

Oct. 9, 1934.

W. E. WUNDERLICH

1,976,686

COMBINED CUTTING AND FORMING MEANS

Filed June 27, 1932

3 Sheets-Sheet 1

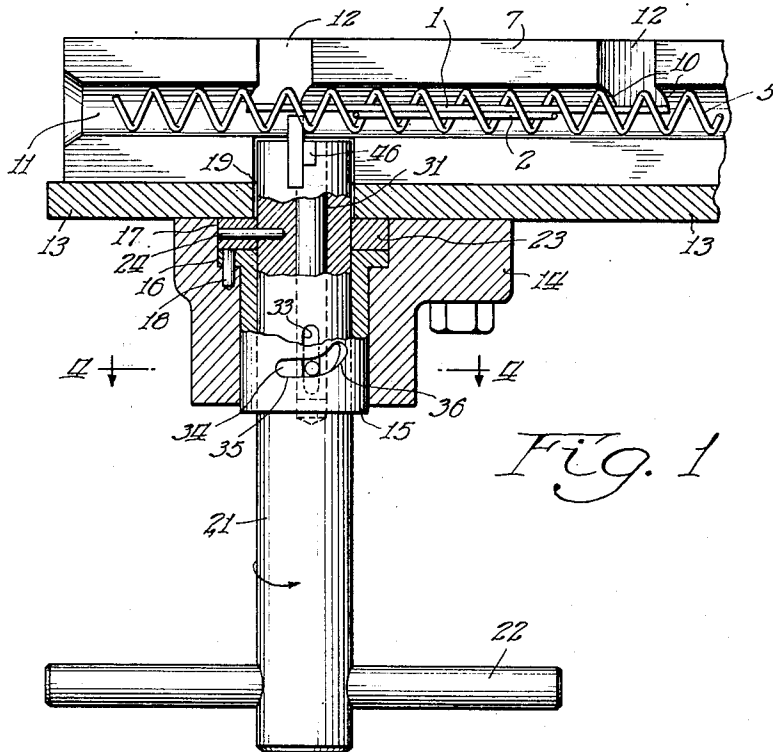


Fig. 1

Fig. 4

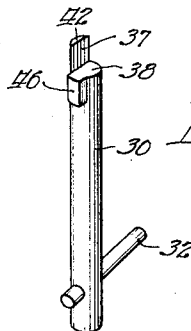
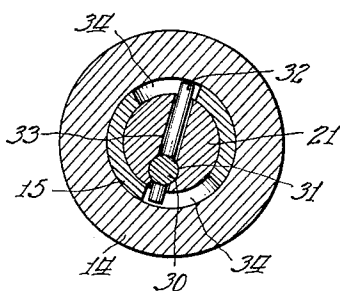


Fig. 5

Inventor
William E. Wunderlich
By *Rauman Mm*
Att.

Oct. 9, 1934.

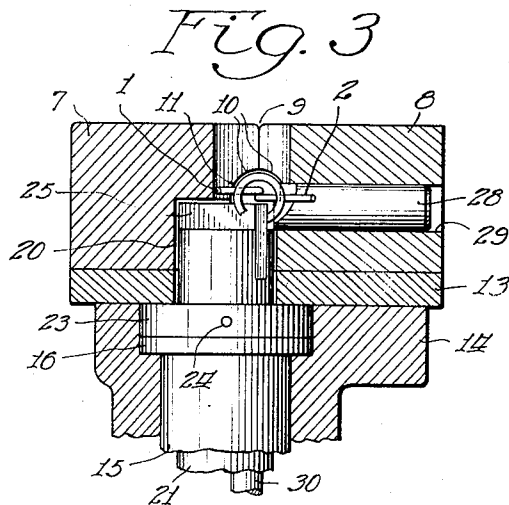
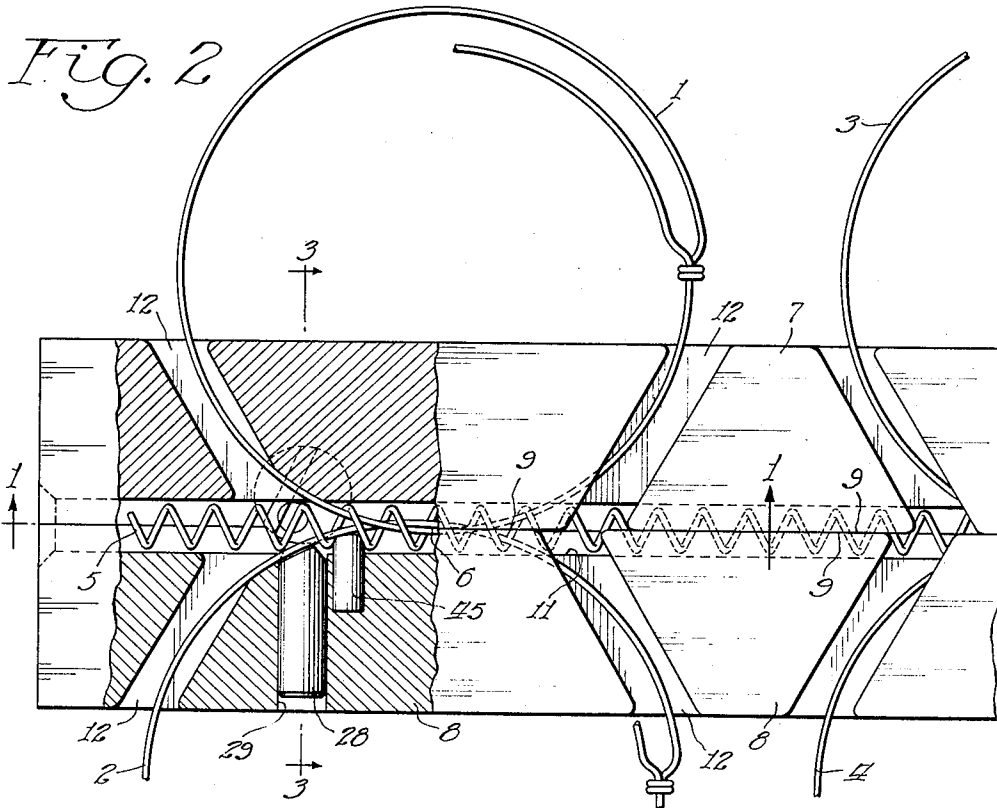
W. E. WUNDERLICH

1,976,686

COMBINED CUTTING AND FORMING MEANS

Filed June 27, 1932

3 Sheets-Sheet 2



Inventor
William E. Wunderlich
By *Ransom M. M.*
Att.

Oct. 9, 1934.

W. E. WUNDERLICH

1,976,686

COMBINED CUTTING AND FORMING MEANS

Filed June 27, 1932

3 Sheets-Sheet 3

Fig. 6

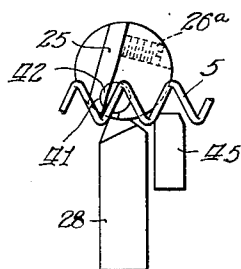


Fig. 7

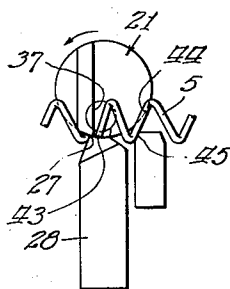


Fig. 8

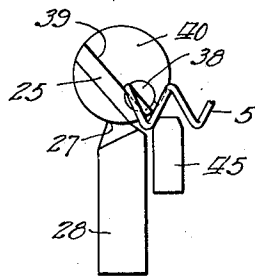


Fig. 9

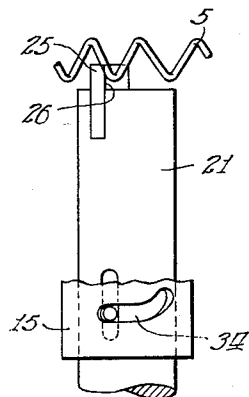


Fig. 10

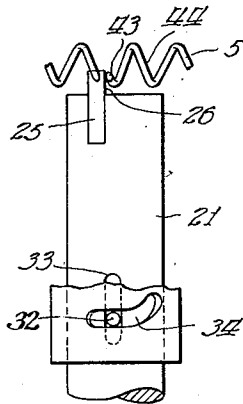


Fig. 11

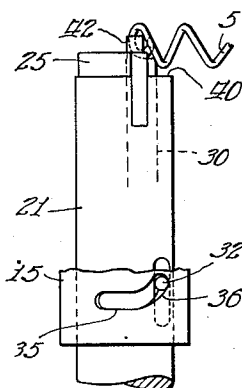


Fig. 12

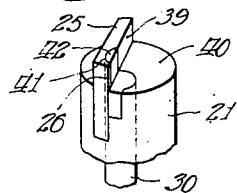
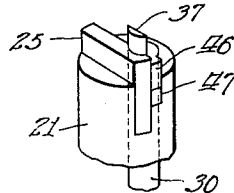


Fig. 13



Inventor
William E. Wunderlich
By Raymond M. M.
Att'y.

UNITED STATES PATENT OFFICE

1,976,686

COMBINED CUTTING AND FORMING MEANS

William E. Wunderlich, Muncie, Ind., assignor to
The Moore Company, Muncie, Ind., a corporation
of Indiana

Application June 27, 1932, Serial No. 619,403

10 Claims. (Cl. 140—1)

This invention relates to combined cutting and forming means more particularly for helically wound wire.

Among other objects, the invention aims to
5 provide means for cutting the wire and forming means automatically controlled by the cutting means for crimping the free end of the wire when cut as by bending it back upon itself to avoid a sharp protruding end of the wire which
10 might tear or catch the fabric covering of a spring assembly for example.

The invention is of particular utility with relation to cutting and crimping means for the connecting helicals of mattress spring assemblies.
15

The invention will be more fully explained in conjunction with the illustrative embodiment thereof shown in the accompanying drawings, in which—

20 Figure 1 is a vertical section through the illustrative means, taken on the line 1—1 of Figure 2;

Figure 2 is a plan view of the illustrative means;

25 Figure 3 is a cross section taken on the line 3—3 of Figure 2;

Figure 4 is a section taken on the line 4—4 of Figure 1;

30 Figure 5 is a perspective view of a separated part;

Figure 6 is a plan view of parts shown in Figure 2 in slightly advanced position;

Figure 7 is a view of the same parts after the wire has been cut;

35 Figure 8 is a still more advanced view of the same parts in the position occupied when the free end of the wire has been crimped;

40 Figure 9 is an elevational view of the parts shown in Figures 6, 7 and 8 and showing the parts in the position corresponding to Figure 6;

Figure 10 is a similar view corresponding to Figure 7;

Figure 11 is a similar view corresponding to Figure 8;

45 Figure 12 is a detail view of the cutting and crimping elements in one position; and

Figure 13 is a view of the same elements in a different or final operative position.

Referring in detail to the figures of the drawings, I have shown the terminal convolutions 1, 2, 3 and 4, which in this instance may be the lower terminal convolutions of a coil spring assembly such as is commonly used in mattress structures, the springs 1, 2, 3 and 4 and other
55 similar springs being conventionally arranged in

upright parallel relationship. The springs 1, 2, 3 and 4 are interconnected, as is well known in the art, by a small diameter binding spring such as the helically wound wire 5, the terminal convolutions 1 and 2 for example being overlapped
60 and the helically wound wire 5 being threaded about these overlapped portions as at 6.

Means for holding the springs in this assembly while being interconnected is here represented by the separable jaws 7 and 8 which meet along
65 the line 9. These jaws are routed out upon their opposing faces adjacent the line 9 as at 10 to jointly form a cylindrical passage 11 through which may be slid the helically wound wire 5, this wire being rotated as it is slid through the
70 passage 11 and thus being threaded about the terminal convolutions 1 and 2, the overlapped portions of which are held in overlapping relation also by the jaws 7 and 8 and disposed centrally of the passage 11 as best shown in Figure
75 3, channels 12 being formed in the upper surfaces of the jaws 7 and 8 to intersect the passage 11 and in which the terminal convolutions 1 and 2 are received to have their overlapping portions positioned in the passage 11.
80

The jaws 7 and 8 may be movable toward and away from each other on the fixed mounting 13 to which is fixedly secured to depend therefrom the support 14 for the combined cutting
85 and forming mechanism next described.

The support 14 has fixed therein the cylindrical bushing 15 having a flange 16 which is received in a recess in the support formed by the counterbore 17. A pin 18 passing through the
90 flange 16 and into the support 14 may fix the bushing with respect to the support. The bushing 15 and the counterbore 17 are coaxial with a circular aperture 19 in the mounting 13 and a circular pocket 20 formed jointly in the jaws 7 and 8 and which pocket intersects the
95 passage 11.

Journalled in the bushing 15 I have shown a cylindrical holder 21 having a handle 22 by which it may be manually rotated and provided with a collar 23 fixed thereon by a pin 24. The
100 collar 23 is received in the counterbore 17 between the flange 16 of the bushing 15 and the mounting 13, thus maintaining the holder in a given plane of rotation. The upper end of the holder 21 projects into the pocket 20 and carries a transversely disposed knife blade 25 rotatable with the holder and having a cutting
105 edge 26 parallel with the axis of the holder. This blade may be retained in place by the set screw 26a to project above the upper end of the
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holder 21, with its side carrying the cutting edge 26 flush with the circumference of the holder. When the holder 21 is rotated in the direction of the arrow in Fig. 1, the cutting edge 26 of the knife blade 25 cooperates with the cutting edge 27 of the fixed abutment or blade 28 (Fig. 7) to cut the wire 5 to discontinue this wire at the lefthand side of the terminal convolutions 1 and 2, assuming these to be the marginal coils of a spring assembly, for example. The blade 28 may be carried by one of the jaws, in this instance, the jaw 8, laterally adjacent where the terminal convolutions 1 and 2 are overlapped its edge 27 also substantially flush with the circumference of the holder 21 but just permitting the edge 26 to pass by. The blade 28 may have a snug driving fit in the hole 29 in the jaw 8. The hole 29 may be open at both ends, so that the blade 28 may be adjusted for wear.

In accordance with my invention I provide forming or crimping means controlled by movement of the blade 25 and which engages the wire 5 immediately after it is cut by the blade.

In the illustrative construction, the holder 21 carries in addition to the blade 25 a finger 30 which is in this instance cylindrical and is slidable in the longitudinal recess 31 in the holder closely adjacent the blade 25. The finger 30 is shown provided with a cross pin 32 which passes through a transverse longitudinally elongated slot 33 in the holder 21, the finger being thus free to move in the holder longitudinally within the limits of this slot. The ends of the pin 32 are received in the curved cam slots 34 in the bushing 15 which have the angularly related branches 35 and 36. When the ends of the pin 32 are in the branches 35 of the slots 34 the pin 32 and with it the finger 30 will rotate together with the holder 21 and in a given plane perpendicular with respect thereto. As the holder 21 is continued to be rotated and the pin 32 moves into the branches 36 of the slots 34, the pin 32 and with it the finger 30, will be moved longitudinally of the holder 21 to cause the upper end of the finger to be moved upwardly for the purpose next described.

The upper end of the finger 30 has two angularly related respectively vertical and horizontal surfaces 37 and 38 which prior to longitudinal movement of the finger 30 as above described, are desirably flush respectively with the surface 39 of the blade 25 and the upper surface 40 of the holder 21, the blade 25 being routed out as at 41 to slidably receive the extension 42 of the finger 30 upon which is provided the vertical surface 37 of the finger. In the position of the holder shown in Figures 6, 9 and 12, the surfaces 37 and 38 of the finger 30 are flush as described with the respective surfaces 39 and 40. The finger therefore in this position of the holder has no functional effect and is entirely free from interference with the movement of the knife blade 25 as the latter rotates to cut the wire 5.

When the wire is cut a turn of the helical immediately adjacent the cut now constitutes the free end 43 of the wire 5 and this free end abuts the surface 39 of the knife blade 25 which has just contacted therewith. Since as constructed and arranged the surface 37 is between the free end of the wire and the blade 25, as the holder is rotated, the free end 43 of the wire may also abut the surface 37 of the finger. As the cutting edge of the blade moves to the right, as shown in Figures 7 and 10, it turns the free

end 43 of the wire back upon the main portion of the wire 5, the fixed blade 28 having an arcuate surface immediately adjacent its edge 27 which is flush with the circumference of the holder 21 and cooperates with the blade to restrict movement of the free end 43 of the wire except as directed by the blade. As the holder 21 rotates still further as shown in Figures 11 and 13 the surface 38 of the finger 30 comes into moving upward abutment with the free end 43 and turns this end back upon itself. At the same time since the extension 42 of the finger is now elevated above the blade 25, the surface 37 may also be still in abutment with the portion of the wire having the free end 43 to restrict its movement except as indicated. To prevent the entire wire 5 from moving to the right under the influence of the finger 30, as shown in Figures 7 and 10, another turn 44 of the wire 5 immediately adjacent the free end 43 is caused to engage a fixed abutment 45 carried by the jaw 8 immediately adjacent the blade 28. Thus the free end 43 of the wire is engaged between the finger 30 and the abutment 45 and the wire 5 is held against axial movement, to be formed or crimped as described.

Having reached the limit of its rotation in one direction determined by the slots 34 as indicated in Figure 11, the holder 21 may then be reversely rotated to restore it to the position shown in Figure 9 where it is ready to cut and form another helically wound wire.

To guard against rotation of the finger 30 with respect to the holder 21, I may provide a pilot lug 46 which is laterally directed from the finger to slide in the enlargement 47 of the recess 31 in the holder 21.

Obviously, the invention is not limited to the details of construction herein shown for purposes of exemplification. Furthermore, it is not indispensable that all features of the invention be used conjointly since various combinations and sub-combinations may be advantageously employed.

Having described an embodiment of my invention, I claim:

1. In a machine of the class described for cutting a helically wound wire, the combination of a fixed blade; a rotatable blade cooperating therewith to cut the wire; a rotatable holder carrying the rotatable blade; a longitudinally movable finger carried by the holder; cam means for moving the finger longitudinally of the holder toward the wire as the holder and rotatable blade are rotated; and an abutment between which and the finger a portion of the wire is engaged.

2. In a machine of the class described for cutting a helically wound wire, the combination of a fixed blade; a rotatable blade cooperating therewith to cut the wire; a rotatable holder carrying the rotatable blade; a longitudinally movable finger carried by the holder, said finger having angularly related surfaces engaging the wire, one of said surfaces being between the free end of the wire and the rotatable blade; cam means controlled by the holder for moving the finger longitudinally of the holder toward the wire as the holder and blade are rotated; and an abutment between which and the finger the free end of the wire is engaged.

3. In a machine of the class described, the combination of a mounting; separable jaws carried by the mounting; a cylindrical passage jointly formed by said jaws, said passage being

- adapted for receiving a helically wound wire therein; a fixed blade carried by one of said jaws; a rotatable holder carried by the mounting between the jaws; a rotatable blade on said holder cooperating with the fixed blade; a longitudinally movable finger carried by the holder; cam means controlled by the holder for moving the finger longitudinally of the holder and transversely of the passage as the holder is rotated; and an abutment carried by one of the jaws between which and the finger the free end of the wire is engaged.
4. In a machine of the class described, the combination of cutting and crimping means including a support; a bushing fixed in said support; a cylindrical holder rotatable in the bushing; a collar on the holder received in an annular recess in the support, and maintaining a fixed plane of rotation for the holder; a blade carried by the holder; a finger slidable in a longitudinal recess in the holder adjacent the blade; a pin fixed to the finger transversely thereof; a curved cam slot in the bushing receiving the pin, said cam slot forcing longitudinal movement of the finger with respect to the holder; and a longitudinal slot in the holder through which the pin passes.
5. In a machine of the class described, the combination of cutting and crimping means including a mounting; a support depending from the mounting; a flanged bushing in said support; a cylindrical holder rotatable in bushing; a collar fixed on the holder and received in an annular recess in the support between the flange of the bushing and the mounting and maintaining a fixed plane of rotation for the holder; a blade rotatable with the holder; a finger slidable in a longitudinal recess in the holder adjacent the blade; a pin fixed to the finger transversely thereof; curved cam slots in the bushing receiving the ends of the pin, said cam slots forcing longitudinal movement of the finger with respect to the holder as the holder is rotated; longitudinal slots in the holder through which the pin passes; and means for rotating the holder.
6. In a machine of the class described, the combination with jaws for positioning terminal convolutions of parallel coil springs in overlapping relation; of a cylindrical passage formed by the jaws jointly and intersecting the convolutions where overlapped for receiving a helically wound wire to be threaded about the overlapped portions of the terminal convolutions; a fixed blade carried by one of the jaws laterally of the overlapped portions; a rotatable blade cooperating with the fixed blade to cut the helically wound wire; a finger engageable with the free end of the wire when cut; and cam means controlled by rotation of the blade for moving the finger to bend the end of the wire upon itself.
7. In a wire cutting and crimping device, the combination of a member having a cutting edge and a wire engaging abutment, and additional abutments cooperating first with the cutting edge and then with the first mentioned abutment to successively cut and crimp the wire by a single continuous relative movement of said parts.
8. In a wire cutting and crimping device, the combination of a rotatable member carrying a cutting edge and a wire engaging abutment, said abutment being longitudinally movable with respect to the rotatable member, fixed abutments cooperating successively with the cutting edge and the movable abutment to cut and crimp the wire, and means for simultaneously rotating the member and moving the movable abutment longitudinally whereby the wire is cut and crimped in a single continuous rotative movement of the member.
9. The combination in a device for cutting and forming a helically wound wire, of means for cutting the wire, and additional means actuated by movement of the first mentioned means for imparting to a free end of the wire where cut a helical movement transverse to the main axis of the helically wound wire.
10. The combination in a device for cutting and forming wire, of means for holding the wire to be cut; a knife blade rotatable on an axis transverse to the wire; and a member adjacent said blade brought into abutment with the wire by movement of the blade and actuated by movement of the blade to move in a helix on an axis parallel to said transverse axis, said member being adapted to carry the cut end of the wire with it in said movement.

WILLIAM E. WUNDERLICH. 125

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