May 4, 1954 J. E. MEDENDORP 2,677,398

MACHINE FOR CRIMPING WIRE FOR SPRING WIRE STRINGERS AND FOR FORMING LOOP SPRINGS ON THE ENDS OF THE WIRES

Filed March 10, 1951 5 Sheets-Sheet 1

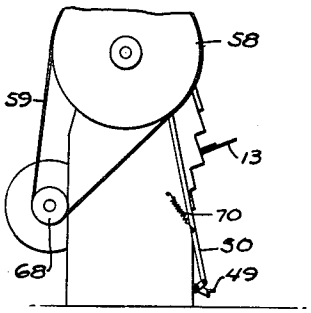


Fig. 2.

Fig. 1.

Fig. 3.

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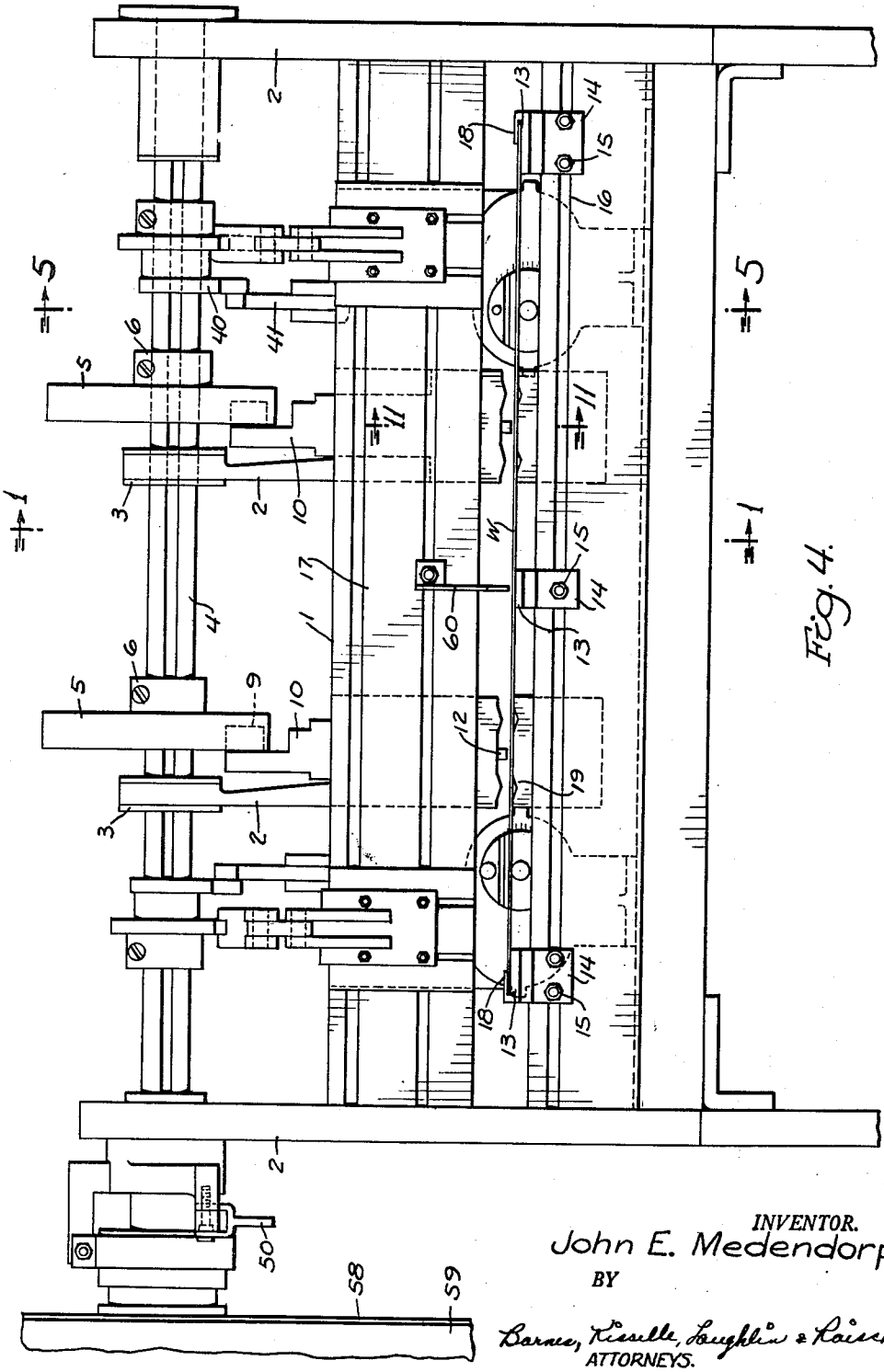


Fig. 4.

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Filed March 10, 1951 5 Sheets-Sheet 3

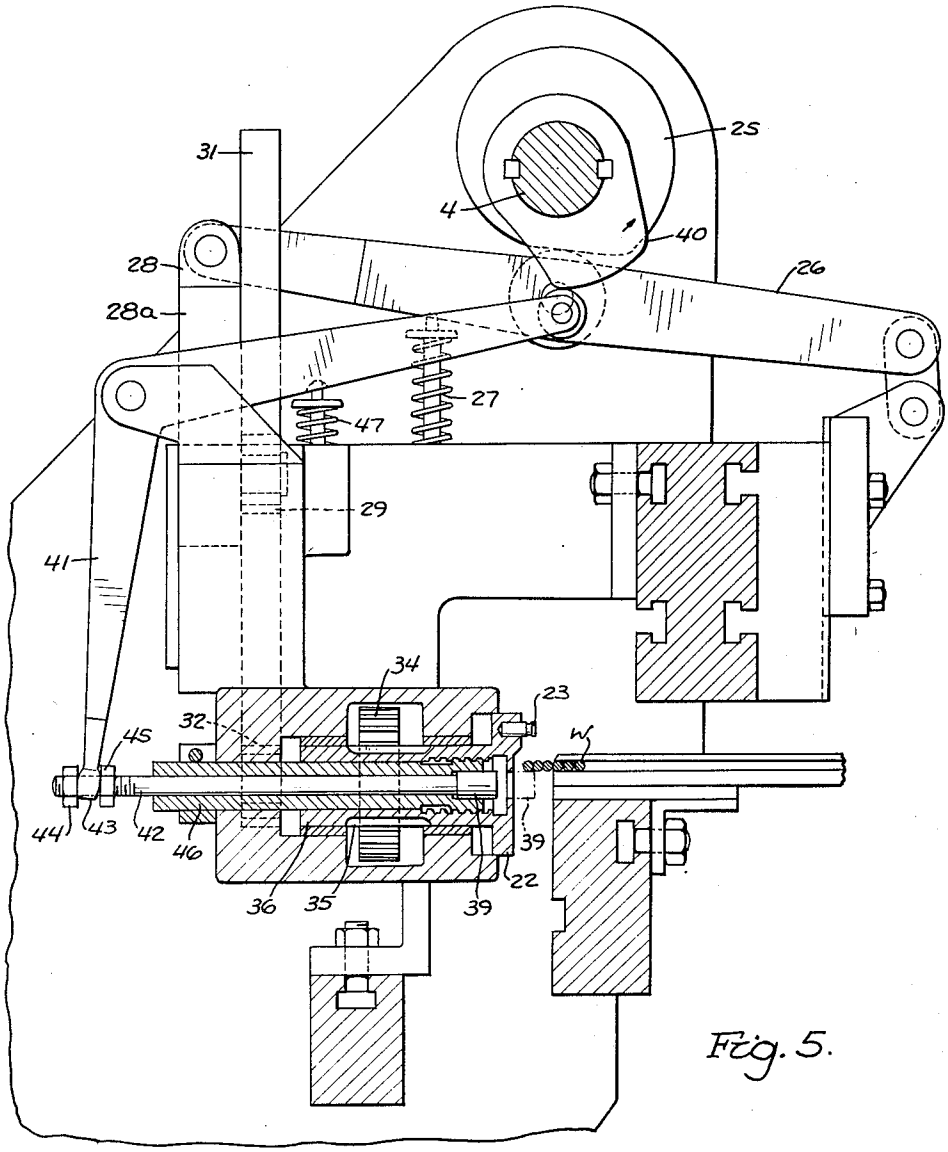


Fig. 5.

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Filed March 10, 1951 5 Sheets-Sheet 4

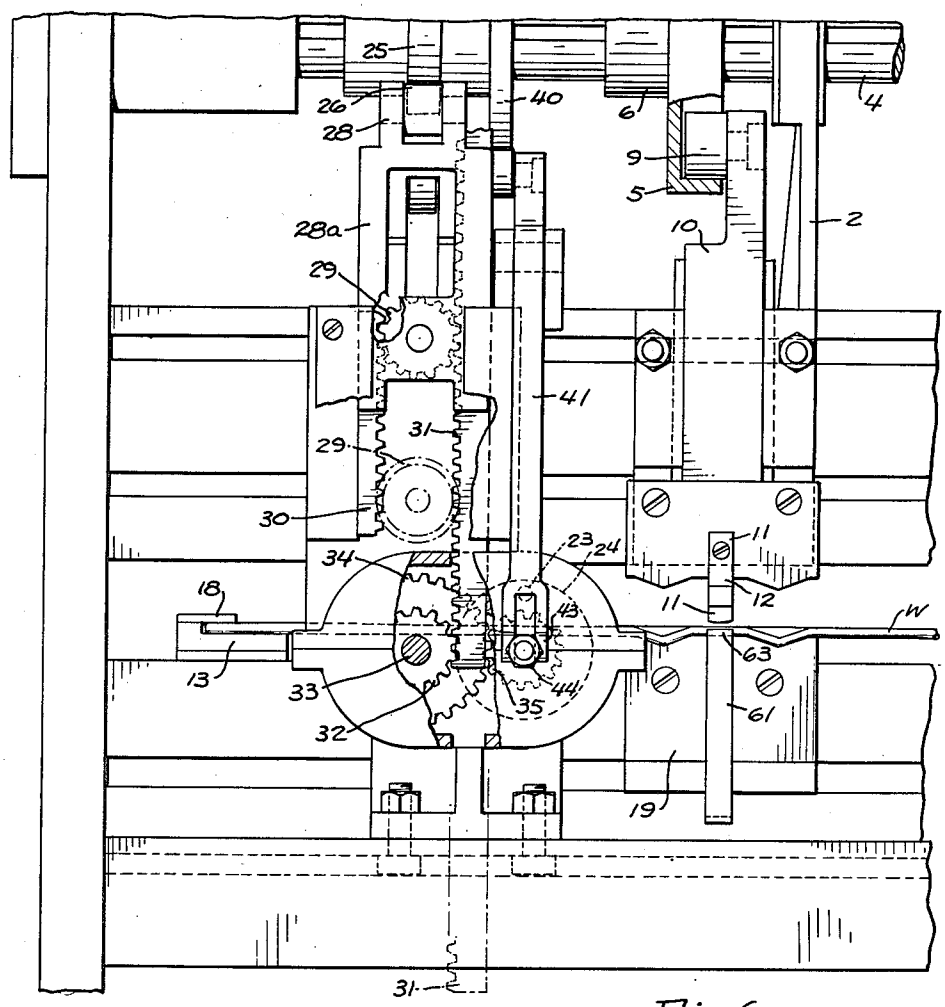


Fig. 6.

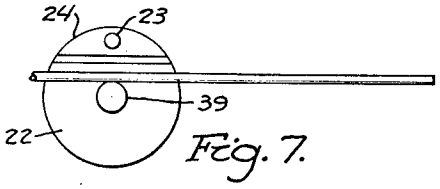


Fig. 7.

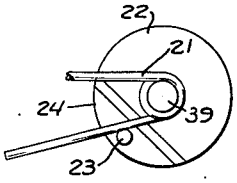


Fig. 8.

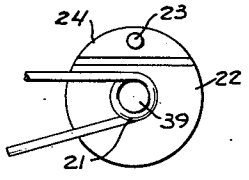


Fig. 9.

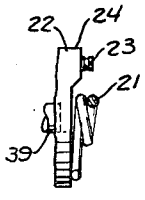


Fig. 10.

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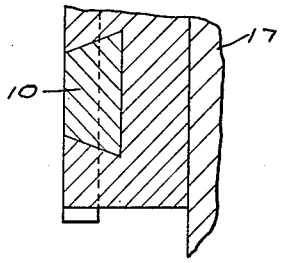


Fig. 12.

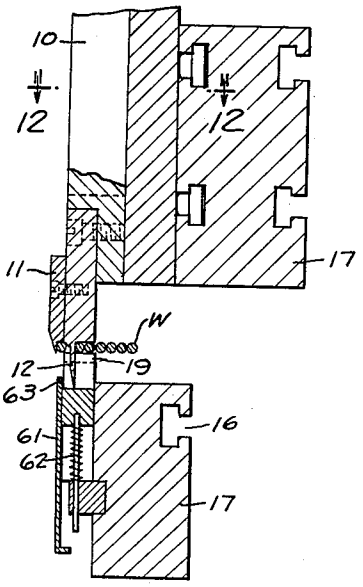


Fig. 11.

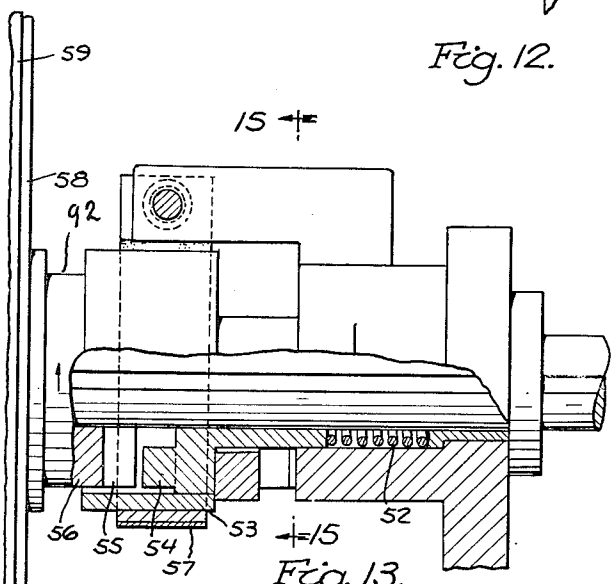


Fig. 13.

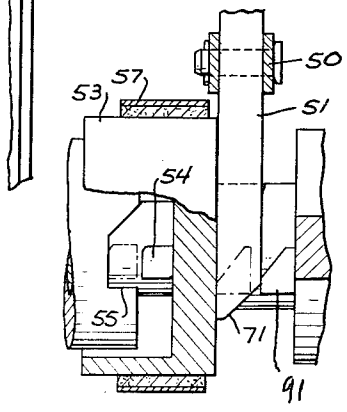


Fig. 14.

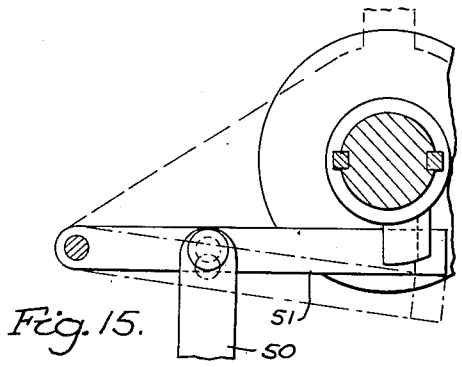


Fig. 15.

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UNITED STATES PATENT OFFICE

2,677,398

MACHINE FOR CRIMPING WIRE FOR SPRING WIRE STRINGERS AND FOR FORMING LOOP SPRINGS ON THE ENDS OF THE WIRES

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Application March 10, 1951, Serial No. 214,942

15 Claims. (Cl. 140—71)

1

This invention relates to a machine for crimping wire to make spring wire stringers for seat springs; the stringers have their ends folded back to form on one end a loop and on the other end a jack spring or a safety-pin type spring.

Maurice Stubnitz has invented several seat cushions which use spring wire beams to support short coiled springs. These spring wire beams are supported in elevated position by safety pin springs or loop springs. Such spring cushions are shown and claimed in Stubnitz Application 92,391 filed May 10, 1949, and Application 133,724, filed December 19,1949, now Patent No. 2,649,896, granted August 25, 1953; Applications 165,734 filed June 2, 1950, now Patent No. 2,609,036, granted September 2, 1952, and 170,108, filed June 24, 1950, show the loop springs at the ends of the wire beams.

My invention is an automatic machine to form the stringers or wire beams with depressions or crimps pressed into the wires, and to fold the wire back at the ends to form a loop at one end and a safety-pin spring at the other end of the wire beam.

In the drawings:

Fig. 1 is a cross section on the line 1—1 of Fig. 4, but tilted up at the left—note floor line.

Fig. 2 is a small end elevation of the machine.

Fig. 3 is an elevation of the spring stringer or wire beam formed on the machine.

Fig. 4 is a front elevation of the machine.

Fig. 5 is a cross section on the line 5—5 of Fig. 4.

Fig. 6 is a fragmentary rear elevation of the machine showing the rack and pinion drive for the winding mechanism.

Fig. 7 is a detail view showing the start of the wind.

Fig. 8 shows the jack spring in process of being wound.

Fig. 9 shows the jack spring completely wound up and the winder returned to starting position.

Fig. 10 is a side view of the winding head and end view of the jack spring showing the mandrel on which the winding is done withdrawing to release the stringer.

Fig. 11 is a section through one of the crimping dies taken on the line 11—11 of Fig. 4.

Fig. 12 is a section taken on the line 12—12 of Fig. 11.

Fig. 13 is a side elevation partly in section showing the one revolution clutch.

Fig. 14 is a bottom plan view, partly in section, of the clutch.

Fig. 15 is a section on the line 15—15 of Fig. 13.

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Refer to Fig. 4. 1 is the frame of the machine from which rise the stanchions 2 provided with the cam shaft bearings 3. The cam shaft is designated 4. Clamped and keyed to the cam shaft (see Fig. 1) is the crimping cam 5. The clamp is designated 6 and the keys 7. This cam has a cam race 8. A roller 9 follows this race. This roller is journaled on the punch 10 which carries the holding plate 11 and the separating finger 12. The wire stringers or work W are fed to the machine on the three work shelves 13. These shelves 13 lean or incline downwardly toward the machine (see Fig. 2). Each shelf is supported on an angle bracket 14 which is bolted by T bolts and nuts 15 to the dovetail groove 16 of the front frame bar 17. These shelves 13 may be adjusted on the frame for taking different length wires. Note that the end shelves have each a cover flange 18 to fit over the wire ends and hold these down while the machine does its work. The center shelf has a finger 60 bolted to the frame bar 17 to cooperate with the shelf to hold the wires from being displaced.

When the cam 5 operating on roll 9 forces the punch 10 downward it forces the two wires W at the right of finger 12 in Fig. 11, against the under die 19 (Fig. 4) and forms the crimps 20 in the stringer shown in Fig. 3. The punch 10 carries the finger 12 which separates the wire to be folded and wound from the group supported upon the shelves 13. See Fig. 11. Here the dies have closed. When the dies close, the finger 12 pushes the slide 61 down against the resistance of spring 62. This finger holds the lowermost wire of the stack on one side and the holding plate 11 holds it on the other side while it is being processed in winding and folding operations now to be described. When the punch and dies open the wire stopping slide pushes up and the ledge 63 is in position (Fig. 6) to stop the stack from sliding off the inclined shelf as the stack feeds forward after the fully processed wire drops out of the machine as later described.

The end of the wire is wound up to form the jack or safety-pin spring 21 by the winding disk 22 and winding pin 23 shown in Figs. 7 to 10 inclusive. Pin 23 projects from the boss 24 on the winder. The disk, boss and pin revolve clockwise as shown in Fig. 7 a turn and three-quarters (approximately). Compare Figs. 7 and 8. Thereupon the members return to the starting position—compare Fig. 9.

This movement is accomplished by the winding cam 25 (Fig. 5) which operates the lever 26 against the thrust of spring 27. This lever 26 (Fig. 6) has

its end pivoted in yoke 28 on slide 28a which journals pinion 29. This pinion meshes and walks over the stationary rack 30 and also turns over the teeth of the sliding rack 31 thereby multiplying the throw or movement of the lever end 26. The teeth of the sliding rack 31 mesh with the teeth of drive pinion 32 which is on the same shaft 33 as the larger driven gear 34 which has teeth meshing with the teeth 35 cut in the winder sleeve 36 (see Fig. 4). This sleeve has a winder head or disk 22. This has a boss 24 which carries the winder pin 23. The movement of the winder cam and winder lever is transmitted by the rack and gears into about a turn and five-eighths (compare Figs. 7, 8, and 9). The pinion 29 and rack 31 move from the full line positions shown in Fig. 6 to the dotted line positions in Fig. 6. Then spring 27 reverses the lever movement and the rack, gears and pinions reverse their movement returning the winder head and pin to the position shown in Fig. 9. The winder sleeve, head and pin advance to engage another wire to be processed.

The wire is wound around a mandrel 39 which, during the winding operation will be advanced to the right as shown in dotted lines in Fig. 5, and during the stripping operation, shown in full lines in Fig. 5, is withdrawn to the left by stripper cam 40 operating on stripper bell crank lever 41 to withdraw mandrel rod 42 by fork 43 between nuts 44 and 45.

The winding pin 23 is grooved (Fig. 5). The winding sleeve 35 is internally threaded to engage the threads of the arbor 46. Hence in winding up the pin 23 pulls the work toward the head 22 and off the shelf 13. At the same time the stripper cam, lever and rod pull the mandrel out of the disk or head 22, hence the work is now ready to drop out of the machine onto the inclined pan 72. The spring 47 returns the lever 41 and also returns the mandrel 39 to its working dotted line position of Fig. 5.

The same winding takes place at the left hand end of the machine, only it is less than a full turn to make the loop 48 shown in Fig. 3. The cam throw and the multiplication of movement by gear rates will be considerably less. There will also be the same pull to by the winding pin and the same stripping of the mandrel out of the loop.

As long as the foot pedal 49 is kept depressed against the pull of spring 70 (Fig. 2), the link 50 (Figs. 13–15) will pull down the clutch throw out lever 51 and the spring 52 will throw the driven clutch member 53 to the left and the jaws 54 of the driven clutch member will engage the jaw teeth 55 of the driving clutch member 91. But when the pedal 49 is released and the clutch throw out lever 51 returns by pull of spring 70 to its upper position, shown in the full lines of Fig. 15, the chamfered end 71 (Fig. 14) is in position to engage the beveled cam 56 on the driven member and this will shift the driven clutch member to the right and disengage the jaw clutch parts and the machine will tend to stop. A brake 57 insures stoppage without overthrow. This brake engages the outside of the driven clutch member which forms a brake drum.

The driving clutch member is the hub 92 of a large pulley wheel 58 which is driven by belt 59 from the small motor pulley 68 (Fig. 2).

What I claim is:

1. A machine for putting crimps in spring wire stringers and bending one or more of the ends of a stringer into a loop like spring leg or legs, having in combination, a frame, dies located on the frame for forming the underside of the crimps, punches sliding in said frame for forming the upper sides of the crimps, means for sliding the punches up and down, shelves on which a group of wires to be worked upon are supported and advanced to the punches and dies, a holding plate attached to each punch for holding the most advanced wire in each group, a finger supported on the slide for holding and separating the most advanced wire from the other wires in the group which are undergoing crimping while the most advanced wire is subjected to end bending operations while this advanced wire is held between the finger and the holding plate, and a work stopping slide supported at the die for sliding movement against spring resistance and provided at its upper end with a ledge to catch and stop the next advanced wire when the completely processed wire drops out of the machine, the said work stoppage slide being pressed down out of the way by the finger on the punch when the punch closes on the work and the under die, and the said work stoppage slide rising with the spring pressure as the finger and the punch withdraw, thereby allowing the wires to feed forward on the shelf and be caught and stopped by the ledge on the work stoppage slide, and winding means for engaging the end of the stringer and performing the said end bending operation while the advanced wire is separated from the group of wires and wires are crimped between the punches and dies.

2. The combination claimed in claim 1 in which the winding means comprises a winding head and a mandrel with power connections are provided, the winding head provided with a pin which catches the end of the most advanced wire and bends it around the mandrel while the crimps are being put in the next wire.

3. The combination claimed in claim 2 and stripping mechanism for pulling the mandrel out of the bend in the wire to allow the processed wire to drop out of the machine.

4. The combination claimed in claim 2 in which the winding head has an internally threaded and attached sleeve which is supported to turn on a threaded arbor and the pin has an annular groove so that the winding head and pin, when they turn, pull the completely processed wire off the shelf.

5. The combination claimed in claim 2 and a threaded arbor support for the winding head which has a threaded sleeve and which has a grooved pin, so that when the mandrel is withdrawn from the bend in the wire, the winding head moves back as well as turns to pull the wire off the supporting shelf.

6. The combination claimed in claim 1 in which there are motion transmitting devices for the winding head which include a stationary rack, a sliding rack, a slide with a pinion which walks over the teeth of the stationary rack and meshes with the teeth of the movable rack to advance that rack, and a gear set operated by the sliding rack to multiply the movement of the winding head with respect to the cam activated movement.

7. A machine for putting crimps in spring wire stringers and bending one or more of the ends of a stringer wire into a loop form of spring leg or legs, having in combination, inclined shelves for gravity feeding the straight wires sidewise to working position, a punch and die mechanism for crimping the said wires in such position at each reciprocation and having a separating finger for, when the punch closes upon the work, select-

ing a wire to be advanced to a position for another operation but said wire still held between the punch and die, a winding head near one end of said shelves for grasping the end of the advanced wire and turning it to bend it into a folded end portion forming a spring leg while being held by the punch and die, means for turning the head and at the same time advancing the head longitudinally to meet the advanced stringer, and motion transmission for reciprocating the punch and selector and turning, advancing and returning the winding head when the transmission is power operated.

8. The combination claimed in claim 7 in which the winding head has a pin and a mandrel, the winding head turning and the pin wrapping the end of the wire around the mandrel.

9. The combination claimed in claim 8 in which the mandrel is slidable out of the processed work and the winding head has internal threads and turns on threads of an arbor and the pin has an annular groove so the head and pin can pull the processed wire to a position to drop out of the machine.

10. The combination claimed in claim 7 in which a cam shaft, a cam and connection operate the punches, a slide with a pinion slidable in the frame by the cam shaft, a stationary rack, a sliding rack in the frame, the pinion operating between the teeth of the two racks and serving by walking on the teeth of the stationary rack and turning into the teeth of the other rack to multiply the movement of the sliding rack with respect to the movement of the slide, driven pinion and gear multiplication means driven by the sliding rack, the winding head and a pin driven by said last mentioned gear and pinion set for engaging an end portion of the wire, and a mandrel around which the wire is wrapped by the head and pin to form a spring loop.

11. The combination claimed in claim 10 and

a lever operated by the cam shaft for moving the mandrel to withdraw it from the work when fully processed to allow the work to drop out of the machine.

12. The combination claimed in claim 10 in which the head is internally threaded and turns upon a threaded arbor to pull the work out of the machine as it wraps it about the mandrel and in which means is provided to pull the mandrel out of the work as the processing of the wire is completed.

13. The combination claimed in claim 12 in which the means to pull the mandrel out of the bend in the wire is a fork and lever engaging object on the mandrel, said lever operated by another cam on the cam shaft.

14. The combination claimed in claim 7 in which the rotation converting means for the punches is a cam shaft and cams and the cam shaft and another cam and rack and pinion operate the bending head.

15. The combination claimed in claim 14 with an automatic throw out clutch and a pedal for operating parts to allow the clutch to engage when the pedal is stepped upon and in which the parts automatically disengage when the foot is taken off or releases the pedal.

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