusammengedrückt ist, die rechtwinklig zu der Längsachse der Warenröhre (33) ausgerichtet ist, und daß die Schraubenfeder (16) quer zu der Längsachse der Warenröhre (33) eingefügt wird. 10 15
5. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, daß** das Verfahren die weitere Stufe einer Drehung der zusammengedrückten Schraubenfeder (16) innerhalb der Tasche (18) einschließt, um der Schraubenfeder eine Ausdehnung innerhalb der Tasche zu erlauben. 20

Revendications 25

1. Un procédé de fabrication d'une suite de ressorts hélicoïdaux (136) dans lequel chacun des ressorts hélicoïdaux (16) est enclos dans une enveloppe en tissu (18) individuelle, ayant des volets latéraux (138) s'étendant longitudinalement, se chevauchant à plat, le procédé comprenant les étapes consistant à : 30
 - a) plier une première fois une nappe de tissu (32) allongée, pour créer un premier volet (A) s'étendant longitudinalement, et plier une deuxième fois ladite nappe de tissu (32) pour créer un deuxième volet (B) s'étendant longitudinalement, qui chevauche ledit premier volet (A) latéralement, de manière à définir un tube en tissu (33) ayant un côté volet et un côté dorsal, ledit deuxième volet (B) situé du côté volet chevauchant latéralement ledit premier volet (A) situé sur ledit côté volet; 35 40
 - b) former des joints de liaison transversaux dans ledit tube en tissu (33) pour créer des poches (18) individuelles, discrètes, afin de loger lesdits ressorts hélicoïdaux (16); 45
 - c) former une ouverture s'étendant latéralement dans ledit tube (33), ledit deuxième volet (B) situé sur ledit côté volet dudit tube (33) étant déplacé de sa relation de chevauchement envers ledit premier volet (A) sur ledit côté volet dudit tube (33); 50 55
 - d) insérer un ressort hélicoïdal (16) comprimé dans l'ouverture existant entre les premier (A) et deuxième (B) volets sur le côté volet du tube

(33),

caractérisé en ce que ledit volet comprend les étapes suivantes, dans l'ordre indiqué:

- l'étape a)
 - l'étape c)
 - l'étape c) étant effectuée en transportant ledit tube en tissu (3) longitudinalement sur un premier élément déflecteur (66, 68) d'une manière telle que ledit premier élément déflecteur (66, 68) provoque la déformation dudit deuxième volet (B) en écartement vis-à-vis de ladite relation de chevauchement avec ledit premier volet (A), lorsque ledit tube en tissu (33) est véhiculé sur ledit premier élément déflecteur (66, 68);
 - l'étape d);
 - transporter ledit tube en tissu (33) le long d'un deuxième élément déflecteur (96, 98), de manière que le deuxième élément déflecteur (96, 98) fasse que le dit deuxième volet (B) soit réaligné en une relation de chevauchement latéral envers ledit premier volet (A), lorsque ledit tube en tissu (33) est véhiculé longitudinalement sur ledit deuxième élément déflecteur (96, 98);
 - interconnecter lesdits premier (A) et deuxième (B) volets se chevauchant latéralement afin de former entre eux un joint de liaison à recouvrement; et
 - l'étape b).
2. Le procédé selon la revendication 1, **caractérisé en ce que** ledit premier volet (A) est créé en faisant passer ladite nappe de tissu (32) sur les bords d'une plaque (34) à pliage en forme de diamant.
 3. Le procédé selon la revendication 1, **caractérisé en ce que** ledit deuxième volet (B) est créé en retournant en sens inverse un bord de ladite nappe (32) autour d'un élément formant crochet (56).
 4. Le procédé selon la revendication 1, **caractérisé en ce que** ledit ressort hélicoïdal (16) est comprimé le long d'un axe orienté à angle droit par rapport à l'axe longitudinal dudit tube en tissu (33) et ledit ressort hélicoïdal (16) est inséré transversalement par rapport à l'axe longitudinal dudit tube en tissu (33).
 5. Le procédé selon la revendication 1, **caractérisé en ce que** le procédé inclut l'étape supplémentaire de rotation dudit ressort hélicoïdal (16) comprimé à l'intérieur de ladite poche (18), afin de permettre audit ressort hélicoïdal de se déployer à l'intérieur de ladite poche.

FIG. 1
(PRIOR ART)

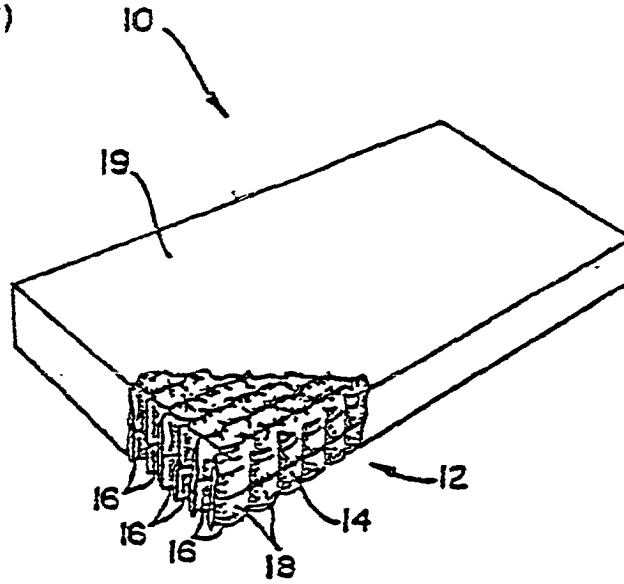
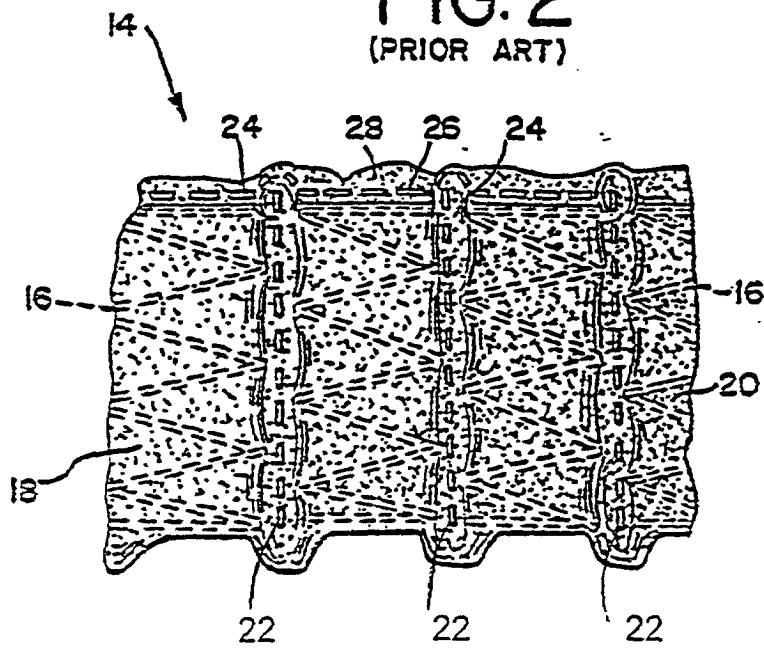


FIG. 2
(PRIOR ART)



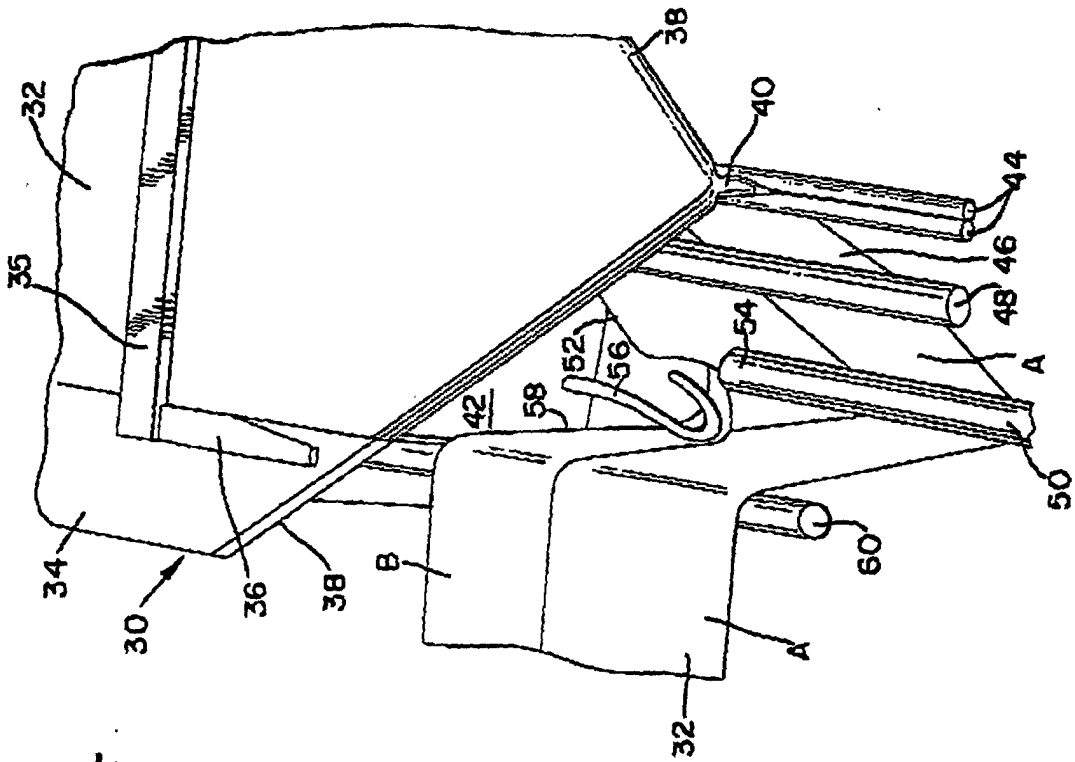
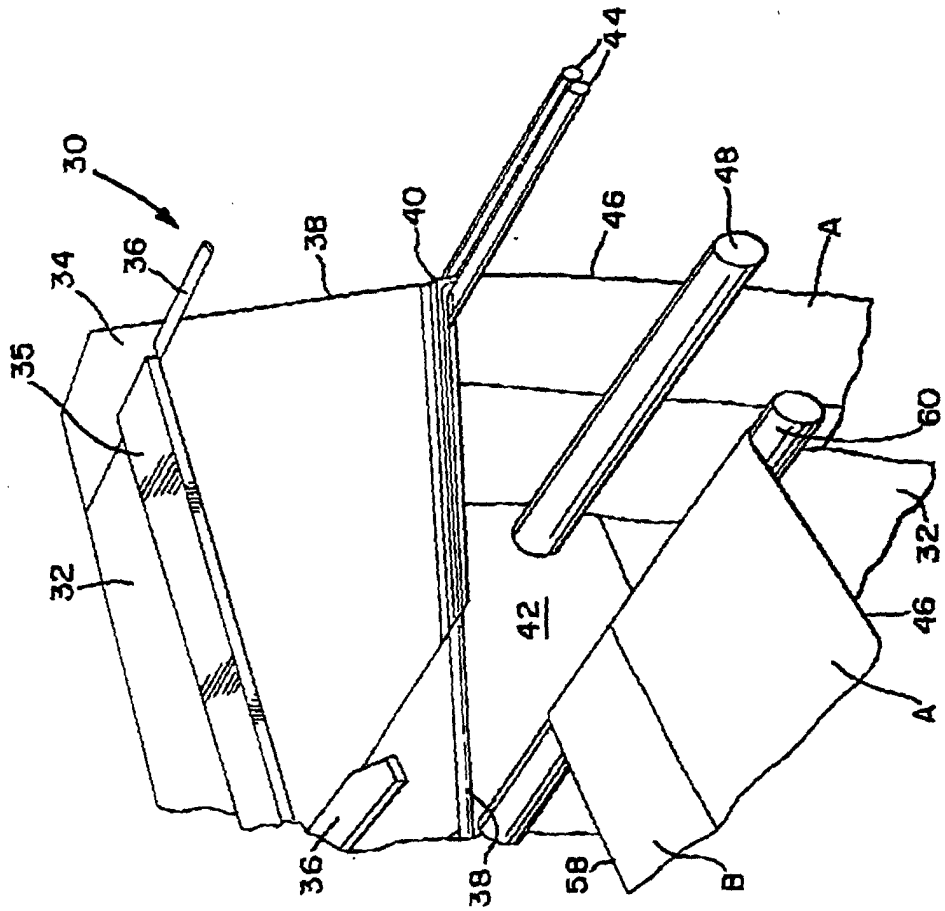
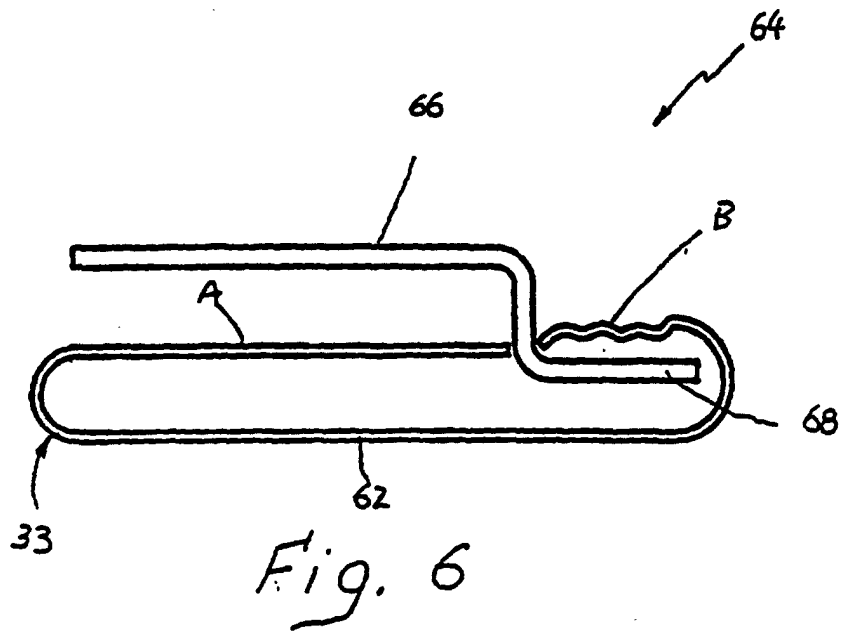
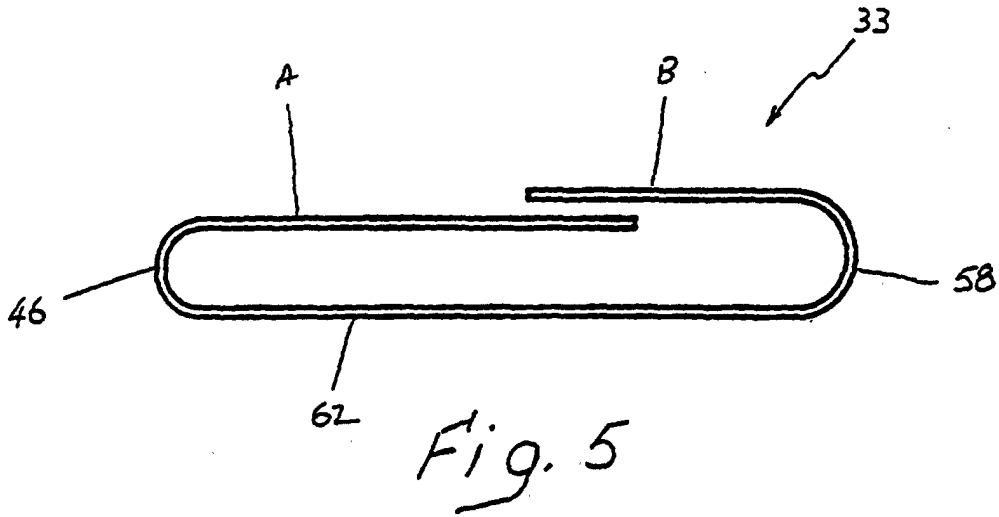


FIG. 4

FIG. 3





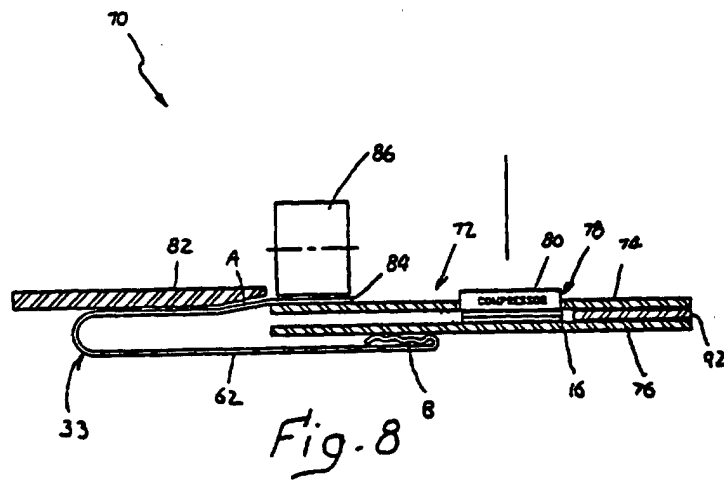
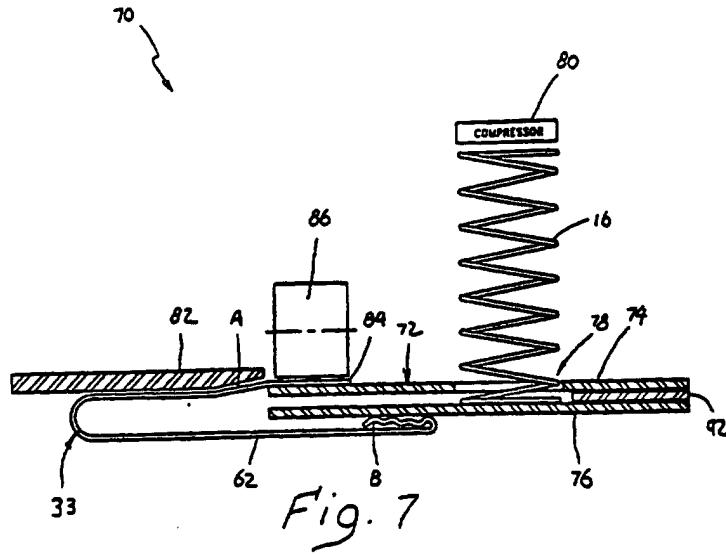


FIG. 9

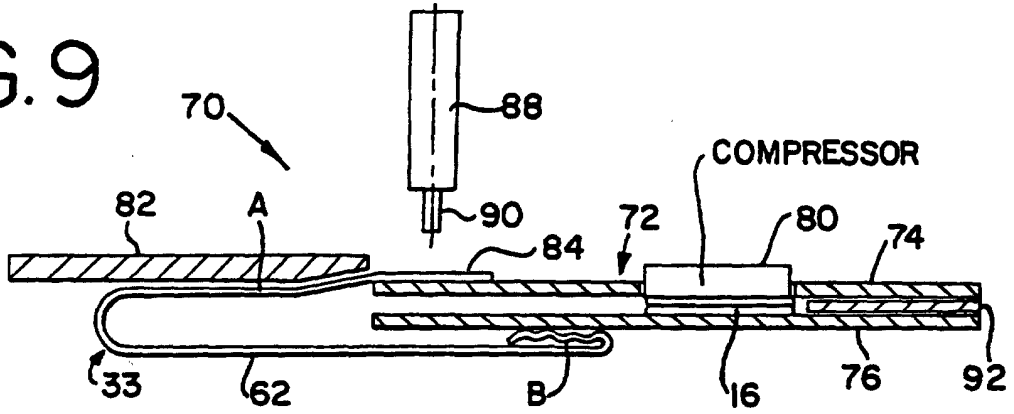


FIG. 10

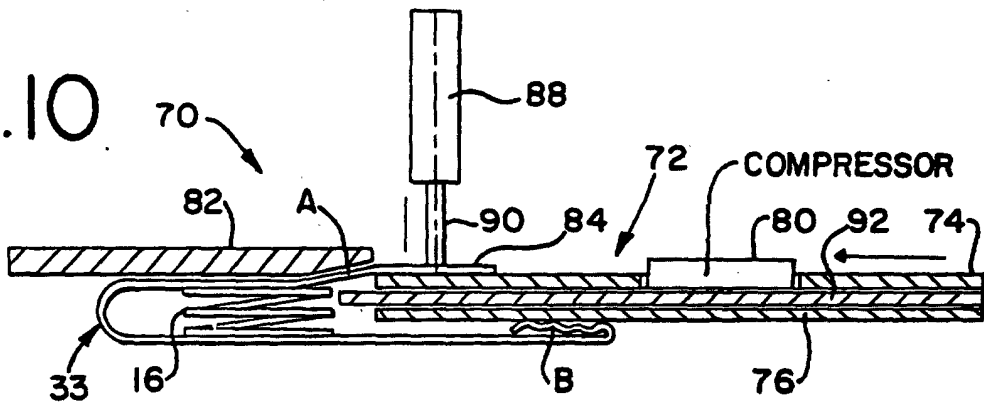


FIG. 11

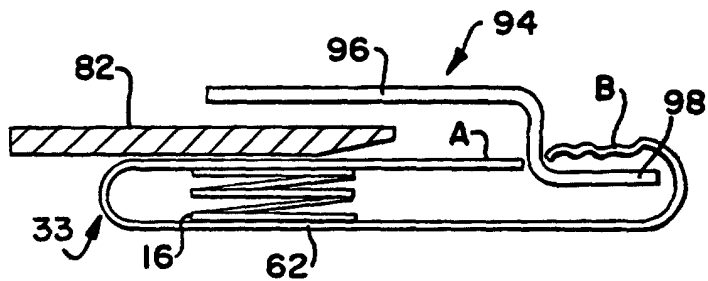


FIG. 12

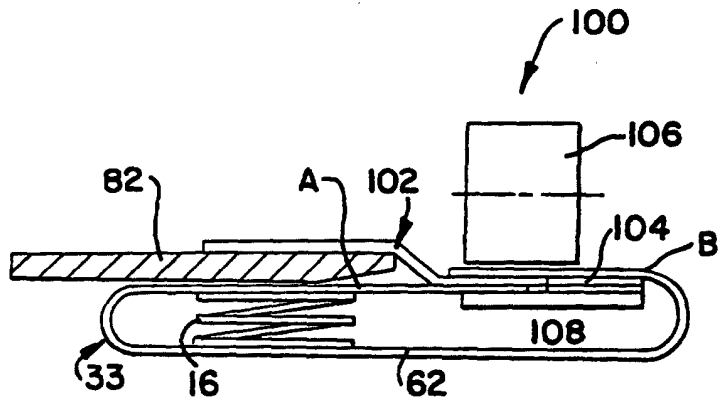


FIG. 13

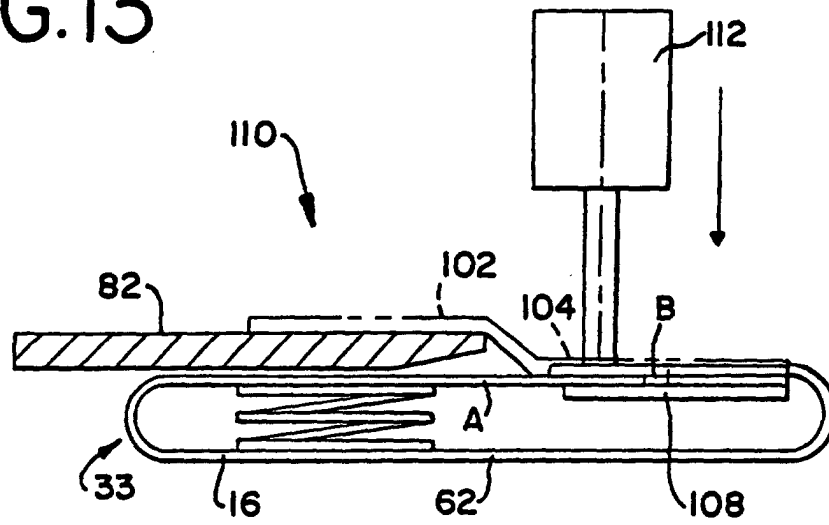


FIG. 14

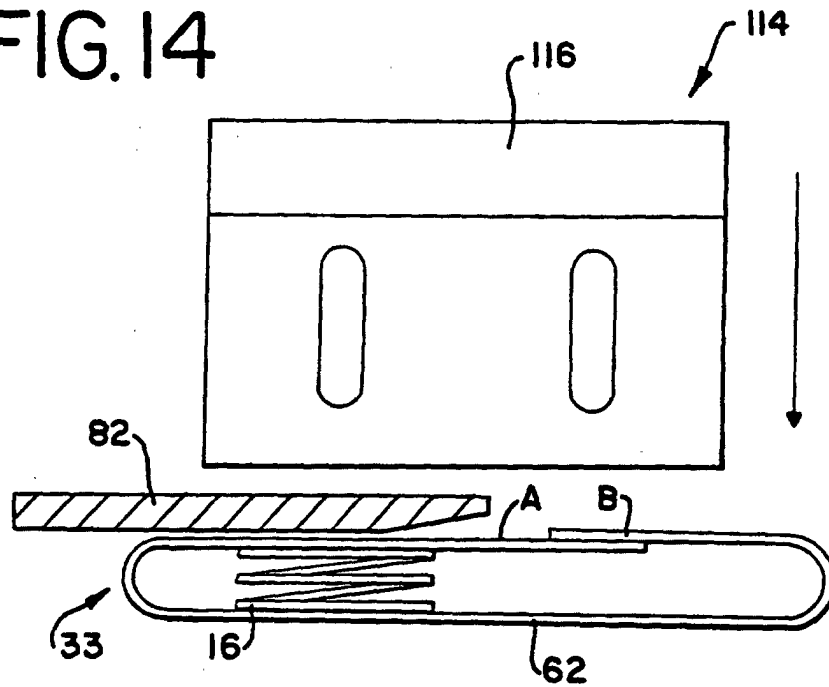


FIG. 15

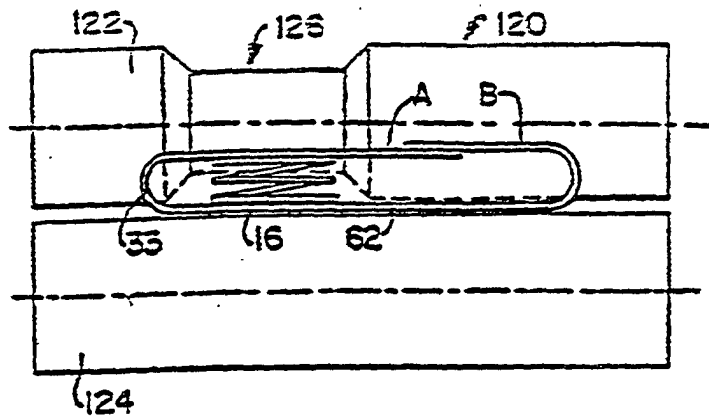


FIG. 16

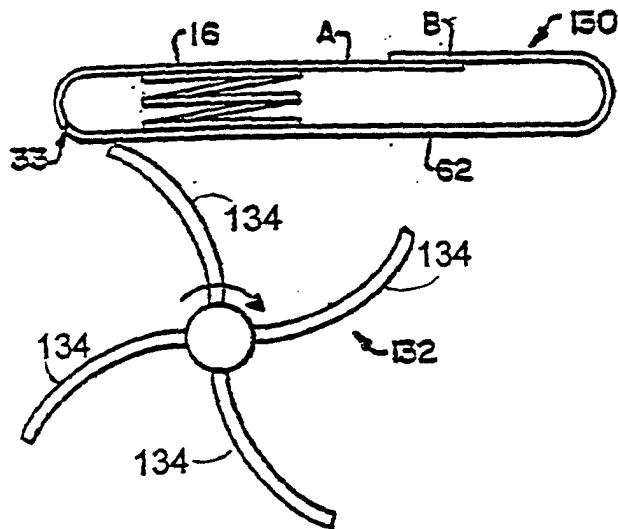


FIG. 17

