

TORSION COIL SPRING

166166

BACKGROUND

- 5 The present invention relates to improvements in spring construction, and especially to bedding springs for use in mattress and/or mattress base construction, or the like.

PRIOR ART

- 10 Numerous forms of bedding springs are known according to the prior art. However, many examples of springs according to the prior art give unsatisfactory performance, are not adaptable for alternative light-/medium-/heavy-duty bedding construction and/or for alternative budget or premium markets. In many cases, completely different types of springs are specified for different types of bedding/mattress
15 construction and/or for different priced market sectors.

Some forms of prior art bedding springs are not conducive to economical mass production and/or are not suitable for economical bedding or mattress construction. The bedding manufacturing industry is very competitive and very cost sensitive.

20

A further disadvantage of known bedding springs are that in order to achieve different spring heights or resilience levels, different thicknesses of spring wire must be used. Having to change from one type of wire to another increases manufacture time and cost.

25

OBJECTS OF THE PRESENT INVENTION

- It is an object of the present invention to provide an improved form of spring suitable for use in bedding manufacture which substantially overcomes or at the least
30 minimises some of the prior art problems referred to above.



G00002

The nature of the invention will be apparent from the following further but non-limiting disclosure of the invention.

SUMMARY OF INVENTION

5

According to a first aspect the present invention consists in a spring suitable for use in bedding construction, said spring including a first leg, a first upper foot, a first lower foot, wherein said first leg, first upper foot and first lower foot are substantially coplanar said spring further including a second leg, a second upper foot, and a second lower foot wherein said second leg, second upper foot and second lower foot are substantially coplanar, wherein said first leg links said first upper foot to said lower foot and includes at least one coil spring at some point along its length; wherein said second leg links said second upper foot to said second lower foot and includes at least one coil spring at some point along its length; wherein a linking means links said first upper foot to said second upper foot and extends transversely from said first upper foot and said second upper foot; wherein the junction between the first upper foot and the first leg is defined by either a single bend radius lying substantially in the plane of the first leg, or a single coil; and wherein the junction between the second upper foot and the second leg is defined by either a single bend radius lying substantially in the plane of the second leg, or a single coil.

10

15

20

Preferably said first leg, first upper foot, and first lower foot have substantially the same shape as said second leg, second upper foot, and second lower foot.

25 Preferably said linking means links a toe of said first upper foot to a toe of said second upper foot.

Preferably said linking means links the toe of said first upper foot to the toe of said second upper foot so that said first leg, first upper foot, and first lower foot are oriented at approximately 180 degrees relative to said second leg, second upper foot, and second lower foot.

30

Preferably said linking means extends substantially diagonally from the toe of said first upper foot to the toe of said second upper foot.

Preferably said at least one coil spring has an axis of rotation which is substantially perpendicular to the plane of orientation of the first or second leg which it is situated on.

5

Preferably said at least one coil spring includes at least one 360 degree turn.

Preferably said at least one coil spring is located at the junction between said first leg and said first upper foot.

10

Preferably said at least one coil spring is located at the junction between said second leg and said second upper foot.

Preferably said at least one coil spring is located at the junction between said first leg and said first lower foot.

15

Preferably said at least one coil spring is located at the junction between said second leg and said second lower foot.

20 Preferably said at least one coil spring is located on said first leg at a point substantially midway between the first upper foot and the first lower foot.

Preferably said at least one coil spring is located on said second leg at a point substantially midway between the second upper foot and the second lower foot.

25

Preferably said first leg has a profile including at least one peak or trough.

Preferably said second leg has a profile including at least one peak or trough.

30 Preferably said first leg has a profile including a series of peaks or troughs.

Preferably said second leg has a profile including a series of peaks and troughs.

Preferably said series of peaks and troughs forms a generally zig-zag shaped profile.

Preferably said first leg includes at least one coil spring located at one or more of the peaks or troughs.

- 5 Preferably said second leg includes at least one coil spring located at one or more of the peaks or troughs.

Preferably said first leg has one peak or trough and has a generally V-shaped or U-shaped profile.

10

Preferably said second leg has one peak or trough and has a generally V-shaped or U-shaped profile.

15

Preferably said first leg includes one coil spring located at the peak or trough of its V-shaped or U-shaped profile.

Preferably said second leg includes one coil spring located at the peak or trough of its V-shaped or U-shaped profile.

- 20 Preferably said first leg includes a first coil spring located at the junction between said first leg and said first upper foot and a second coil spring located at the junction between said first leg and said first lower foot, and wherein said second leg includes a third coil spring located at the junction between said second leg and said second upper foot and a fourth coil spring located at the junction between said second leg and said
25 second lower foot.

Preferably a fifth coil spring is located at the peak or trough of said first leg and a sixth coil spring located at the peak or trough of said second leg.

- 30 Preferably said first upper foot includes at least one kink at some point along its length to prevent movement of said spring when fixed to a body of a mattress.

Preferably said second upper foot includes at least one kink at some point along its length to prevent movement of said spring when fixed to a body of a mattress.

Preferably said first lower foot includes at least one kink at its free end to prevent movement of said spring when fixed to a main framing of a mattress.

- 5 Preferably said second lower foot includes at least one kink at its free end to prevent movement of said spring when fixed to a main framing of a mattress.

Preferably said spring is of unitary or contiguous construction.

- 10 Preferably said spring is made from a single piece of wire or similar material.

- Preferably the first upper foot extends toward the second leg at an acute angle from the first leg as measured along the second leg and wherein the second upper foot extends toward the first leg at an acute angle from the second leg as measured along the first leg.
- 15

The present invention will now be described in more detail according to three preferred but non-limiting embodiments and with reference to the accompanying drawings:

20

Figure 1: Is a perspective view of the first preferred embodiment of the present invention ;

Figure 2: Is a front elevational view of the first preferred embodiment of the present invention;

25

Figure 3: Is a rear elevational view of the first preferred embodiment of the present invention;

- Figure 4: Is a side elevational view of the first preferred embodiment of the present invention;
- Figure 5: Is a top view of the first preferred embodiment of the present
- 5 Figure 6: Is a bottom view of the first preferred embodiment of the present invention;
- Figure 7: Is a perspective view of the second preferred embodiment of the present invention;
- 10 Figure 8: Is a front elevational view of the second preferred embodiment of the present invention;
- Figure 9: Is a rear elevational view of the second preferred embodiment of the present
- 15 invention;
- Figure 10: Is a side elevational view of the second preferred embodiment of the present invention;
- 20 Figure 11: Is a top view of the second preferred embodiment of the present invention;
- Figure 12: Is a bottom view of the second preferred embodiment of the present invention;
- 25 Figure 13: Is a perspective view of the third preferred embodiment of the present invention;
- Figure 14: Is a front elevational view of the third preferred embodiment of the present invention;
- 30

Figure 15: Is a rear elevational view of the third preferred embodiment of the present invention;

5 Figure 16: Is a side elevational view of the third preferred embodiment of the present invention;

Figure 17: Is a top view of the third preferred embodiment of the present invention;

10 Figure 18: Is a bottom view of the third preferred embodiment of the present invention;

First Preferred Embodiment (Figures 1 to 6)

As can be seen in Figures 1 to 6 the first preferred embodiment of the spring 1 of the present invention includes two legs 2, two upper feet 3, two lower feet 4, two coils 5, a link 15 6, two kinks 7 and two bends 8. The return portion or "kink" 7 on the end of both lower feet 4 is present to prevent the bottom portion of the spring 1 from slipping out of the ties and/or fixings used to fasten the spring to the main framing of the mattress (not shown). The length and angle of the return or kink 7 are variable depending on the ties and/or fixings used. In some cases, where a return portion or kink 7 is not required, the wire 20 would be straight, without a "kink 7".

The radius 9 at the bottom and top of both legs 2 prevents stress concentrations at these points when the spring 1 is compressed and can be varied according to the degree of flexibility required in the spring 1 as a whole.

25 The diameter of the coil 5, which would usually, but not always, be situated in the middle of the overall height, is varied to achieve a stiffer or softer spring as required for individual applications. A smaller diameter would result in a stiffer spring 1, while a larger diameter would give a softer spring 1. If an extremely soft spring 1 is required, two or even three 30 turn coils 5 could be used instead of the single turn coils 5 illustrated.

Similar in application to the kinks 7, the bends 8 at the extremities of the lower feet 4 are used to prevent movement of the top part of the spring 1 when fixed to the body of a mattress (not shown). The width, depth and position of these bends 8 would also be determined by the ties and/or fixings used to fasten the spring 1 to the main framing of the mattress (not shown). With some methods of fixing it would not be necessary to have a bend 8, and the wire would be left straight.

Radii 9 avoid stress concentrations at points where the wire is bent. Ideally these radii 9 should be as large as possible while still allowing for the spring 1 to be secured to the mattress frame (not shown).

The overall length of the spring form 1 determines the number of supports in the mattress frame per unit length. A shorter overall length would allow more spring forms 1 to be used providing for a stronger mattress. A longer overall length would result in fewer spring forms 1 being used, resulting in a softer mattress. The overall design of the mattress frame would also dictate the overall length required.

The overall width of the spring form 1 has a bearing on the stiffness of the spring 1 as a whole. A narrow spring 1 would be relatively stiff, while a wider spring 1 would be softer. The overall design of the mattress frame would also dictate the overall width required.

The overall height of the spring form 1 is determined by the thickness of the mattress to which it is being fitted. The overall height also has a bearing on the overall stiffness of the spring 1. A spring form 1 with a greater height would be stiffer than a spring with a shorter height.

Second Preferred Embodiment (Figures 7 to 13)

As can be seen in Figures 7 to 13 the second preferred embodiment of the spring 1 of the present invention includes two legs 2, two upper feet 3, two lower feet 4, four coils 5, a link 6, two kinks 7 and two bends 8. The return portion or "kink" 7 on the end of both

lower feet 4 is present to prevent the bottom portion of the spring 1 from slipping out of the ties and/or fixings used to fasten the spring to the main framing of the mattress (not shown). The length and angle of the return or kink 7 are variable depending on the ties and/or fixings used. In some cases, where a return portion or kink 7 is not required, the
 5 wire would be straight, without a "kink 7".

The diameter of the coils 5 is varied to achieve a stiffer or softer spring 1 as required for individual applications. A smaller diameter would result in a stiffer spring 1, while a larger diameter would give a softer spring 1. If an extremely soft spring 1 is required, two or
 10 even three turn coils 5 could be used instead of the single turn coils 5 illustrated.

The radii 9, which would usually, but not always, be situated in the middle of the overall heights, prevent stress concentrations at these points when the spring 1 is compressed and can be varied according to the degree of flexibility required in the spring 1.
 15

Similar in application to the kinks 7, the bends 8 at the extremities of the lower feet 4 are used to prevent movement of the top part of the spring 1 when fixed to the body of a mattress (not shown). The width, depth and position of these bends 8 would also be determined by the ties and/or fixings used to fasten the spring 1 to the main framing of the
 20 mattress (not shown). With some methods of fixing it would not be necessary to have a bend 8, and the wire would be left straight.

Radii 9 avoid stress concentrations at points where the wire is bent. Ideally these radii 9 should be as large as possible while still allowing for the spring 1 to be secured to the
 25 mattress frame (not shown).

The overall length of the spring form 1 determines the number of supports in the mattress frame per unit length. A shorter overall length would allow more spring forms 1 to be used providing for a stronger mattress. A longer overall length would result in fewer spring
 30 forms 1 being used, resulting in a softer mattress. The overall design of the mattress frame would also dictate the overall length required.

The overall width of the spring form 1 has a bearing on the stiffness of the spring 1 as a whole. A narrow spring 1 would be relatively stiff, while a wider spring 1 would be softer. The overall design of the mattress frame would also dictate the overall width required.

5

The overall height of the spring form 1 is determined by the thickness of the mattress to which it is being fitted. The overall height also has a bearing on the overall stiffness of the spring 1. A spring form 1 with a greater height would be stiffer than a spring with a shorter height.

10

Third Preferred Embodiment (Figures 13 to 18)

As can be seen in Figures 13 to 18 the third preferred embodiment of the spring 1 of the present invention includes two legs 2, two upper feet 3, two lower feet 4, six coils 5, a link 6, two kinks 7 and two bends 8. The return portion or "kink" 7 on the end of both lower feet 4 is present to prevent the bottom portion of the spring 1 from slipping out of the ties and/or fixings used to fasten the spring to the main framing of the mattress (not shown). The length and angle of the return or kink 7 are variable depending on the ties and/or fixings used. In some cases, where a return portion or kink 7 is not required, the wire would be straight, without a "kink 7".

The diameter of the coils 5 is varied to achieve a stiffer or softer spring 1 as required for individual applications. A smaller diameter would result in a stiffer spring 1, while a larger diameter would give a softer spring 1. If an extremely soft spring 1 is required, two or even three turn coils 5 could be used instead of the single turn coils 5 illustrated.

The radius 9 at the bottom and top of both legs 2 prevents stress concentrations at these points when the spring 1 is compressed and can be varied according to the degree of flexibility required in the spring 1 as a whole.

30

Similar in application to the kinks 7, the bends 8 at the extremities of the lower feet 4 are used to prevent movement of the top part of the spring 1 when fixed to the body of a mattress (not shown). The width, depth and position of these bends 8 would also be determined by the ties and/or fixings used to fasten the spring 1 to the main framing of the mattress (not shown). With some methods of fixing it would not be necessary to have a bend 8, and the wire would be left straight.

Radii 9 avoid stress concentrations at points where the wire is bent. Ideally these radii 9 should be as large as possible while still allowing for the spring 1 to be secured to the mattress frame (not shown).

The overall length of the spring form 1 determines the number of supports in the mattress frame per unit length. A shorter overall length would allow more spring forms 1 to be used providing for a stronger mattress. A longer overall length would result in fewer spring forms 1 being used, resulting in a softer mattress. The overall design of the mattress frame would also dictate the overall length required

The overall width of the spring form 1 has a bearing on the stiffness of the spring 1 as a whole. A narrow spring 1 would be relatively stiff, while a wider spring 1 would be softer. The overall design of the mattress frame would also dictate the overall width required.

The overall height of the spring form 1 is determined by the thickness of the mattress to which it is being fitted. The overall height also has a bearing on the overall stiffness of the spring 1. A spring form 1 with a greater height would be stiffer than a spring with a shorter height.

Springs according to the present invention are fabricated from suitable wire grades known in the art to spring and bedding manufacturers. Similarly bedding utilising such springs is manufactured according to techniques known to bedding manufacturers.

Although the invention has been described with reference to examples and drawings relating to preferred embodiments of the invention, it will be appreciated by persons to whom this specification is addressed that the invention is not limited thereto or thereby, and that alternatives to and modifications of specifically described features may be made or
5 included without departing from the spirit or scope of the invention as disclosed herein. All such alternatives and modifications are thereby intended to be included as part of this invention.

CLAIMS

1. A spring suitable for use in bedding construction, said spring including a first leg, a first upper foot, a first lower foot, wherein said first leg, first upper foot and first
5 lower foot are substantially coplanar said spring further including a second leg, a second upper foot, and a second lower foot wherein said second leg, second upper foot and second lower foot are substantially coplanar, wherein said first leg links said first upper foot to said lower foot and includes at least one coil spring at some point along its length; wherein said second leg links said second upper foot to said second
10 lower foot and includes at least one coil spring at some point along its length; wherein a linking means links said first upper foot to said second upper foot and extends transversely from said first upper foot and said second upper foot; wherein the junction between the first upper foot and the first leg is defined by either a single bend radius lying substantially in the plane of the first leg, or a single coil; and wherein the
15 junction between the second upper foot and the second leg is defined by either a single bend radius lying substantially in the plane of the second leg, or a single coil.
2. The spring as claimed in claim 1 wherein said first leg, first upper foot, and first lower foot have substantially the same shape as said second leg, second upper
20 foot, and second lower foot.
3. The spring as claimed in either of claims 1 or 2 wherein said linking means links a toe of said first upper foot to a toe of said second upper foot.
- 25 4. The spring as claimed in claim 3 wherein said linking means links the toe of said first upper foot to the toe of said second upper foot so that said first leg, first upper foot, and first lower foot are oriented at approximately 180 degrees relative to said second leg, second upper foot, and second lower foot.
- 30 5. The spring as claimed in claim 3 wherein said linking means extends substantially diagonally from the toe of said first upper foot to the toe of said second upper foot.

6. The spring as claimed in claim 1 wherein said at least one coil spring has an axis of rotation which is substantially perpendicular to the plane of orientation of the first or second leg which it is situated on.

5 7. The spring as claimed in claim 6 wherein said at least one coil spring includes at least one 360 degree turn.

8. The spring as claimed in claim 1 wherein said at least one coil spring is located at the junction between said first leg and said first upper foot.

10

9. The spring as claimed in claim 1 wherein said at least one coil spring is located at the junction between said second leg and said second upper foot.

10. The spring as claimed in claim 1 wherein said at least one coil spring is located at the junction between said first leg and said first lower foot.

15

11. The spring as claimed in claim 1 wherein said at least one coil spring is located at the junction between said second leg and said second lower foot.

20 12. The spring as claimed in claim 1 wherein said at least one coil spring is located on said first leg at a point substantially midway between the first upper foot and the first lower foot.

13. The spring as claimed in claim 1 wherein said at least one coil spring is located on said second leg at a point substantially midway between the second upper foot and the second lower foot.

25

14. The spring as claimed in claim 1 wherein said first leg has a profile including at least one peak or trough.

30

15. The spring as claimed in claim 1 wherein said second leg has a profile including at least one peak or trough.

16. The spring as claimed in claim 14 wherein said first leg has a profile including a series of peaks or troughs.

17. The spring as claimed in claim 14 wherein said second leg has a profile
5 including a series of peaks and troughs.

18. The spring as claimed in either of claim 16 or 17 wherein said series of peaks and troughs forms a generally zig-zag shaped profile.

10 19. The spring as claimed in claim 16 wherein said first leg includes at least one coil spring located at one or more of the peaks or troughs.

20. The spring as claimed in claim 16 wherein said second leg includes at least one coil spring located at one or more of the peaks or troughs.

15

21. The spring as claimed in claim 14 wherein said first leg has one peak or trough and has a generally V-shaped or U-shaped profile.

22. The spring as claimed in claim 14 wherein said second leg has one peak or
20 trough and has a generally V-shaped or U-shaped profile.

23. The spring as claimed in claim 21 wherein said first leg includes one coil spring located at the peak or trough of its V-shaped or U-shaped profile.

25 24. The spring as claimed in claim 22 wherein said second leg includes one coil spring located at the peak or trough of its V-shaped or U-shaped profile.

25. The spring as claimed in claim 1 wherein said first leg includes a first coil spring located at the junction between said first leg and said first upper foot and a
30 second coil spring located at the junction between said first leg and said first lower foot, and wherein said second leg includes a third coil spring located at the junction between said second leg and said second upper foot and a fourth coil spring located at the junction between said second leg and said second lower foot.

26. The spring as claimed in claim 25 further including a fifth coil spring located at the peak or trough of said first leg and a sixth coil spring located at the peak or trough of said second leg.

5 27. The spring as claimed in claim 1 wherein said first upper foot includes at least one kink at some point along its length to prevent movement of said spring when fixed to a body of a mattress.

10 28. The spring as claimed in claim 1 wherein said second upper foot includes at least one kink at some point along its length to prevent movement of said spring when fixed to a body of a mattress.

15 29. The spring as claimed in claim 1 wherein said first lower foot includes at least one kink at its free end to prevent movement of said spring when fixed to a main framing of a mattress.

20 30. The spring as claimed in claim 1 wherein said second lower foot includes at least one kink at its free end to prevent movement of said spring when fixed to a main framing of a mattress.

31. The spring as claimed in claim 1 wherein said spring is of unitary or contiguous construction.

25 32. The spring as claimed in claim 31 wherein said spring is made from a single piece of wire or similar material.

30 33. The spring as claimed in claim 1 wherein the first upper foot extends toward the second leg at an acute angle from the first leg as measured along the second leg and wherein the second upper foot extends toward the first leg at an acute angle from the second leg as measured along the first leg.