Feb. 25, 1969 E. L. BRONSTIEN, JR., ET AL 3,429,767

PRODUCTION OF CUSHION AND MATTRESS CONSTRUCTIONS

Filed June 14, 1965 Sheet 1 of 2

FIG. 1

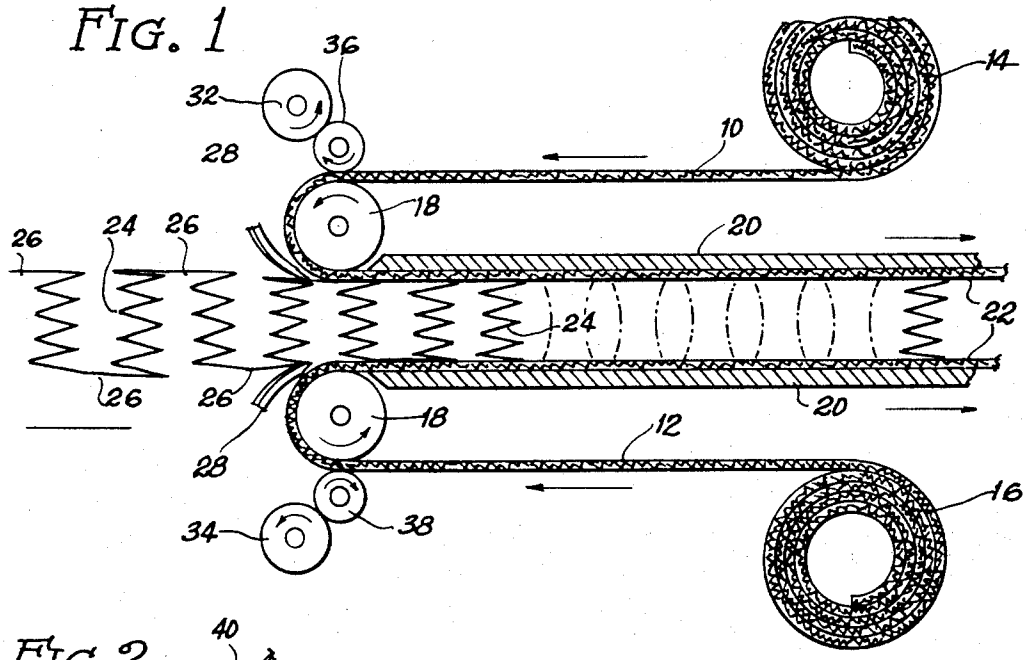


FIG. 2

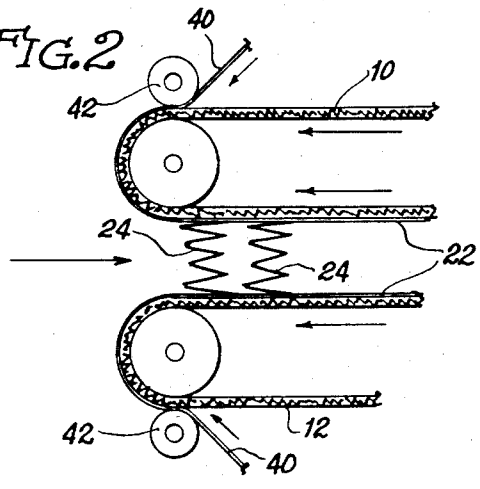


FIG. 3

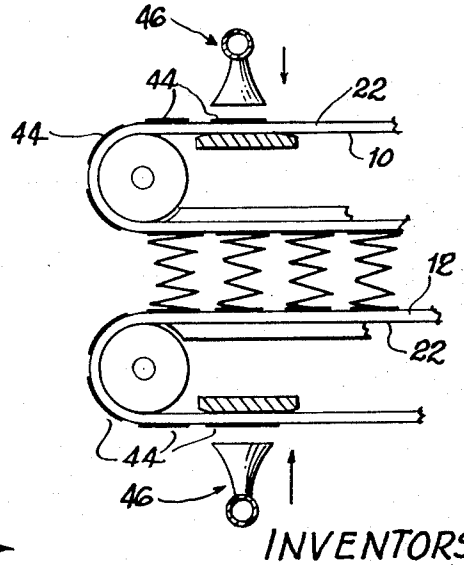
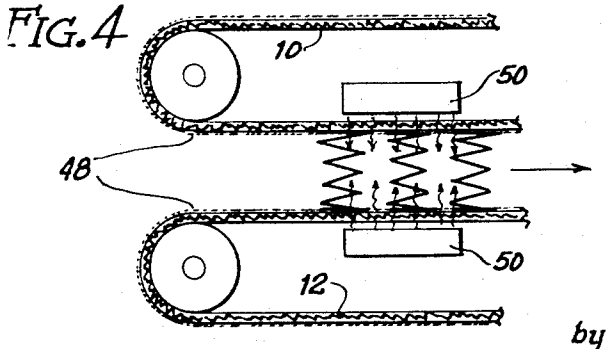


FIG. 4



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PRODUCTION OF CUSHION AND MATTRESS CONSTRUCTIONS

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FIG. 5

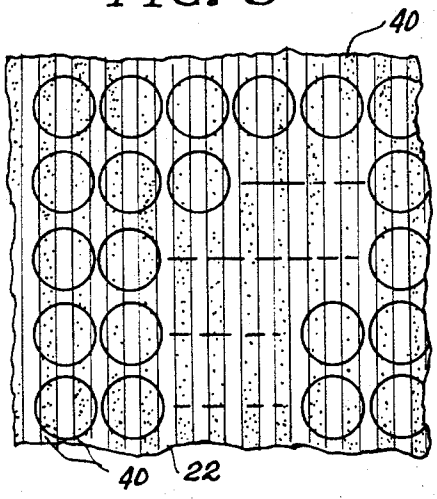


FIG. 6

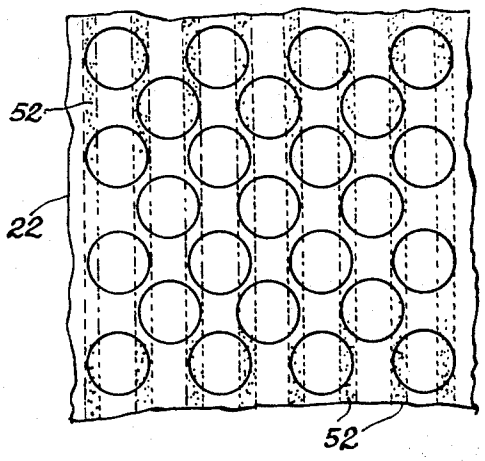


FIG. 7

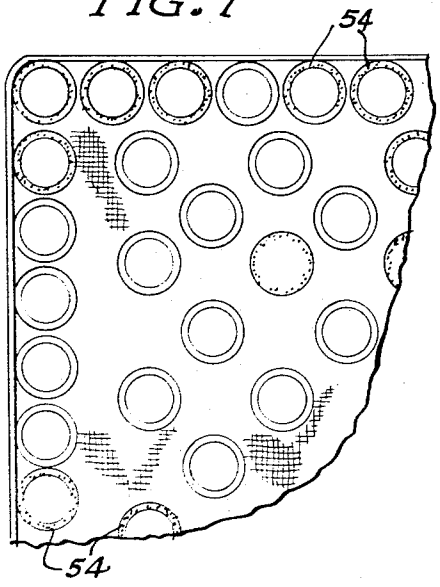


FIG. 8

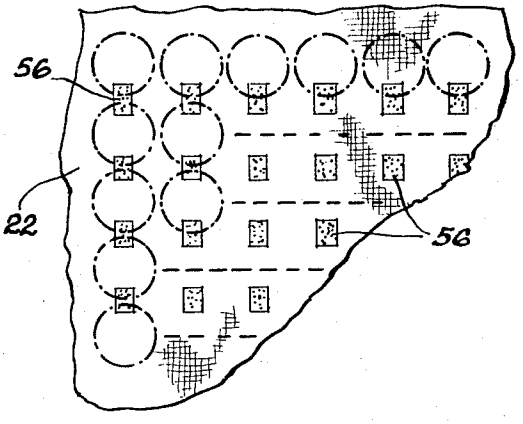
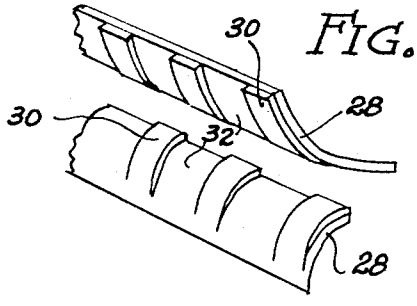


FIG. 9



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PRODUCTION OF CUSHION AND MATTRESS CONSTRUCTIONS

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U.S. Cl. 161—43 17 Claims
Int. Cl. A47c 23/04

ABSTRACT OF THE DISCLOSURE

A system for producing articles such as cushions and mattresses wherein a plurality of coil springs are arranged with their vertical axes in substantially parallel relationship with a panel of material on at least one side overlying the coil ends. The panels are provided with an adhesive on one surface, and the panels are continuously fed to a coil supply station. Rows of coils are provided at this station for engagement with the panel whereby the coils can be secured to the panel.

Specification

This invention relates to the production of cushions and mattresses. In particular, the invention is concerned with mattresses primarily used for beds and comprising so-called innerspring mattresses. The invention is also related to the production of loose cushions for furniture and the like, and is applicable to fixed cushion constructions, such as cushions used for automobile seats.

The production of mattresses usually involves the use of relatively complex machinery. Thus, present mattresses usually comprise coil springs which are arranged in side-by-side relationship in the mattress with their respective vertical axes being substantially parallel. In some instances, the springs are located in separate pockets; however, in the usual case, tie wires extend transversely throughout the mattress for maintaining the coils in their desired positions. Border wires are also employed for reinforcing the edges of the mattresses and, in addition, panels of material, usually in several layers, are applied over the coil combination.

Current practices employed for the production of mattresses have led to the production of highly complicated equipment for producing the mattresses on a mass production basis. The machinery may include mechanisms for forming coils and for feeding the coils into an assembly construction. In this construction, additional mechanisms are employed for driving tie wires into association with a plurality of coils for thereby forming the coils into an assembly.

After an assembly of coils has been formed, additional equipment must be provided for applying the desired material for covering of the mattress. In instances where the coils are included within pockets in a mattress construction, other machinery must be utilized for accomplishing this end.

Even where machinery of the type described is provided, certain undersiable limitations characterize the mattress production. For example, equipment for applying tie wires in the coil assembly is limited in its capabilities to the extent that the tie wires can only be applied over a limited distance. Accordingly, the coil assemblies are usually run through the equipment lengthwise so that the tie wires need only be driven across the width of the mattress. Since a wide variety of mattress widths are marketed, it is necessary to provide additional equipment

for different widths or to provide for adjustment of a particular machine.

In addition to manufacturing difficulties, conventional mattress designs suffer from certain defects with respect to durability. Even the best mattress constructions tend to lose their shape after extended use. Tie wires break thereby disrupting the desired coil arrangement and the desired relationship of the covering material to the coil springs is lost. Such defects result in definite problems from the standpoint of comfort and physical problems can also arise where a mattress gives unsatisfactory support.

Similar problems arise during the manufacture of cushion constructions. Thus, the manufacture of cushions which include a plurality of coil springs with flexible panels on one or both sides has been conducted in the past in accordance with techniques similar to techniques employed in mattress manufacture. Accordingly, difficulties are prevalent from the standpoint of manufacturing and from the standpoint of durability of the manufactured products.

It is a general object of this invention to provide a sysytem for the manufacture of cushions and mattresses which overcomes many serious defects recognized in current techniques.

It is a more particular object of this invention to provide a method for the production of cushions and mattresses which greatly simplifies their construction from the standpoint of the assembly of coil springs and covering material.

It is a still further object of this invention to provide cushion and mattress constructions which are characterized by an extremely high degree of durability whereby the usable life of the constructions is materially extended and whereby the construction can be used comfortably and safely for long periods of time.

It is an additional object of this invention to provide unique panel members which can be employed in a highly efficient manner for the production of constructions of the type referred to.

These and other objects of this invention will appear hereinafter and for purposes of illustration but not of limitation, specific embodiments of this invention are shown in the accompanying drawings in which:

FIGURE 1 is a schematic elevational view in section illustrating the technique for cushion and mattress production which characterizes the instant invention;

FIGURE 2 is a fragmentary sectional view illustrating one alternative form of the invention wherein adhesive tape is employed for securing of the cushion or mattress assembly;

FIGURE 3 is a fragmentary view illustrating another alternative of the invention wherein an adhesive printing mechanism is employed for securing of the assembly;

FIGURE 4 is a fragmentary sectional view illustrating an alternative of the invention wherein induction heating mechanisms are employed for setting of the adhesive;

FIGURES 5 through 8 comprise fragmentary plan views illustrating various adhesive and coil patterns which can be employed in the practice of this invention; and,

FIGURE 9 is a fragmentary perspective view illustrating a suitable coil feed mechanism employed in the practice of this invention.

The method of this invention is generally applicable to the production of cushions and mattresses wherein a plurality of coil springs are arranged with their vertical axes in substantially parallel relationship. Panels of material are generally located on opposite sides of the construction for engagement with the ends of the coil springs and for purposes of enclosing the coil springs. The invention will be described with reference to mattress con-

structions although it will be appreciated that generally the same operations are applicable in the case of cushions. Although the following discussion relates to the use of flexible panels of materials on both sides of the spring assembly, the techniques can be employed where a relatively rigid member is located on one side, as for example a furniture deck.

In the one form of the invention, separate lengths of the panels of material are fed past a coil supply location. The lengths are maintained in spaced-apart relationship whereby coil springs can be fed between the facing surfaces of the panels. Adhesive is applied to the panels of material prior to reaching the coil supply location whereby the ends of the coils can be secured to the panels. By continuously feeding coils between continuously moving panels, an assembly comprising the coils and panels can be continuously produced.

In the preferred form of the invention, the width of the panels corresponds to the length of the mattresses which are produced by the method. Accordingly, the completed assemblies can be severed transversely at any desired point depending upon the width of the mattresses to be produced. For any standard length, the same system can be employed with the only variation being in the mechanisms for cutting the assemblies produced.

In an alternative procedure, the continuous application of adhesive adjacent to the coil supply location is dispensed with. The adhesive is instead applied at the source of manufacture of the panels or at some other time. An adhesive which will dry on the panels and which can then be reactivated by heat is preferably employed in this case.

The accompanying drawings provide illustrations for demonstrating the techniques of the invention. FIGURE 1 illustrates an arrangement wherein panels of material **10** and **12** are continuously fed from rolls **14** and **16**. The panels are moved around guide rollers **18** and then over backing bars **20**. The bars **20** are spaced-apart a predetermined distance whereby the facing surfaces **22** of the respective panels will be spaced apart in a desired manner.

Coils **24** are adapted to be fed between the moving panels of material. In one embodiment illustrated, the coils comprise a continuous arrangement including wire members **26** which interconnect adjacent coils. Standard equipment can be employed for producing continuous lengths of individual coils **24**. Obviously, the coils could be connected crosswise of the apparatus whereby entire transverse rows could be fed into the apparatus. It will also be understood that individual, unconnected coils can readily be utilized in achieving the results of this invention.

Guide bars **28**, also illustrated in FIGURE 9, can be moved for maintaining a desired space between coils in an assembly. The bars include ridge members **30** which define channels **32** corresponding to the approximate width of a coil **24**. Lengths of coils, when fed through the use of these guide bars, will maintain a spaced relationship relative to the panels **10** and **12** corresponding to the spacing between the channels **30**.

FIGURE 1 also illustrates roller coaters **32** and **34** and associated applicator rollers **36** and **38**. Combinations of the type shown, which can be of any conventional design, are employed for applying adhesive to the surfaces **22** of the panels **10** and **12**. The application of the adhesive may involve application substantially entirely over the surfaces **22**. On the other hand, selective application of adhesive is contemplated, and various alternatives will hereinafter be described. Also, and as previously noted, applicators can be dispensed with if the adhesive is applied to the panels at a separate location.

The coils are preferably fed between the panels whereby the coils will be slightly compressed when passing along the area confined by the backing bars **20**. This arrangement will serve to hold the coils in a desired position during their passage throughout the mechanism shown. The spacing between the faces **22** of the panels is maintained so that this spacing will not significantly exceed the height of the coils in an unconfined state.

It will be appreciated that an assembly which comprises the panels **10** and **12** having coils **24** attached thereto can be continuously produced with the arrangement of this invention. It is contemplated that the length of the mattresses produced could be determined by cutting the assembly transversely at desired intervals whereby the width of the mattresses will be generally determined by the width of the assembly. It is preferred, however, to employ a system wherein the width of the panels **10** and **12** will correspond to the desired length of a mattress. Accordingly, cuts made transversely of the assembly will determine the width of the mattresses produced. Since a large volume of mattresses are produced in standard lengths but of varying widths, the same construction can be employed for producing all such mattresses with the only variations required being in the cutting mechanisms. In this connection, it will be apreciated that a row of springs could be excluded transversely of the assembly at desired cutting intervals. This can be accomplished by utilizing lengths of coils **24** which are predetermined to correspond to the number of coils desired in a mattress of a given width. If unconnected individual coils are fed into the construction, then it is merely necessary to skip a feeding operation all across the construction for providing a free path for a cutting instrument. The method of this invention is not limited to the use of any particular means for feeding the springs between the panels. The lengths of coils **24** could be fed directly from a conventional machine employed for producing such lengths. On the other hand, it will be obvious that such lengths could be manually fed into the machine. Thus, if 10 rows of springs were necessary, 10 people could be employed for handling of the coils, at least at the initial stage of feeding.

Manual feeding of the coils is perfectly feasible even though spacing control and the like may be subject to variation. It has actually been found that the durability which characterizes constructions produced in accordance with the described techniques is sufficient to overcome any undesirable characteristics which might be expected due to spacing variations between individual coils.

FIGURES 2 through 8 illustrate various alternative arrangements, particularly with reference to adhesive application and coil arrangements. In FIGURE 2, the panels **10** and **12** are fed in the same manner and coils **24** are sequentially located between these panels. In this embodiment, pressure-sensitive tape **40** is fed between each panel and guide rolls **42** whereby the tape can be applied to the sufaces **22** of the respective panels. By employing double sided pressure-sensitive adhesive tape, the tape will secure itself to the faces **22**, and in addition, the ends of the coils **24** will be secured to the tape.

In the arrangement of FIGURE 3, there is illustrated a mechanism suitable for imprinting circles **44** of adhesive onto the faces **22** of the panels **10** and **12**. A conventional printing mechanism **46** is illustrated as being suitable for use in the application of adhesive in this manner.

The arrangement of FIGURE 4 is substantially the same as those previously described; however, in this instance, the adhesive **48** which is applied to the panels comprises an adhesive which is set by means of heat application. A highly suitable system for achieving heating includes the use of induction heaters **50**, which are adapted to supply heat after the panel and coil assembly is produced. Induction heaters are particularly suitable since they will actually heat the metal coils, the ends of which are in engagement with the adhesive. The heat transmitted by the coil ends to the adhesive causes setting thereof and is effective to produce an extremely satisfactory bond.

FIGURES 5 through 8 illustrate adhesive arrangements as well as suitable coil pattern arrangements for mat-

tresses. FIGURE 5 illustrates the manner in which the tapes **40** can be applied to a panel surface **22**. It will be noted that the spacing between the tapes is such that every coil will contact at least two of the tapes. With a particularly good adhesive, a one-point contact may be suitable; and other obvious variations are also contemplated. The use of tapes is highly desirable since tapes are easy to handle and can be readily applied.

The arrangement of FIGURE 6 illustrates the manner in which stripes **62** of adhesive can be associated with the surface **22** of a panel. Again, the stripes are spaced-apart with at least one-point of contact being provided for each coil.

The adhesive pattern shown in FIGURE 7 involves the provision of circles **54** of adhesive as discussed with reference to FIGURE 3. The adhesive may be located on the surface so that the coil ends will correspond to the adhesive circles. It will be obvious, however, that even if exact correspondence is not provided, there will still be ample contact between the coil ends and the adhesive portions.

FIGURE 8 illustrates a still further alternative wherein blocks **56** of adhesive are applied to a surface **22**. Again, the spacing between the adhesive areas must be such that at least one-point contact is achieved in all instances.

FIGURES 5 through 8 are also of interest in that they illustrate the versatility which can be achieved with respect to coil arrangements. In FIGURE 5, the coils are arranged in horizontal and vertical rows. In FIGURE 6, the horizontal rows overlap slightly and a diagonal arrangement is achieved. In FIGURE 7, the interior of the coil arragement differs from the edge arrangement in that the density of coils at the edges is substantially greater. This provides for greater support at the edges which are known to be subject to the greatest tendency toward deformation.

Coil arrangements of the type illustrated can be readily achieved with this invention since feeding of coils between the panels can be controlled insofar as the respective rows are concerned. Whether done automatically or manually, there is no need for any particular pattern across the construction since each row can be fed between the panels independently of the other rows. Furthermore, the density across the construction can be varied arbitrarily at any given time. This is in contrast to conventional arrangements which must provide careful control with respect to coil location due to the fact that tie wires are employed.

Edge reinforcement can be achieved in the manner shown in FIGURE 7; however, the system of this invention is susceptible to the provision of other reinforcing means. It is contemplated that polyurethane foam panels could be aligned all around the side walls of providing edge support. Border wires for interconnecting outer coils can also be employed.

In conventional mattress manufacture, several layers of materials are ordinarily applied over the coil assembly. Thus, an insulating layer may be applied immediately over the coil ends, an intermediate filling material may overlie the insulating layer and, finally, an outer covering may be applied. With the system of this invention, it is possible to provide for complete covering of the coils in the manner illustrated without the need for additional covering operations. Thus, the panels **10** and **12** may themselves comprise a suitable final covering material, or they may each comprise a plurality of layers of material with each layer functioning in the manner of the prior art.

With respect to certain of the panels of the various types which can be employed in conjunction with the system of this invention, it is to be noted that these panels are possessed of unique characteristics. Thus, the instant invention contemplates the use of panels which have an adhesive applied to one surface at a location other than the location of the assembly operation. The adhesive on these panels is of a nature which will not adhere to other surfaces until the coil ends are in position against the surface of the panel. For example, various adhesives can be applied to the panel surface which will dry subsequent to application. Such panels can then be employed in the systems described and heating means of the type referred to can then be used for activating the adhesive at the appropriate time. Alternatively, a pressure-sensitive material could be applied to the panel surfaces along with protective strips with the latter being removed prior to contact of the surfaces with the coil ends.

With respect to the panels, it will be appreciated that the product aspects of this invention contemplate conventional spring insulator materials having adhesive applied on one surface, and such materials may include one element in sandwich arrangements or they may include an assembly of various materials such as the assembly previously referred to. In one specific form of the invention, adhesive strips are applied to "Tufflex" blankets manufactured by the Wood Conversion Company, these blankets comprising a wood fiber bound construction having a cotton net on one side.

In the practice of this invention, hot melt adhesives can be applied through the use of various conventional techniques including techniques which involve the use of induction coils as described above. Liquid emulsion adhesives which may require induction heating for driving out solvents and pressure-sensitive adhesives are also entirely suitable. Reference is made to an article entitled "The Hot Melts" in the February 1965, issue of "Assembly Engineering," pages 43 through 47, for a discussion of compositions and methods involving adhesives suitable for use in the practice of this invention. This disclosure is, of course, non-limiting in that contact adhesives of a butyl rubber composition, water emulsion adhesives comprising polymers and copolymers of various resins and vinyls and pressure-sensitive adhesives of the natural or synthetic rubber base type are all contemplated for use.

It will be understood that various changes and modifications may be made in the above described system which provide the characteristics of this invention without departing from the spirit thereof particularly as defined in the following claims.

That which we claim is:

1. A method for the production of articles comprising cushions and mattresses wherein the articles comprise a plurality of coil springs arranged with their vertical axes in substantially parallel relationship, and including panels of material on opposite sides of said springs overlying the coil spring ends, said method comprising the steps of continuously feeding separate lengths of said material past a coil supply location, maintaining said lengths in spaced-apart relationship with the spacing between lengths being no greater than the normal height of a coil, said lengths of material each being characterized by a continuous application of adhesive material on at least one surface, the surfaces of each length carrying said adhesive material being in opposed relationship at said coil supply location, said adhesive material being applied on discrete portions of said surfaces with the spacing between said portions being controlled whereby each coil end contacts at least one portion, and continuously feeding said coils between said lengths at said coil supply location whereby said ends of the coils are secured to said lengths.

2. A method in accordance with claim **1** wherein said adhesive comprises strips of double-faced pressure-sensitive tape applied in spaced-apart relationship on said surfaces.

3. A method in accordance with claim **1** wherein said adhesive comprises stripes of adhesive applied in spaced-apart relationship.

4. A method in accordance with claim **1** including the step of printing circles of adhesive on said surfaces.

5. A method in accordance with claim **1** comprising

the steps of applying blocks of adhesive in spaced-apart locations over said surfaces.

6. A method for the production of articles comprising cushions and mattresses which include a plurality of coil springs arranged with their vertical axes in substantially parallel relationship with at least one panel of material on one side of the articles overlying the ends of said coil springs, said method comprising the steps of providing an adhesive material on one surface of said panel, continuously feeding said panel past a coil supply location, providing an elongated coil feeding means at said coil supply station, said feeding means extending transversely of the direction of movement of said panel and adapted to handle a plurality of coils whereby a plurality of coils can be simultaneously fed into engagement with said panel, and continuously feeding rows of said coil supply location to bring said coil ends into contact with said surface whereby said ends of the coil are adapted to be secured to said panel.

7. A method in accordance with claim 6 wherein said adhesive is applied to cover substantially completely the entire area of said surfaces.

8. A method in accordance with claim 6 wherein said adhesive comprises a hot melt adhesive, and including the step of heating said adhesive after feeding of said coils between said lengths for achieving bonding action of said adhesive.

9. A method in accordance with claim 6 including the step of holding said coils in compression as they are brought into contact with said panel whereby the coil ends are pressed into engagement with the panel surfaces.

10. A method for the production of articles comprising cushions and mattresses of the type comprising a plurality of coil springs arranged with their vertical axes in substantially parallel relationship, and including panels of material on opposite sides of said springs overlying the ends of said coil springs, said method comprising the steps of continuously feeding separate lengths of said material past a coil supply location, maintaining said lengths in spaced apart relationship with the spacing between said lengths being no greater than the normal height of a coil, said lengths each having an adhesive material on one surface, the separate lengths being fed to said coil supply location with said surfaces being maintained in opposed relationship, providing an elongated coil feeding means at said coil supply station, said feeding means extending transversely of the direction of movement of said panel and adapted to handle a plurality of coils whereby a plurality of coils can be simultaneously fed into engagement with said panel, and continuously feeding said coils between said lengths at said coil supply location, and securing said coil ends to said surfaces by means of said adhesive.

11. A method in accordance with claim 10 wherein the width of said panels of material corresponds to the length of articles to be produced, whereby said material and the coils secured thereto can be cut transversely to produce articles of a desired width.

12. A method in accordance with claim 10 wherein said adhesive is continuously applied to said surfaces immediately prior to feeding of said lengths to the coil supply location.

13. A method in accordance with claim 10 wherein said adhesive is previously applied to said surfaces and including the step of activating said adhesive for securing of the coil ends to said surfaces.

14. A method in accordance with claim 13 wherein said adhesive is applied to said surfaces in liquid form and is dried on said surfaces, and wherein the adhesive is activated by heating the adhesive after said coil ends are brought into contact with said surfaces.

15. A method in accordance with claim 10 wherein the coils supplied to said feeding means are secured together in a series with the coils in a series forming a row in one direction in the finished article with the rows in the cross direction being formed by coils from adjacent series.

16. A flexible panel comprising a length of material employed in the production of articles comprising cushions and mattresses, said panel being provided for overlying the ends of a plurality of coils which are arranged in said articles with their vertical axes in substantially parallel relationship, and said panel including an adhesive material applied over one surface for engagement with said coil ends, said adhesive material being applied on discrete portions of said surface with the spacing between said portions being controlled to be less than the spacing between coil ends in a completed article whereby each coil end will contact at least one of said portions.

17. A panel in accordance with claim 16 wherein said adhesive is in substantially dry form after application to the panel and is adapted to be activated when exposed to heat.

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HAROLD ANSHER, *Primary Examiner.*

U.S. Cl. X.R.

156—291, 301, 306; 5—353.1, 354