March 27, 1934. H. G. BRANDWEIN 1,952,413

MACHINE FOR SPINNING HELICAL SPRINGS

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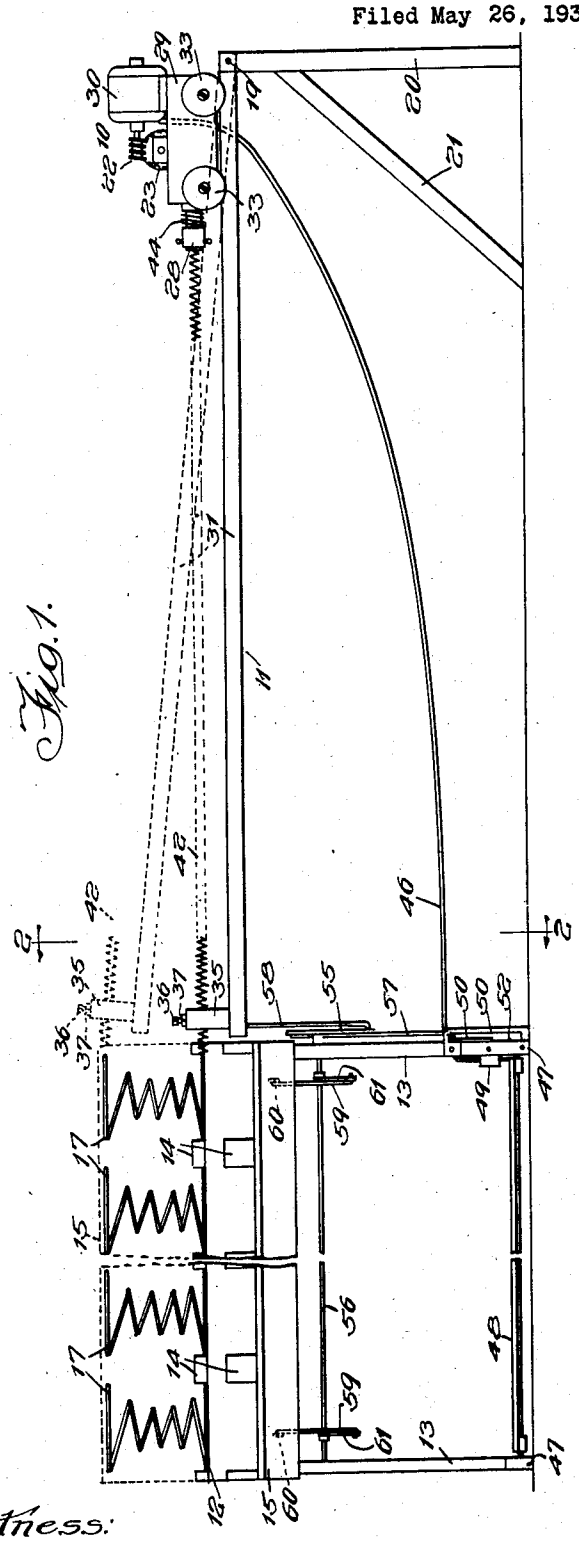


Fig. 1.

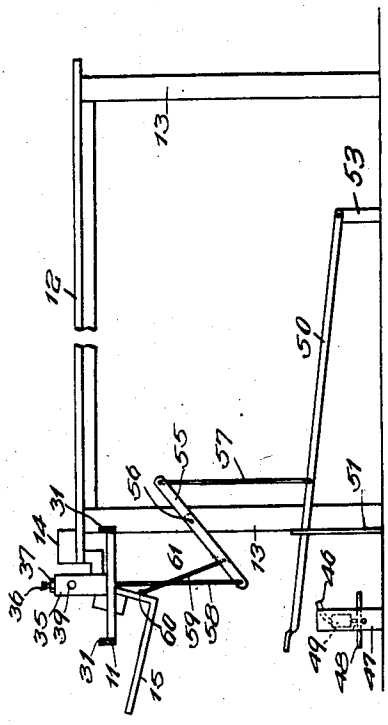


Fig. 2.

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Fig. 3.

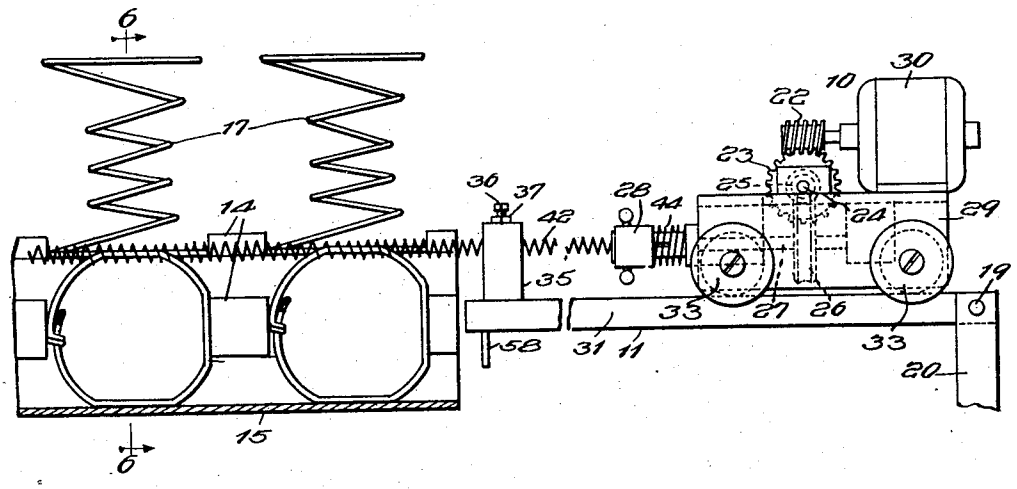
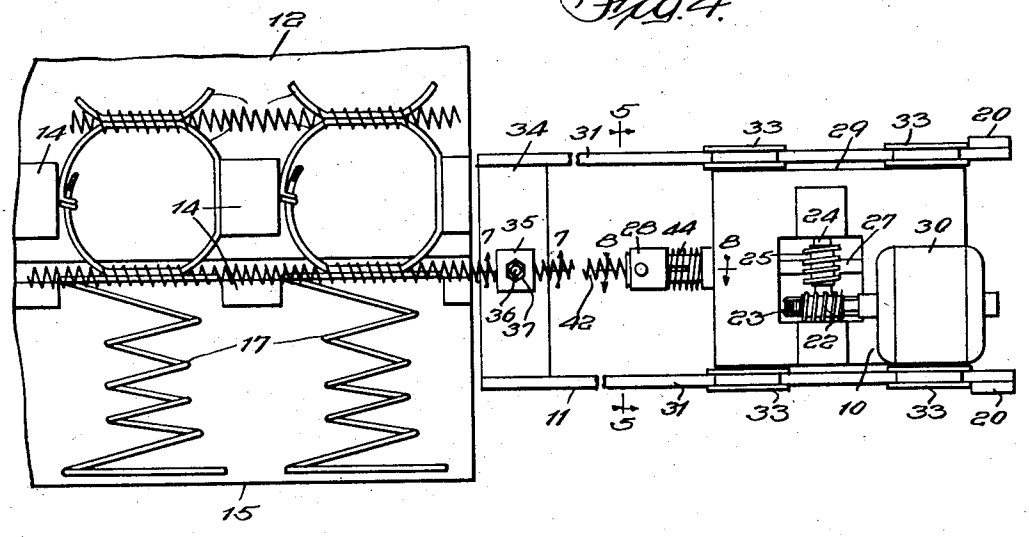


Fig. 4.



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Fig. 5.

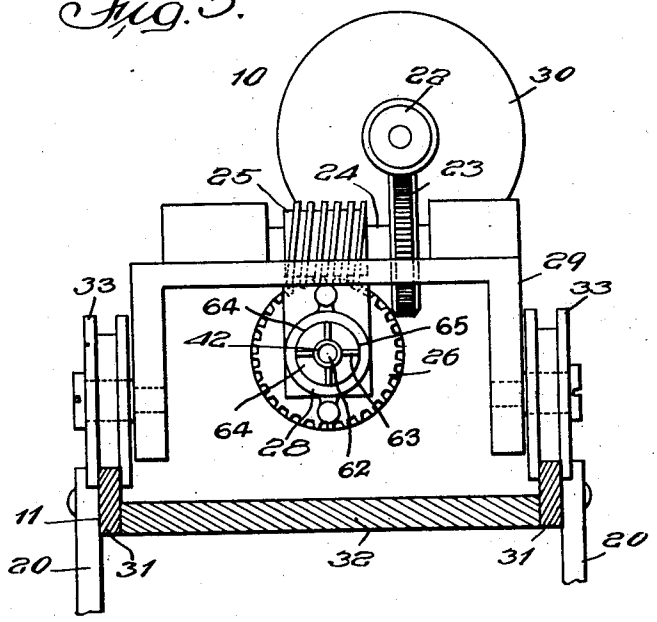


Fig. 6.

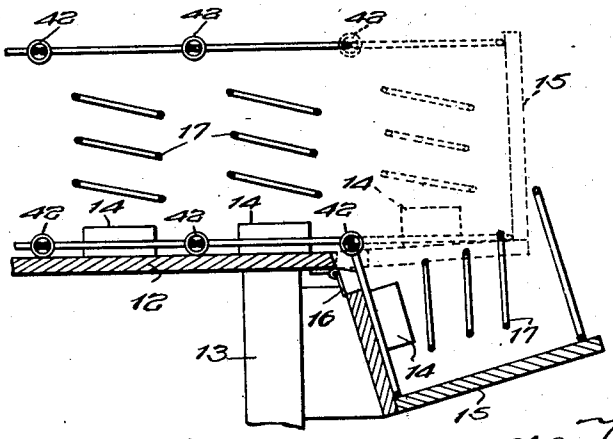


Fig. 7.

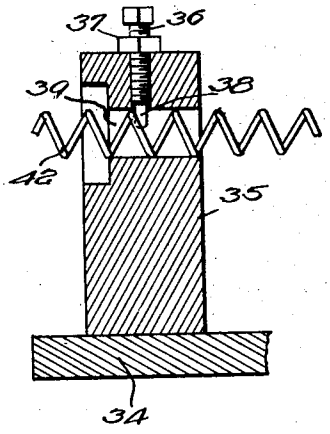
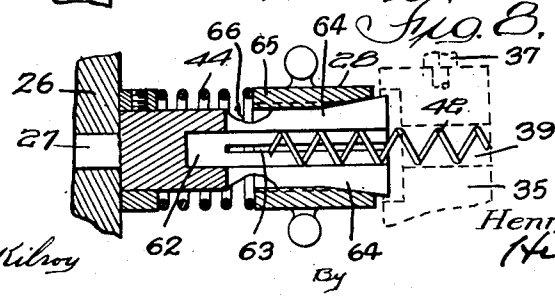


Fig. 8.



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UNITED STATES PATENT OFFICE

1,952,413

MACHINE FOR SPINNING HELICAL SPRINGS

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Application May 26, 1930, Serial No. 455,766

6 Claims. (Cl. 140—3)

The invention relates to improvements in machines for manufacturing mattress springs, and more particularly, it relates to improvements in machines for interlocking coil springs or similar articles together by means of helical springs or the like.

The invention contemplates generally the provision of actuating mechanism for advancing and spinning helical springs into interlocking engagement with a plurality of members, such for example, as contiguous portions of adjacent spiral springs, and more particularly the invention contemplates an actuating mechanism which advances as the helicals rotated thereby are advanced. The invention is shown and described as embodied in a revolving chuck and a traveling support or carriage for the chuck and its actuating mechanism.

In carrying out the invention, one end of a helical spring is fixedly mounted in the chuck for the purpose of rotating the helical spring about its longitudinal axis, and as a result of such rotation the free or open end of the helical contacts with and is spun about objects lying in its path. While the device has one of its important applications in its adaptation to mattress construction wherein the open end of the rotated helical spring engages and fastens together in cork screw fashion, the contiguous portions of adjacent spiral springs lying in its path, it is equally adapted for any operation involving the interlocking of similar contiguous articles by means of helical springs or the like. The interlocking of spiral springs by means of helical springs, has been accomplished heretofore in mattress construction by manually spinning or wrapping the helicals about the spirals or, if done mechanically, the spinning operation has been accomplished by the use of a stationary actuating mechanism. The use of a stationary mechanism for such a purpose requires either that the helical springs be fed with or through the actuating mechanism, or that the work about which the helicals are spun shall be moved towards the stationary mechanism, and an important object of the invention is the provision of improved mechanism for rotating or spinning in cork screw fashion, a helical spring into operative and holding engagement with a stationary object or objects lying in the path of the rotated helical.

Another object of the invention is the provision of improved actuating mechanism for rotating and spinning helical springs in the assembly and construction of mattress springs or the like, of which the helicals form a part.

A further object of the invention is the provision of a machine for spinning helical springs into an assembled mattress spring construction wherein the actuating mechanism and actuated helicals will be advanced or retracted together, the actuating mechanism being for this purpose mounted on a carriage and movable upon a track or runway towards and away from the stationary mattress construction.

A still further object of the invention is to generally improve mechanism for spinning or rotating helical springs in the manner and for the purpose described.

Many other objects and advantages herein shown and described will be obvious to those skilled in the art from the description herein given.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claims.

In the drawings wherein like reference characters indicate like or corresponding parts,

Fig. 1 is an elevational view of a device embodying the principles of my invention;

Fig. 2 is a partial elevational and sectional view of the device taken along the line 2—2 of Fig. 1;

Fig. 3 is a broken or fragmentary view of the device and work shown in Fig. 1, drawn to a larger scale;

Fig. 4 is a plan view of the device shown in Fig. 3;

Fig. 5 is a view along the line 5—5 of Fig. 4, drawn to a larger scale;

Fig. 6 is a view along the line 6—6 of Fig. 3; and

Figs. 7 and 8 are views along the lines 7—7 and 8—8 of Fig. 4, drawn to a larger scale.

Referring now to the drawings, the numeral 10 generally designates a carriage and an actuating mechanism mounted on a track 11. A table 12 is positioned at the forward end of the track 11 to provide a support for a mattress spring assembly comprising a plurality of spiral springs 17 interlocked by helical springs 42. A plurality of legs 13 carry the table 12 which has a hinged shelf 15 at the end adjacent the track 11.

The springs 17 are shown as arranged in longitudinal and transverse rows on the table 12. A plurality of blocks 14 separate or form spacers for the transverse rows of springs 17. The springs 17 are in closely spaced relation in the transverse rows preferably with their end coils in contact. The closely positioned contiguous portions of the

end coils of the springs 17 are fastened together with helical springs 42, one of such helicals being positioned at the top and one at the bottom between the longitudinal rows of springs 17 and preferably extending the full width or length of the spring structure.

The mechanism 10 carries a helical spring 42 which is adapted to be spun or rotated into cork screw engagement with the contiguous portions of the end coils of the springs 17, as best shown in Fig. 3.

The initial assembly of the spring structure consists in arranging a plurality of spiral springs 17 in vertical position in a longitudinal row adjacent the inclined shelf 15, as shown fragmentarily in Fig. 4. The same number of springs 17 are then positioned on the inclined shelf 15 with their bottom end coils in contact with the corresponding end coils of the vertical springs 17, as best shown in Fig. 6. The mechanism 10 is then advanced and operated in a manner hereafter described, so as to bring the free end of the helical 42 into spinning engagement with the lower end coils of the two adjacent rows of springs 17, thereby interlocking the springs 17 in pairs as the mechanism 10 is advanced. This step in the process of assembly, results in each of the spiral springs 17 in a vertical row being interlocked at its bottom end with a corresponding spring 17 in the inclined row. Upon completion of the spinning of the helical spring 42, the mechanism 10 is disengaged from the helical spring and returned to its starting position on the track 11. The chuck 28 in advancing, contacts with the block 35 and the resulting pressure compresses the spring 44, permitting the chuck to release the helical spring 42 automatically. Another helical 42, intended to interlock the upper ends of the adjacent rows of spiral springs 17, is then mounted in the mechanism 10. The track 11 is next elevated to the dotted line position shown in Fig. 1, in order that the helical 42 may operatively engage the top coils of the two adjacent rows of springs. The shelf 15 is brought to its upright position, as indicated by dotted lines in Fig. 6, in which position the top end coils of the springs 17 carried by the shelf, contact with or are in closely spaced relation with the corresponding coils of the adjacent row of vertical springs with which they have already been connected at their lower ends by the preceding operation. The mechanism 10 is again advanced on the track 11, and spins the helical spring 42 about the contiguous portions of the top coils of the two adjacent longitudinal rows of spiral springs 17, thereby completing the operation of interlocking the longitudinal row of vertical spiral springs 17, carried on the table, with the longitudinal row of springs carried by the shelf 15.

The spring structure thus far completed, is then shifted or moved over an amount equivalent to the width of a spring 17, thereby bringing the outside longitudinal row of springs 17 to the position on the table 12 previously occupied by the next adjacent row of spiral springs. A new supply of spiral springs 17 is positioned on the shelf 15 in inclined position, the same being in turn fastened at the bottom and at the top by means of helical springs 42 in accordance with the steps already described. This process of adding an additional row of spiral springs 17 at one side and shifting the spring structure over the width of one row is continued until the spring structure is of the desired size. The springs 17 of the longitudinal rows may be arranged in staggered relation with the springs of the next adjacent row rather than opposite thereto. With this arrangement the straight or outermost portion of the end coils of any one row of springs are in alignment with the corresponding portion of the next adjacent row and the advancing helical, thereby alternately engages the springs of the rows between which it is positioned.

The track 11, on which the mechanism 10 moves back and forth, comprises a pair of rails 31 suitably fastened together at one end by a connecting plank 32 and at the other end by a plank 34. The end of the track 11 opposite to the table 12 is supported by a pair of legs 20 suitably braced by members 21. The track 11 is connected to the legs 20 by a pivot 19 and is supported at the other end by a system of levers and links, the operation of which is hereinafter more particularly described. Since the spinning of the helical springs 42 is performed alternately at the bottom and at the top of the spaces between the two longitudinal rows of spiral springs 17, the track 11 is necessarily alternately shifted from its full line position to its dotted line position, and vice versa, in order that the helicals 42 may in turn be spun into holding engagement with the top and the bottom end coils of the adjacent rows of spiral springs 17.

The track 11 is raised and lowered by the operation of a foot lever 50, best shown in Fig. 2. The lever 50 is positioned adjacent the end of the table 12 with which the track connects and is pivotally mounted at one end upon a support 53.

An arm 55 is fixedly mounted upon and rotates a pivot rod 56 extending the length of the table 12 and journaled in the legs 13. One end of the arm 55 is connected to the foot lever 50 by a link 57. The other end of the arm 55 is connected with the free end of the track 11 by means of a link 58. The link 58 thereby provides a support for the free end of the track 11, and by shifting the lever 50 the link is operable to raise and lower the track. The position of the lever 50, shown in Fig. 2, corresponds with the full line position of the track 11, as shown in Fig. 1.

A member 51 mounted on one leg 13 of the table 12 provides a guide for the foot lever 50. The weight of the track 11 holds the lever 50 in the position shown in Fig. 2, in contact with the upper end of the guide member 51. In elevating the track 11 to its dotted line position of Fig. 1, the lever 50 is pressed downwardly to the bottom of the guide member 51 where it engages and is held in position by a projection 52. The movement of the lever 50 to the lower end of the guide member 51 actuates the links 57 and 58 and the connecting arm 55, so as to move the track 11 to its dotted line position of Fig. 1.

The elevated position of the track 11 is such as to align the end of the helical spring 42 with the top end coils of the vertical springs 17 and the advance of the mechanism 10 on the track 11, when in its dotted line position, causes the helical 42 carried thereby to spin about and operatively engage the top end coils of the adjacent longitudinal rows of springs 17.

The movement of the lever 50 to raise the track 11 also elevates or swings the shelf 15 about hinges 16 to its vertical dotted line position shown in Fig. 6 as hereinafter described. This movement of the shelf 15 into vertical position brings the row of inclined springs 17 carried thereby into the vertical position shown in dotted lines in Fig. 6 wherein the top coils are in contact with the top coils of the next adjacent row of springs. The

springs 17 are held in vertical position by the elevated shelf 15 until the helical 42 is spun into engagement with and binds the top end coils of the springs 17 together. The shelf 15 is then lowered to its inclined position and is ready for the reception of a new row of springs.

The swinging of the shelf 15 from its full line position in Fig. 6 to its dotted line position, and vice versa, is accomplished at the same time and by the same operations as are required for raising and lowering the free end of the track 11. For this purpose, the pivot rod 56 is provided with a pair of crank arms 61 rotatable with the rod, and operatively connected with the shelf 15 by means of a pair of links 59. The links 59 are pivotally connected at their upper ends with eyebolts 60 suitably fastened in the shelf 15 and at their lower ends are pivotally connected with the arms 59. The movement of the foot lever 50 to elevate the track 11, rotates the pivot rod 56 and causes the links 59 to lift the shelf 15 to its vertical position, and the track 11 to its dotted line position. The release of the lever 50 from its lowermost position in the guide member 51 and its return to the upper end thereof will permit the shelf 15 to return to its inclined full line position and the track 11 to its lower full line position of Fig. 1.

The carriage and actuating mechanism 10 includes a motor 30 suitably mounted on a frame 29. Supporting wheels 33 permit the carriage 10 to move back and forth on the track 11. The motor 30 is preferably operatively connected with the chuck 28 by means of a worm 22 mounted on the outer end of the motor shaft. A worm wheel 23 is mounted on a shaft 24 in meshing engagement with the worm 22. A worm 25 is mounted on the shaft 24 in meshing engagement with a worm wheel 26. A rotatable member 27 has the worm 26 fixedly mounted on one end and the other end of the member is enlarged to form a chuck generally designated by the numeral 28. The chuck 28 has a bore 62 and a pair of longitudinally extending diametrical recesses 63 arranged to form a plurality of clamping members 64. The exterior surfaces of the clamping members 64 are inclined outwardly towards the end of the chuck. Each of the clamping members 64 has a recess 66 forming a bending line for the members. A band 65, encircling the clamping members 64, is normally forced towards the end of the chuck by a compression spring 44. In order that a helical 42 may be mounted in the chuck, the band 65 is moved against the resistance of the spring 44 thereby permitting the clamping members 64 to spread sufficiently to receive the helical. Upon insertion of the helical 42 in the bore 62 and release of the band 65, the spring 44 will force the band outwardly and thereby press the members 64 into clamping engagement with the helical.

The rear end of the helical 42 thus fastened in the chuck 28 has its other end extending through a pull block 35. The block 35 is fastened to the connecting board 34 of the track 11 and has an aperture 39 through which the helical 42 projects, as best shown in Fig. 7. A screw bolt 36, mounted in the upper end of the block 35, is held in the position shown by means of the nut 37. The lower end of the bolt 36 has a stem 38 projecting into the aperture 39 in contact with the rotating helical 42 contained therein. Contact of the rotating helical 42 with the stem 38 pulls the carriage and mechanism 10 forwardly on the track 11. The aperture 39 in the block 35 is so positioned as to bring the helical 42 into alignment with the bottom end coils of the springs 17 when the track 11 is in full line position of Fig. 1, and into alignment with the top end coils of the springs 17 when the track 11 is in the dotted line position of Fig. 1.

A pair of conductors 46 connect the motor 30 with a source of electrical energy. A switch 49 positioned on a supporting block 47, near the leg 13, with which the foot lever 50 is connected is operable to control the motor 30. The switch 49 is operated by a treadle 48 rotatably mounted in a pair of blocks 47. The treadle preferably extends the full length of the table to enable the operative to control the motor 30 from either side of the table or from any intermediate point. The motor is inoperative for the horizontal position of the treadle 48, and the switch mechanism 49 is such that tilting the forward end of the treadle downwardly starts the motor 30, and so rotates the helical 42, as to feed the helical into the spring structure and to advance the mechanism and carriage 10 on the track 11. The resulting advance movement of the carriage and mechanism 10 can be stopped at any time by returning the treadle to its horizontal position. The complete spinning of the helical 42 into the spring assembly will bring the band 65 into contact with the block 35. The contact of the band 65 with the block 35 automatically releases the helical 42 from the chuck by forcing the band rearwardly against the resistance of the spring 44, thereby permitting the clamping members 64 to spread sufficiently to release the helical 42. The mechanism 10 carrying the motor 30 can then be returned to the position shown in Fig. 1 ready to receive another helical 42, the initial return movement being preferably caused by pulling rearwardly on the band 65 to prevent engagement of the member 64 with the helical 42.

In the event that the helical 42 does not properly engage the contiguous portions of the adjacent spiral springs 17, it will be desirable to retract the helical and the mechanism 10 a short distance. This retraction is accomplished by the operative tilting or rotating the treadle 48 in the opposite direction from the movement required to advance the mechanism. The extending of the treadle the full length of the table and its connection with a reversible motor in the manner described enables the operative to advance and to retract the helical as desired from any position adjacent the table 12 on which the work is located.

Thus, it will be seen that I have provided novel mechanism operable to spin helical springs individually into operative engagement with vertical springs in mattress construction and that the driving and spinning mechanism is moved toward the work in such a way as to relieve the work from any pull occasioned by the advance of the helicals.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence, I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. Apparatus for fabricating spring assemblies comprising a table providing a support for a plurality of spring units arranged in rows with portions of the units in one row closely spaced to

corresponding portions of units in the other row, a carriage movable towards and away from the table, a revolvable chuck mounted on the carriage for fixedly holding a helical, mechanism on the carriage operable to rotate the chuck, a fixed member with which the helical has spinning engagement whereby the helical is advanced by rotation of the chuck into interlocking engagement with said adjacent unit portions, said fixed member being in the path of said chuck and operating to release the helical upon contact of the chuck with said fixed member.

2. Apparatus for fabricating spring assemblies comprising a table providing a support for a plurality of spiral springs arranged in parallel rows with the lower end coils of the springs of one row adjacent the corresponding portions of the springs of the other row, a carriage movable towards and away from the table along a path substantially parallel to said rows, a revolvable chuck mounted on the carriage for fixedly holding a helical, the axis of the chuck being in substantial alignment with the adjacent portions of the springs of two of said rows, mechanism on the carriage operable to rotate the chuck, and a fixed member with which the helical has spinning engagement whereby said helical is advanced into interlocking engagement with said adjacent portions of the springs with which it is in substantial alignment, said fixed member being in the path of said chuck and operating to release the helical from the chuck upon contact of the chuck with said member.

3. Apparatus for fabricating spring assemblies comprising a table, an inclined shelf forming an extension of the table, means on the shelf providing a support for a plurality of inclined spiral springs arranged in a row with a portion of the end coils of said inclined springs in substantial longitudinal alignment with the corresponding portions of a plurality of springs arranged in a parallel vertical row on the table adjacent said shelf, a carriage movable in a path parallel to said rows, a revolvable chuck mounted on the carriage for fixedly holding a helical, the axis of rotation of said chuck being in substantial alignment with said substantially aligned portions of said rows of springs, mechanism on the carriage operable to rotate the chuck and helical spring, a fixed member with which the helical has spinning engagement whereby rotation of the chuck advances the helical into interlocking engagement with said aligned portions of said vertical and inclined rows of springs, said carriage and chuck being advanced with said helical, said fixed member being in the path of said chuck and operating to release the helical from the chuck upon contact of the chuck with said member.

4. Apparatus for fabricating spring assemblies comprising a table, a hinged shelf forming an extension of the table, means adjustable to support the shelf in both inclined and horizontal position, means on the shelf providing a support, when the shelf is inclined, for a plurality of inclined spiral springs arranged in a row with a portion of the end coils of said inclined springs in substantial longitudinal alignment with the corresponding portions of a plurality of springs arranged in a parallel vertical row on the table adjacent said shelf, a carriage movable in a path parallel to said rows, a revolvable chuck mounted on the carriage for fixedly holding a helical, the axis of rotation of said chuck being in substantial alignment with said substantially aligned portions of said rows of springs respectively positioned on the shelf and table, mechanism on the carriage operable to rotate the chuck and helical spring, a fixed member with which the helical has spinning engagement whereby rotation of the chuck advances the helical into interlocking engagement with said aligned portions of said vertical and inclined rows of springs, said carriage and chuck being advanced with said helical, said fixed member being in the path of said chuck and operating to release the helical from the chuck upon contact of the chuck with said member.

5. Apparatus for fabricating spring assemblies comprising a table, a hinged shelf forming an extension of the table, means adjustable to support the shelf in both inclined and horizontal position, means on the shelf providing a support, when the shelf is inclined, for a plurality of inclined spiral springs arranged in a row with a portion of the end coils of said inclined springs in substantial longitudinal alignment with the corresponding portions of a plurality of springs arranged in a parallel vertical row on the table adjacent said shelf, a track extending parallel to said rows, a carriage mounted on the track, a revolvable chuck mounted on the carriage for fixedly holding a helical, the axis of rotation of said chuck being in alignment with said substantially aligned portions of said rows of springs respectively positioned on the shelf and table, mechanism on the carriage operable to rotate the chuck and helical spring, a fixed member with which the helical has spinning engagement whereby rotation of the chuck advances the helical into interlocking engagement with said aligned portions of said vertical and inclined rows of springs, said carriage and chuck being advanced with said helical, said fixed member being in the path of said chuck and operating to release the helical from the chuck upon contact of the chuck with said member, means operable to elevate the shelf to horizontal alignment with the table, and means operable to elevate the end of said track adjacent the table for the purpose described.

6. In a spring assembling mechanism, a frame having a horizontal, planiform upper surface, a row of spring positioning means aligned thereon, a second row of aligned spring positioning means mounted laterally adjacent said first row and spaced therefrom a distance sufficient to position springs positioned thereon in lateral juxtaposition, said second row of spring positioning means being pivotally movable to separate the upper ends of springs mounted on said second row of spring positioning means from springs mounted on said first row of spring positioning means, the lower ends of said springs remaining in lateral juxtaposition.

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