PUBLISHED MAY 11, 1943. BY A. P. C.

H. BÜTTNER

METHOD AND DEVICE FOR MANUFACTURING SPRING-NETS FOR MATTRESSES, SEAT-CUSHIONS AND THE LIKE

Filed June 4, 1942

Serial No. 445,792

3 Sheets-Sheet 1

Fig. 1

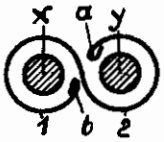

Fig. 2

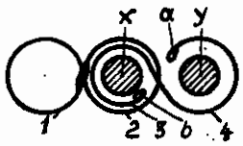

Fig. 3

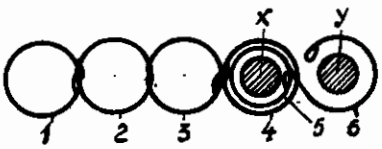

Fig. 4

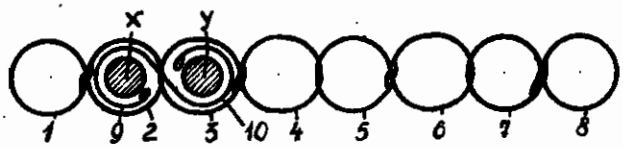

Fig. 5

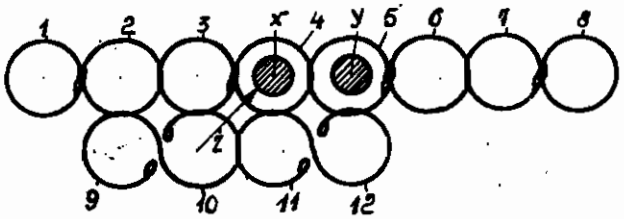

Fig. 6

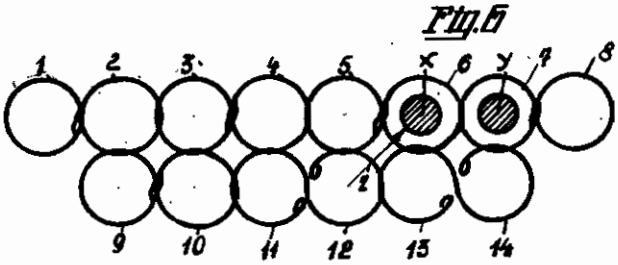

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Fig. 7

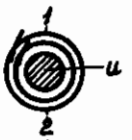


Fig. 8

Fig. 9

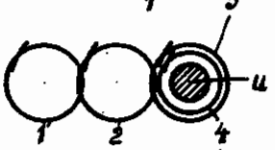


Fig. 10

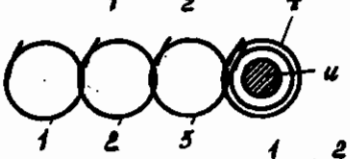


Fig. 11

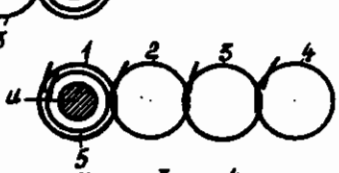


Fig. 12

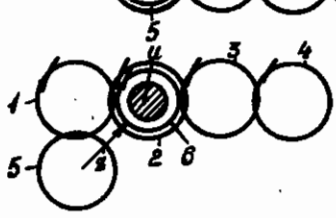


Fig. 13

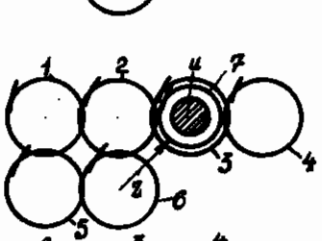
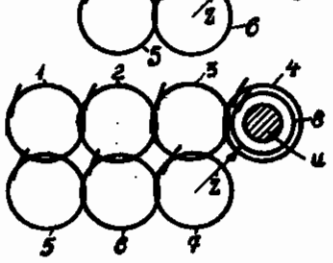


Fig. 14



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3 Sheets-Sheet 3

Fig. 15

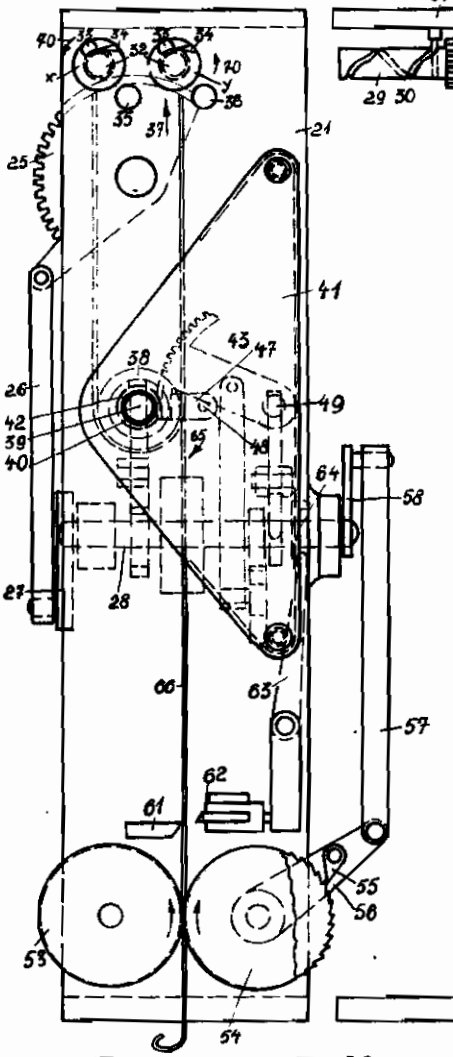


Fig. 16

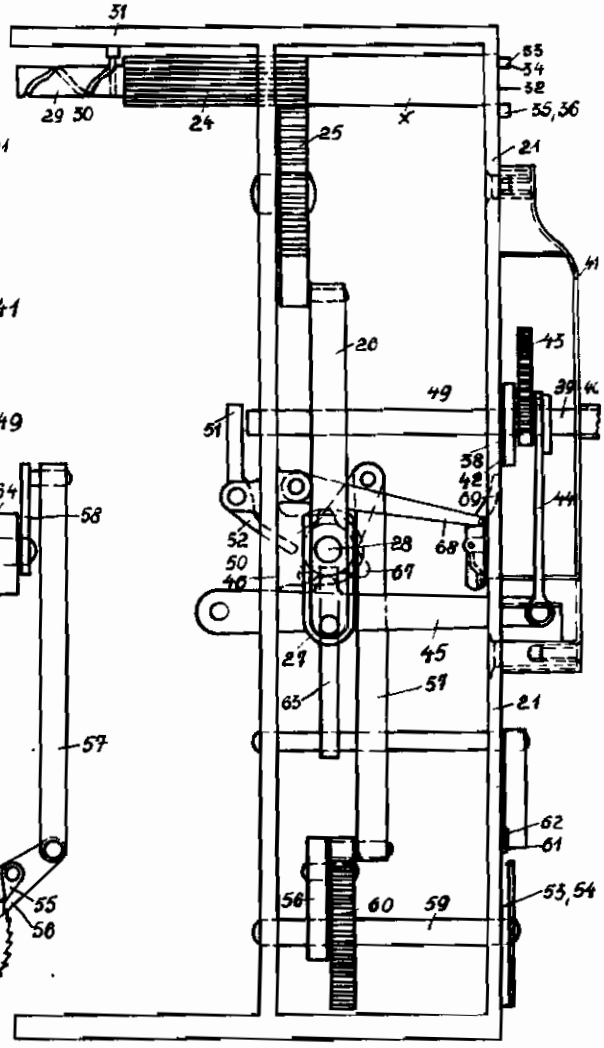


Fig. 17

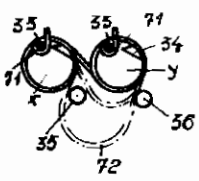


Fig. 18

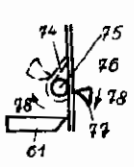


Fig. 19

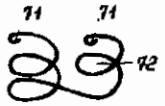
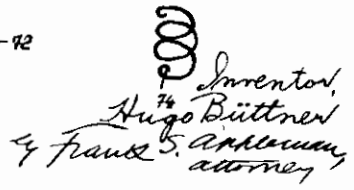


Fig. 20



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ALIEN PROPERTY CUSTODIAN

METHOD AND DEVICE FOR MANUFACTURING SPRING-NETS FOR MATTRESSES, SEAT-CUSHIONS AND THE LIKE

Hugo Büttner, Wuppertal-Vohwinkel, Germany; vested in the Alien Property Custodian

Application filed June 4, 1942

Spring-nets for mattresses, seat-cushions and the like have hitherto been manufactured in that the individual springs have been wound into one another by hand. This manual work is of course comparatively expensive.

The object of the present invention is to carry out said winding operation mechanically, whereby the manufacture of spring-nets of the kind stated, especially double springs, can be carried out speedier and in a simpler manner.

According to invention the method adapted is that the spring to be interwound with an adjacent spring is wound up a mandrel having a smaller diameter than the mentioned spring, over which the adjacent spring in its untensioned state is placed.

The device according to invention for carrying out this method comprises upwardly and downwardly controlled winding mandrels protruding through a cover plate. Their upper ends having recesses adapted to take the ends of the springs.

In order to provide the springs during winding with elongated loops extending in the direction of the spring said recess is formed on the one hand by a bolt arranged at the rim of the frontal face of the mandrel, and on the other hand by an oblique jaw likewise arranged on the rim of said frontal face.

The unwound piece of spring wire must be kept tensioned during the winding operation. This is effected according to the present invention with the aid of stops provided laterally in front of the winding mandrels against which the unwound piece of spring wire bears.

In order to render possible the manufacture of a double spring there are according to this invention two winding mandrels provided and situated remote from another by a distance corresponding to the diameter of a finished spring, and in front of said mandrels a bending device is provided so dimensioned as to suffice for two springs located side by side and so designed as to be able to give a wire piece cut from a roll of hair pin bend of 180° in its center.

This bending device consists, according to invention, of a disk detachable from the cover plate and having a diameter corresponding to the space between the winding mandrels and having upon its axle a gripper arm to take hold of the spring wire.

In order to prevent the stop pertaining to the second winding mandrel from constituting an obstacle during the winding procedure it is designed, according to this invention, in such a manner that it can recede when the winding process is completed.

When manufacturing a single spring the end thereof must be provided with a loop, therefore, according to invention, the one knife jaw of the cutting device can be concentrically moved about the forming bolt for the spring loop, thus bending of the loop and cutting-off takes place simultaneously.

The object of invention is shown schematically in the drawings, and show as follows:

Figs. 1–6 the method for the manufacture of a spring-net consisting of double springs,

Figs. 7–14 the method for the manufacture of single springs,

Fig. 15 is a plan view of the device,

Fig. 16 a side view of Fig. 15,

Fig. 17 a diagrammatical representation of the winding procedure,

Fig. 18 a plan view of the parts serving to bend the loop at the end of a single spring,

Fig. 19 a finished double spring,

Fig. 20 a finished single spring,

In Figs. 1–3 and 7–10 is illustrated the manufacture of the first row of the spring-net, and Figs. 4–6 and 11–14 show the interwinding of the second row of the net with the first row.

When manufacturing a spring-net of double springs two mandrels x and y (Figs. 1–6) are used, and when making a spring-net of single springs (Figs. 7–14) only one mandrel is employed. These mandrels revolve about their longitudinal axis in a clockwise and in an anticlockwise direction, and are supported in a machine frame in which they can move upward and downwardly.

In the following the method of manufacturing a spring net according to Figs. 1–6 is described. The mandrels x and y are firstly in their lowermost position, then each receives one end of the wire which has been bent to resemble a hair pin and finally constitutes the double spring 1 and 2. The mandrels then grip the ends and revolve in an anticlockwise direction, moving upwardly simultaneously. Coinciding with the mandrels gripping the wire ends the loops a and b are bent and formed. By reason of the rotation and upward motion of the mandrels the wire is helically wound upon them. Thereafter the mandrels move downwardly and the loops a and b become disengaged from the gripping device whereby the springs 1 and 2 are untensioned so that they assume relatively to the mandrels a and b the position of springs 1 and 2 shown in

Fig. 1. That is encompassing the mandrels in an untensioned state.

Now the spring 2 is laid around the mandrel x and double spring 3 and 4 is wound around the mandrels x and y in the same manner as described above. Simultaneously with laying the spring 2 over mandrel x the loops a and b can be interhooked with one another.

The spring 3 which is adjacent to spring 2 and is to be interwound with it, is therefore wound around mandrel x over which the adjacent spring 2 has been placed in an untensioned state, whereby the spring 3 is compulsory wound into spring 2.

Thereupon the spring 4 is conveyed onto mandrel x in an untensioned state, then the springs 3 and 4 are interhooked; spring 5 is then wound around mandrel x and spring 6 is wound around mandrel y, whereby springs 4 and 5 which lie adjacent to one another are compulsory interwound.

The springs 3 and 5 have of course the same diameter as all other springs, although their diameter as shown in the drawing is smaller, but this has been done merely for the purpose of clearness. This applies also to all other springs having a smaller diameter and shown located within larger springs.

In the above described manner it is rendered possible to produce series of springs of any desired length.

In order to connect the springs of the second row with the springs of the first row the operation proceeds as follows:

Firstly the springs 2 and 3 of the first row are placed upon the mandrels x and y in an untensioned state, whereafter the double spring 9, 10 is wound upon said mandrels in exactly the same manner as has been described with reference to Fig. 1 whereby the springs 2 and 9, or 3 and 10 respectively, will be interwound, they may then be drawn apart, compare Fig. 5. Now spring 11 must be interwound with spring 10, as well as with spring 4. For this purpose the springs 4 and 5 are placed upon the mandrels x and y in an untensioned state, furthermore, the spring 10 adjacent to spring 11 likewise in untensioned state is placed upon mandrel x in that this spring is drawn over in the direction indicated by arrow z. This can be done without any difficulty since the springs concerned can be easily shifted relatively to one another, as none of them are rigidly connected with any adjacent springs, but only interwound with same. Now the springs 11 and 12 are wound upon the mandrels x and y in exactly the same manner as above described, so that spring 11 is wound within the springs 4 and 10 and spring 12 is wound within the spring 5. When the springs are then drawn apart, the spring 11 will be interwound with the springs 10 and 4 and spring 5 with the spring 12.

The interwinding of springs 13 and 14 is again effected in the same manner, that the springs 6 and 7 are placed upon the mandrels x and y in an untensioned state, furthermore by drawing spring 12 over onto mandrel x in the direction indicated by the arrow z; the springs 13 and 14 being then wound around the mandrels x and y. This working procedure can be continued in the manner stated until a spring-net of the desired length and width has been manufactured. The springs projecting at the rim, as for instance the springs 1 and 8 can be inserted into the adjacent springs in order to reinforce the rim springing, or single springs are wound into the intermediate spaces and connected with the adjacent springs or with the frame.

The manufacture of a spring-net of single springs is effected in a similar, but far simpler manner, compare Figs. 7–14. In this case only one mandrel u is employed which however, operates in exactly the same manner, as for example the mandrel x in Figs. 1–6. Firstly the spring 1 is produced with the aid of said mandrel u. This spring remains on the mandrel u in an untensioned state, and into it is wound the spring 2, whereby spring 2 will be interwound with the spring 1. Then the spring 2 is placed upon mandrel u and spring 3 is wound around this mandrel which is then interwound with spring 2. The same takes place with a spring 4 (see Figs. 9 and 10). In this manner it is rendered possible to produce a row of springs having any desired lengths and interwound with each other.

In order to render it possible to manufacture the second row of springs the operation is carried out in a similar manner as described in respect to double springs. First of all spring 1 is again placed onto the mandrel u (Fig. 11), then spring 5 is wound around mandrel u, that is to say, into spring 1, whereby the springs 1 and 5 will be interwound. (Fig. 12.) Now the spring 6 must be interwound with spring 2, as well as with spring 5. For this purpose, not only spring 2 is placed onto mandrel u, but also the spring 5 is drawn over this mandrel in the direction indicated by arrow z. Then this spring is wound upon mandrel u, and in this manner spring 6 is interwound with the springs 5 and 2 (Fig. 13). The working is proceeded with in the same manner in order to complete the second row of the spring net. The spring 7 is wound upon mandrel u, upon which the springs 3 and 6 have been previously placed, this latter spring having been drawn over in the direction indicated by arrow z. When spring 7 is untensioned it is interwound with the springs 6 and 3 (Fig. 14). The procedure is continued in the same manner in that spring 8 is now wound upon mandrel u, which has previously had spring 4 and spring 7 placed upon it in an untensioned state.

Interconnecting of the loops a and b, Figs. 1–6, can be effected at any desired point of time. In Figs. 1–3 it is effected immediately after the spring concerned has been withdrawn from the mandrel; in Figs. 4–6 it is effected in a similar manner but one process section later, viz. after the springs of the second row have likewise been withdrawn from the mandrel.

The device for manufacturing the spring-net is constructed as follows:

Covering plate 2 is provided with appropriate apertures through which the mandrels x and y pass. A section of each mandrel is designed as pinion 24 which engages with a toothed segment 25 driven by means of connecting-rod 26 and crank 27 from shaft 28. The ends 29 of the winding mandrels x and y are designed as worms 30 in which a guide pin 31 engages and upon which the mandrels are given an upward and downward motion.

On the frontal face 32 of the winding mandrels a bolt pin 33 and an oblique jaw 34 are fitted which grip the end of the spring. The bolt 33, as well as said jaw 34 are situated immediately at the rim of frontal face 32. In front of mandrels x and y and on the covering plate 21 two stops 35 and 36 are fitted for the wire piece that has not yet been wound. Whilst stop 35 is mov-

able in the direction indicated by arrow 37 the stop 36 is rigidly fitted to this plate.

On the cover plate 21 and in front of the mandrels x and y a bending device is arranged consisting of a disk 38 which with its axle 39 fitted in support-bearing 40 carries a bridge-plate 41. The diameter of disk 40 corresponds to the distance between winding mandrels x and y. On axle 39 a cog wheel 42 is also fitted, which is driven from shaft 28 by the intermediary segment 43 and with the aid of a pair of levers 44, 45 and an eccentric 46. The cog wheel 42 is rigidly connected with a lug 47 carrying a pin 48.

The disk 38 can be raised from cover plate 21 by means of bolt 49, in that an arm 51 of a double armed lever 51, 52 be actuated by an eccentric 50 on axle 26, and bears against the axle 49.

The manner of operation of this device is as follows:

Firstly the method of producing a double-spring is to be described. The wire to be operated is drawn from a roll and conveyed forward by means of rollers 53 and 54, rotating in the direction of the arrows immediately in front of winding mandrel y. The conveying rollers are driven by means of a pawl 55, actuated from the shaft 28 by intermediary levers 56, 57 and crank 58, said pawl 55 engaging with the ratchet teeth provided on the circumference of wheel 60 located on conveyer axle 59.

After the length of wire requisite for manufacture of a double spring has been fed forward it is cut off between a rigid knife 61 and a movable knife 62 actuated by lever 63 sliding in an eccentric curve 64 after said piece of wire has been cut off, lug 47 is moved in the direction indicated by arrow 65 and bolt 48 bends the wire 68 round the disk 38 giving it a hair pin bend. When this has been effected the bending device is lifted off from the cover-plate, whereby the bent wire can be pushed between the mandrels x and y by means of the eccentric 67 and the levers 66 and 69.

Now both winding mandrels commence to rotate in the direction indicated by arrow 70, whereby firstly the loops 71 are formed by means of bolts 33 and jaws 34. Hereby mandrels x and y remain stationary in the axial position, but with continued operation the mandrels rise upwardly through cover-plate 2 by means of worm threads 30 so that the wire piece is taken along and winds itself tightly around the mandrels x and y.

The loop 72 (Fig. 17) not yet wound in the winding process becomes continually tighter and is held tensioned by the stops 35 and 36. Shortly before completion of the winding operation the bolt 35 recedes so that the wire can contract to its final shape. Due to succeeding downward motion of the winding mandrels x and y the bolts 33 and the jaws 34 release the loops 71 of the spring, whereupon this automatically opens and to form the finished double spring shown in Fig. 5.

If two double springs are to be interwound this is effected by means of the device according to invention very simply in that, prior to downward motion of the mandrels x and y, viz. when the double springs still tensioned and tightly wound around the mandrels, for example the part 72 of the double spring as in Fig. 19 is placed over the winding mandrel x or over part 73 of the tensioned spring as in Fig. 17 respectively. If the mandrels x and y are now moved downwardly, the parts 72 and 73 spring into one another and hang together with their windings after being drawn apart.

In order to manufacture a single spring of the kind shown in Fig. 20 the mandrel x is disengaged, whereupon the rigid knife 61 is set at a distance from the loop-winding mandrel 75 as is requisite to form the loop 74. Then a driver 76, the edge 77 of which is designed as a cutting knife is moved in the direction indicated by arrow 78, whereby the wire end is cut and loop 74 formed. The winding and inter-winding is effected in the same manner as for a double spring.

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