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PATENT SPECIFICATION

DRAWINGS ATTACHED

1095.980



Inventor: LESLIE THOMAS DOCKER

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SEE ERRATA SLIP ATTACHED

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Int. Cl.:—B 68 g 7/00

COMPLETE SPECIFICATION

The manufacture of Spring Units for Mattresses and the like

We, MULTILASTIC LIMITED, a British Company of 134 High Street, Brierley Hill, Staffordshire, do hereby declare the invention for which we pray that a Patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to the manufacture of spring units for mattresses and the like, and is particularly concerned with spring units made from bands of springs of the kind each comprising a length of resilient wire bent so as to form a plurality of coil springs arranged side-by-side in a row, the spring unit comprising a plurality of bands disposed side-by-side and interconnected by helical wires extending transversely to the bands.

From one aspect the present invention consists in a method of making a spring unit from a plurality of bands of springs, each band comprising a length of resilient wire bent so as to form a plurality of coil springs arranged side-by-side in a row, the method comprising a series of successive cycles, each cycle comprising the steps of causing feeding means to engage the bands at locations spaced from a linking station and move them forwards bodily to an extent such that those parts of the bands which are to be linked at the linking station are all disposed in the neighbourhood of the station, causing locating means to engage the parts and carry those that are not already at the station to the station without moving the bands bodily, the bands being disposed side-by-side at the station and the parts to be linked being mutually aligned transversely of the bands, and causing a helical wire at the linking station to be rotated and moved axially, in the manner of a screw, across the bands so as to link the parts together.

In a preferred method the parts of the bands which are to be linked are moved by the feeding means to or past the linking station, the locating means carrying those that have moved past the station back to the station.

Each helical wire preferably performs a second linking function, in addition to its primary function of linking the bands together, the helical wire linking two separate parts of the wire which forms each band, these parts lying close together but being disposed at spaced positions along the length of the wire. That part of the wire which extends between these parts preferably constitutes a pair of adjacent springs in the band.

The invention also consists in apparatus for making a spring unit from a plurality of bands of springs, each band comprising a length of resilient wire bent so as to form a plurality of coil springs arranged side-by-side in a row, the apparatus comprising means for guiding and intermittently feeding a plurality of bands of springs bodily forwards past a linking station, locating means at the linking station operative to engage parts of the bands to be linked together and to carry those parts that are not already at the station, but are in the neighbourhood of the station, to the station without moving the bands bodily, and means at the linking station for causing a helical wire to be rotated and moved axially, in the manner of a screw, across the bands so as to link the parts together.

The invention also consists in a spring unit made by the method outlined above or by the apparatus outlined above.

The invention will now be more particularly described with reference to the accompanying drawings, in which:—

Figure 1 is a somewhat diagrammatic plan view of a spring unit in accordance with the invention,

Figure 2 is a side view of the spring unit shown in Figure 1,

Figure 3 is a perspective view of part of one of the component bands of the spring unit shown in Figures 1 and 2,

Figure 4 is a side view of apparatus for making spring units in accordance with the invention,

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Figure 5 shows part of Figure 4 to an enlarged scale, other parts being omitted for clarity.

Figure 6 is a perspective view of part of the apparatus shown in Figure 4, certain parts having been omitted for clarity.

Figure 7 is a sectional elevation to an enlarged scale of part of the apparatus shown in Figure 4,

Figure 8 is a perspective view, with parts omitted for clarity, of part of the mechanism shown in Figure 6,

Figures 9(a), 9(b) and 9(c) are diagrammatic side views illustrating three successive steps in the method of operation of the apparatus shown in Figure 4,

Figure 10 is an end view of a band as shown in Figure 3, with an alternative form of guide, and

Figure 11 is a diagrammatic plan view illustrating an alternative form of feeding means.

Figures 1 and 2 illustrate a spring unit diagrammatically. Such a unit is intended for use in a spring mattress, but similar units may well be used in upholstery, cushions, motor vehicle seats and the like. The unit illustrated comprises a plurality of bands of springs 20 each of the form shown in Figure 3 and described below in greater detail. The bands 20 are disposed side-by-side and are interconnected by helical wires 21 and 22 extending transversely of the bands. As can be seen from Figure 2 there are two sets of helical wires those having the reference 21 being at the upper face of the spring unit and those having the reference 22 being at the lower face of the unit. Successive helical wires along the unit are at opposite faces of the unit.

The bands of springs are of a known kind. Each band comprises a length of resilient wire bent so as to form a plurality of coil springs 23 arranged side-by-side in a row. The springs are generally helical in shape and successive springs are alternately left- and right-handed. Each spring 23 is joined at one end to the spring to one side of it and at the other end to the spring to the other side of it. Each pair of adjacent springs is interconnected by a loop 24 which consists of part of the length of wire. The loop 24 is shaped approximately as three sides of a rectangle or as the letter U, having two generally parallel side limbs 25 and a connector 26 between them. The loop is substantially flat and lies in the plane of one edge face of the band, the side limbs 25 extending in a direction transverse to the length of the band and the connector 26 extending lengthwise of the band. The length of the connector 26 is such that the side limbs 25 to which it is joined are so spaced that the two springs 23 to which they are joined stand between the side limbs. Successive loops 24 along the wire are at opposite edge faces of the band so that there are two groups of loops, those in one group lying at one edge

face of the band and those in the other group lying at the other edge face of the band. The arrangement is such that there is little or no gap between successive loops in each group, so that if any pair of successive loops in either group is considered in isolation, for example the loops 27 and 28, it will be understood that one side limb 29 of loop 27 lies close to and parallel with one side limb 30 of the other loop 28.

As can be seen from Figure 1, each of the helical wires 21 and 22 embraces a pair of adjacent side limbs 25 of each band; and each such pair of adjacent side limbs 25 is embraced by a helical wire.

Each coil spring 23 in each band is coupled to the two springs on either side of it by having some of its turns linked to turns of the two adjacent springs; this can readily be seen from Figure 3. (For the sake of clarity this linking has not been shown in Figure 1). For convenience of handling each band of springs is wound to form a drum-shaped coil with its axis substantially parallel with the axes of the springs in the band. Each successive turn of the coil lies radially outwards, beyond the preceding turn, and interfits or nests closely with the preceding turn. This interfitting or nesting is made possible due to the shape of the band. In end view the band is of sinuous appearance; the end view of a band 31 is shown diagrammatically in Figure 10. The consequence is that each successive turn is disposed outwards from the preceding turn by a distance a little greater than the thickness of the wire from which the band is formed.

The drum shaped coils are mounted on suitable stands, one of which is shown in Figure 4. The stand comprises a base 32 with an upright pillar on which are mounted sleeves 33 each with a laterally projecting arm 34 — only one arm 34 being shown, for clarity. An upright spindle 35 is mounted at the end of each arm and carries a rotor comprising a tube 36, rotatable on the spindle 35, and a circular plate 37 fixed to the tube 36. A coiled band of springs, the outline of which is indicated as 38, rests on the plate 37 and is engaged at its centre by fins 39 on the upper part of the tube, so that the rotor rotates with the coil 38. An adjustable friction band 40 embraces the lower end of the rotor tube 36 to prevent the coil 38 unwinding in an uncontrolled manner. It is to be understood that as many coils are provided as there are bands in the completed spring unit.

The main part of the apparatus is shown to the right-hand side of Figure 4. This comprises a stand 42 on which there is a fixed framework 43 carrying a plurality of guide channels 44 disposed side-by-side and comprising a flat base 45 (see Figure 7) with spaced parallel upright plates 46 defining guideways between them. At the rear the chan-

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nels fan outwards as indicated at 47, and their upright plates extend upwards and downwards, to enable bands of springs to be readily guided into the apparatus from the stands.

5 In an alternative construction, not illustrated in detail, the guide channels 44 are replaced by a plurality of fixed rods. Each band is guided by three or more rods arranged in spaced parallel relationship, successive rods being on opposite sides of the band and lying in the longitudinally extensive grooves in the band which are apparent when the band is viewed from one end. A typical arrangement using three rods 48 is illustrated in Figure 10.

15 Those end portions of the guide channels 44, which are further from the coils, are straight, horizontal and parallel to one another, and lead to a linking station described in detail below. Feeding means are provided which serve to engage the bands and to move them forwards bodily, in unison, once in each cycle of operations of the apparatus. The feeding means comprise four parallel links 49 and 50, two at each side of the apparatus, pivoted at their lower ends to the stand 42. The links 49 are connected by a pair of adjustable connecting links 51 to arms 53 on a shaft 54 carrying at each end arms 55 which are coupled to the rear pair of links 50. The links 49 and 50 are caused to reciprocate by means of a pneumatic piston and cylinder unit 52 mounted on the fixed framework 43 and connected to an arm on the shaft 54 parallel with the arms 53. A wheeled carriage 56 runs on the fixed framework 43 and includes a pair of parallel rods 57 extending across the open tops of the guide channels 44. The carriage is coupled to the rear links 50 so as to be reciprocated by these links. Each of the rods 57 carries a plurality of fingers 58, one finger from each rod depending into each channel. As shown in Figure 7 each finger 58 is so mounted so as to be able to swing forwards but not rearwards. The arrangement is such that on each operation of the unit 52 the fingers engage the bands and move them forwards a distance equal to the width of two springs, and then return to engage the band again two springs further back than before.

Transverse bars 59 extend between the forward links 49 and have claws 60 mounted on them. There is a pair of claws for each band, one above the band and one below it. All the claws are of the same shape, and one typical claw is shown in Figure 6. As will be seen from this Figure the front part 61 can engage a wire of the band and draw the band forward as the claw itself moves forward while the rear part is inclined away from the associated band so that the claw becomes disengaged from the band as the claw moves rearwards. As with the fingers 58 the arrangement is such that the claws enter alternate

springs and assist in moving the bands forwards a distance equal to the width of two springs during each cycle of operation.

At the linking station there are two sets of jaws 63 and 64 which constitute locating means one set of jaws, 63, being below the bands and the other, 64, being above the bands. Each set of jaws comprises a number of pairs of jaws equal to the number of bands, each pair acting on an associated band. One jaw 65 of each pair is stationary and extends in a generally vertical direction as can be seen best in Figure 6. The other jaw 66 is pivoted to the fixed jaw 65 by a horizontal pivot pin 67 transverse to the direction of feed of the bands.

In Figure 6 there is only shown the end pair of jaws of the lower set 63, but it is to be understood that the remaining pairs of jaws of this set are similar, and that the jaws of the upper set 64 are again similar but are inverted. Each pair of jaws is controlled by an individual, double-acting pneumatic piston-and-cylinder unit 68 of which the cylinder is pivoted to the framework 43 and the piston is pivoted to an extension 69 of the pivoted jaw 66 beyond the pivot pin 67. At the back of each of the fixed jaws 65 of the lower set of jaws 63 is mounted a ramp 41 (Figure 5) to prevent the edge of the associated band catching on the jaw, and enabling it instead to move over the jaw.

In operation the pairs of jaws 63 and 64 are opened and the feeding means is operated to feed the bands forwards as described above. The arrangement is such that at the end of the forward movement pairs of side limbs 25 have moved over the backs of the fixed jaws 65 and snapped into the open mouths of the jaws. While some pairs of side limbs 25 may lie against the inner faces of the adjacent fixed jaws 65 the extent of the feed is so arranged that most if not all the pairs move a short way beyond the fixed jaws but remain in the mouths of the jaws. The movable jaws 66 are then pivoted back against the fixed jaws, carrying the pairs of side limbs 25 backwards to the fixed jaws and locating them accurately. The distance moved by the side limbs 25 is relatively small so that the bands are not moved bodily but are only flexed somewhat by this movement of the side limbs.

In Figure 6 the pivoted jaw 66 is shown in a position intermediate its fully open and fully closed position. The cycle of operations described above is illustrated in Figure 9(a), 9(b), and 9(c). Figure 9(a) shows the jaws open and the bands being moved forwards by fingers 58. Figure 9(b) shows the fingers in their most forward position and pairs of limbs 25 in the jaws; while Figure 9(c) shows the jaws closed and the limbs 25 pulled backwards slightly, and also shows the fingers 58 after they have moved back to their rearmost position preparatory to pushing the bands for-

wards again when the jaws re-open.

The inner faces of each pair of jaws 65 and 66, that is the faces which meet when the jaws are closed, are recessed as indicated at 70 to afford a tubular opening from one side to the other for receiving a pair of side limbs of the band. Further, the walls defining the tubular opening are grooved as indicated at 71 in such a manner that when the jaws are closed the grooves form a continuous helix. A small gap is left between each pair of jaws and the next in order to enable the wires connected to the side limbs 25 to be accommodated. In use the helical groove defined by each set of jaws receives a helical wire for linking the side limbs together and linking the bands together as described above and illustrated in Figures 1 and 2. A helical wire is introduced, in the manner of a screw, from one end of each set of jaws immediately after the jaws are closed. Each of the two helical wires is rotated and moved axially by mechanism of the kind shown in Figure 6. This mechanism is mounted on the fixed framework 43 at the far side of the apparatus shown in Figure 4, and comprises a pair of parallel rollers 72 formed with annular grooves and rotated continuously in the same direction by a motor (not shown). A third roller 73, which is also grooved, is mounted on a support 74 pivoted at 75 to the framework 43. A manually operable lever 76, pivoted to the framework at its lower end, carries arms 77 which enter slots in the support 74 as illustrated. The lever is urged to the position shown by a tension spring 78 and restrained by an adjustable stop 79. In use the operator of the apparatus pulls the lever 76 down, inserts one end of a helical wire between the rollers 72 and 73, and releases the lever, whereupon the wire is gripped by the rollers, rotated and propelled lengthwise. The movement of the helical wire is limited by a fixed stop (not shown) at the opposite side of the apparatus to the feed mechanism.

After the two helical wires have been linked to the bands the end portions thereof, which project a short way beyond the sets of jaws, are cut off, and the newly formed ends, close to the end jaws, are turned inwards to form a loop around the adjacent wires of the end bands. This cutting and turning of each end of each wire is performed by a single tool 80 pivoted to a fixed member 81 at the adjacent end of the set of jaws by a horizontal pin 82 parallel with the direction of feed of the bands.

The tool 80 shown in Figure 6 is also shown, separated from the adjacent jaws, in Figure 8, which also shows a fixed cutter block 83 mounted on the fixed member 81. A helical wire 84 is also shown. In use the tool 80 is pivoted in the direction of the arrow by a pneumatic piston-and-cylinder unit of which the piston 85 (Figure 6) is connected to an

extension 86 of the tool 80 beyond the pivot pin 82. An upstanding lug 87 traps the wire against the fixed cutter block 83, severs the wire and carries the severed end onwards towards the adjacent band until the end portion of the severed wire forms a closed or nearly closed loop.

After the cutting and turning operation the tools 80 are returned to their initial positions, the jaws opened to release the helical wires, and the feeding means is again operated to move the bands and completed part of the spring unit forwards. Because the links 49 are pivoted at their lower ends the claws 60 rise as they pull the linked bands forwards and tend to raise the bands. This helps the bands clear the lower set of jaws 63, while further assistance is given by a transverse bar 88 below the bands and secured to the links 49 by brackets 89. The upward movement of the bands, however, tends to prevent rather than assist the bands passing the upper set of jaws 64. To overcome this difficulty a fixed bar 90, parallel with the bar 88 is mounted above the bands between the jaws and the links 49.

The various steps described above may each be initiated in turn by an operator who can check each operation before starting the next. Alternatively some or all of the steps may be initiated automatically on completion of the previous step or steps.

Although the feed means described above comprise fingers 58 and claws 60 which engage the bands of springs, either of these means may be omitted if it is found that the apparatus is working satisfactory without them.

In an alternative form of apparatus illustrated diagrammatically in Figure 11 the feed means comprises a plurality of endless chains, there being a pair for each band. One pair of chains 91 and 92 is shown in plan view. Each chain extends around a pair of sprocket wheels, and has a run extending lengthwise beneath the band 93 with which it is associated. Only the lower part of the band is illustrated. The chains 91 and 92 are moved intermittently and in unison but one chain 91 of each pair moves faster than the other chain 92.

Each chain has a series of uniformly spaced teeth 94 and 95, the interval between successive teeth 94 on the faster chain 91 being slightly greater than the distance between the axes of alternate springs in the band 93, and the interval between successive teeth 95 on the slower chain 92 being slightly less than the distance between the axes of alternate springs in the band 93. During each cycle each chain moves forwards a distance such that each tooth on it takes up the position previously occupied by the next tooth in front of it. The arrangement is such that in use as the teeth on those parts of the pair of chains approach the runs beneath the bands, the teeth on the chains enter successive springs

alternately as shown at the left-hand end of Figure 11. During each cycle the teeth move the band 93 forward by a distance equal to the width of two springs, while each tooth 94 on the faster chain 91 approaches the tooth 93 next in front of it on the slower chain 92. Where the chains approach the linking station (not shown, but somewhat to the right of the parts shown in Figure 11) each tooth 94 on the faster chain 91 has caught up the tooth 93 next in front of it on the slower chain 92, and each pair of adjacent teeth locates between them a pair of side limbs 25 on the band 93. As the teeth withdraw as shown at 96 the springs are passed to the linking station at substantially the correct spacing, and are there located by locating means such as the jaws described above.

WHAT WE CLAIM IS:—

1. A method of making a spring unit from a plurality of bands of springs, each band comprising a length of resilient wire bent so as to form a plurality of coil springs arranged side-by-side in a row, the method comprising a series of successive cycles, each cycle comprising the steps of causing feeding means to engage the bands at locations spaced from a linking station and move them forwards bodily to an extent such that those parts of the bands which are to be linked at the linking station are all disposed in the neighbourhood of the station, causing locating means to engage the parts and carry those that are not already at the station to the station without moving the bands bodily, the bands being disposed side-by-side at the station and the parts to be linked being mutually aligned transversely of the bands, and causing a helical wire at the linking station to be rotated and moved axially, in the manner of a screw, across the bands so as to link the parts together.

2. A method according to Claim 1 in which the parts of the bands which are to be linked are moved by the feeding means to or past the linking station, the locating means carrying those that have moved past the station back to the station.

3. A method according to either of Claims 1 and 2 in which each helical wire links two separate parts of the wire which forms each band, these parts lying close together but being disposed at spaced positions along the length of the wire.

4. A method according to any of the preceding Claims in which two spaced helical wires are linked to the bands after each movement of the bands bodily forwards.

5. A method according to any of the preceding Claims in which, after each helical wire is linked to the bands, any projecting ends of the wire are trimmed and the end portions of the trimmed wire are bent towards the body of the spring unit to form a closed or partially closed loop.

6. Apparatus for making a spring unit from

a plurality of bands of springs, each band comprising a length of resilient wire bent so as to form a plurality of coil springs arranged side-by-side in a row, the apparatus comprising means for guiding and intermittently feeding a plurality of bands of springs bodily forwards past a linking station, locating means at the linking station operative to engage parts of the bands to be linked together and to carry those parts that are not already at the station, but are in the neighbourhood of the station, to the station without moving the bands bodily, and means at the linking station for causing a helical wire to be rotated and moved axially, in the manner of a screw, across the bands so as to link the parts together.

7. Apparatus according to Claim 6 in which the means for feeding the bands of springs forwards comprises a plurality of fingers or claws adapted to enter the springs at positions spaced from the linking station, means operative to push the fingers or claws forwards, and means operative to return the fingers or claws to their previous positions while they are automatically retracted from the springs.

8. Apparatus according to Claim 6 in which the means for feeding the bands of springs forwards comprises a plurality of pairs of flexible, endless elements, one pair for each band of springs, each pair of elements including adjacent runs close to the path of the associated band, and each element having uniformly spaced teeth for engaging the band when in said runs, the teeth on one element being closer together than those on the other, and means for moving the elements intermittently but simultaneously, in such a manner that at each move each tooth in said runs takes the place of a tooth which was further forward, the arrangement being such that successive teeth on the pair of elements enter adjacent springs of the associated band and move together as they move along said runs so as to bring the parts of the springs between them into the desired relative positions.

9. Apparatus according to any of Claims 6 to 8 in which the feeding means is operative to move the parts to be linked to or past the linking station, and the locating means is operative to carry back to the linking station those parts to be linked which have past the station.

10. Apparatus according to any of Claims 6 to 9 in which the locating means incorporates helical grooves constituting a guide for the helical wire.

11. Apparatus according to any of Claims 6 to 10 in which the locating means comprises jaws which can be opened to receive the parts to be linked together and closed to carry the parts to the linking station and hold them in place while the helical wire is linked to them.

12. Apparatus according to Claim 11 in which the linking means includes a plurality

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alternately as shown at the left-hand end of Figure 11. During each cycle the teeth move the band 93 forward by a distance equal to the width of two springs, while each tooth 94 on the faster chain 91 approaches the tooth 93 next in front of it on the slower chain 92. Where the chains approach the linking station (not shown, but somewhat to the right of the parts shown in Figure 11) each tooth 94 on the faster chain 91 has caught up the tooth 95 next in front of it on the slower chain 92, and each pair of adjacent teeth locates between them a pair of side limbs 25 on the band 93. As the teeth withdraw as shown at 96 the springs are passed to the linking station at substantially the correct spacing, and are there located by locating means such as the jaws described above.

WHAT WE CLAIM IS:—

- 20 1. A method of making a spring unit from a plurality of bands of springs, each band comprising a length of resilient wire bent so as to form a plurality of coil springs arranged side-by-side in a row, the method comprising
- 25 a series of successive cycles, each cycle comprising the steps of causing feeding means to engage the bands at locations spaced from a linking station and move them forwards bodily to an extent such that those parts of the bands
- 30 which are to be linked at the linking station are all disposed in the neighbourhood of the station, causing locating means to engage the parts and carry those that are not already at the station to the station without moving
- 35 the bands bodily, the bands being disposed side-by-side at the station and the parts to be linked being mutually aligned transversely of the bands, and causing a helical wire at the linking station to be rotated and moved
- 40 axially, in the manner of a screw, across the bands so as to link the parts together.

- 45 2. A method according to Claim 1 in which the parts of the bands which are to be linked are moved by the feeding means to or past the linking station, the locating means carrying those that have moved past the station back to the station.

- 50 3. A method according to either of Claims 1 and 2 in which each helical wire links two separate parts of the wire which forms each band, these parts lying close together but being disposed at spaced positions along the length of the wire.

- 55 4. A method according to any of the preceding Claims in which two spaced helical wires are linked to the bands after each movement of the bands bodily forwards.

- 60 5. A method according to any of the preceding Claims in which, after each helical wire is linked to the bands, any projecting ends of the wire are trimmed and the end portions of the trimmed wire are bent towards the body of the spring unit to form a closed or partially closed loop.

- 65 6. Apparatus for making a spring unit from

a plurality of bands of springs, each band comprising a length of resilient wire bent so as to form a plurality of coil springs arranged side-by-side in a row, the apparatus comprising means for guiding and intermittently feeding a plurality of bands of springs bodily forwards past a linking station, locating means at the linking station operative to engage parts of the bands to be linked together and to carry those parts that are not already at the station, but are in the neighbourhood of the station, to the station without moving the bands bodily, and means at the linking station for causing a helical wire to be rotated and moved axially, in the manner of a screw, across the bands so as to link the parts together.

7. Apparatus according to Claim 6 in which the means for feeding the bands of springs forwards comprises a plurality of fingers or claws adapted to enter the springs at positions spaced from the linking station, means operative to push the fingers or claws forwards, and means operative to return the fingers or claws to their previous positions while they are automatically retracted from the springs. 85

8. Apparatus according to Claim 6 in which the means for feeding the bands of springs forwards comprises a plurality of pairs of flexible, endless elements, one pair for each band of springs, each pair of elements including adjacent runs close to the path of the associated band, and each element having uniformly spaced teeth for engaging the band when in said runs, the teeth on one element being closer together than those on the other, and means for moving the elements intermittently but simultaneously, in such a manner that at each move each tooth in said runs takes the place of a tooth which was further forward, the arrangement being such that successive teeth on the pair of elements enter adjacent springs of the associated band and move together as they move along said runs so as to bring the parts of the springs between them into the desired relative positions. 90

9. Apparatus according to any of Claims 6 to 8 in which the feeding means is operative to move the parts to be linked to or past the linking station, and the locating means is operative to carry back to the linking station those parts to be linked which have past the station. 105

10. Apparatus according to any of Claims 6 to 9 in which the locating means incorporates helical grooves constituting a guide for the helical wire. 110

11. Apparatus according to any of Claims 6 to 10 in which the locating means comprises jaws which can be opened to receive the parts to be linked together and closed to carry the parts to the linking station and hold them in place while the helical wire is linked to them. 125

12. Apparatus according to Claim 11 in which the linking means includes a plurality 130



of pairs of jaws, each pair being associated with a different band of springs.

13. Apparatus according to any of Claims 6 to 12 in which there is means at the linking station for causing two helical wires to be rotated and moved axially, in the manner of screws, across the bands so as to link the parts together, one helical wire linking parts at one edge face of each band, and the other linking parts at the other edge face of each band.
14. Apparatus according to any of Claims 9 to 13 in which means is provided for trimming any projecting ends of a helical wire after it has been linked to the bands of springs and bending the end portion of the trimmed wire towards the body of the spring unit to form a closed or partially closed loop.
15. Apparatus for making a spring unit from

a plurality of bands of springs, substantially as hereinbefore described with reference to and as shown in Figures 3 to 9 of the accompanying drawings, or embodying the modification of Figure 10 or Figure 11.

16. A method of making a spring unit, substantially as hereinbefore described with reference to the accompanying drawings.

17. A spring unit made by a method according to any of Claims 1 to 5 or Claim 16, or made by apparatus according to any of Claims 6 to 14.

BARKER, BRETTELL & DUNOAN,
Agents for the Applicants,
Chartered Patent Agents,
16 Greenfield Crescent,
Edgbaston,
Birmingham 15.

ERRATA

SPECIFICATION No. 1,095,980

Page 3, line 121, for "Figure" read "Figures"

Page 5, line 41, for "hands" read "bands"

Page 5, line 91, for "Claim" read "Claim"

Page 5, line 102, after "simultaneously" delete comma

THE PATENT OFFICE
8th April 1968



* C L M S *