June 20, 1939. E. W. KRUEGER 2,162,815

METHOD OF SECURING WIRES TOGETHER

Filed Nov. 6, 1937 2 Sheets-Sheet 1

Fig. 1.

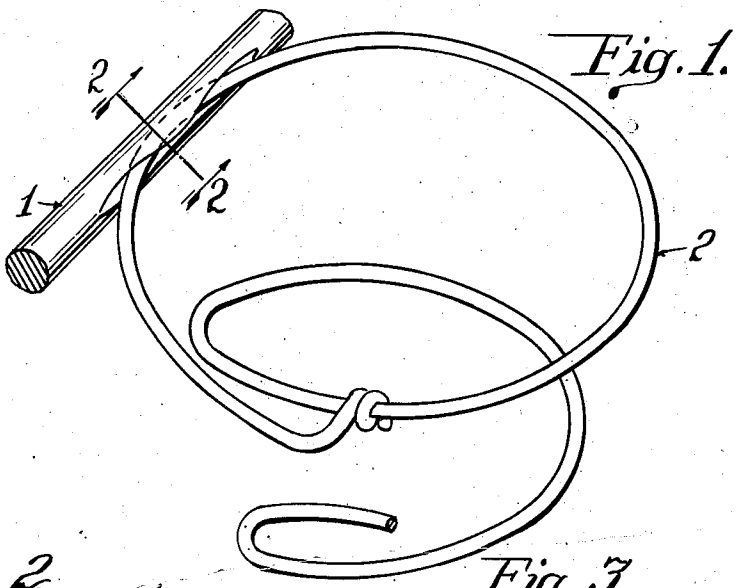


Fig. 2.

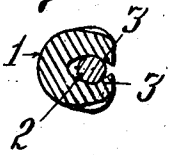


Fig. 3.

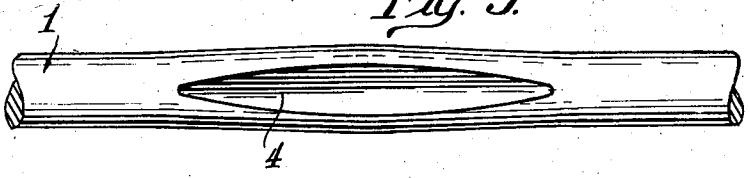


Fig. 4.

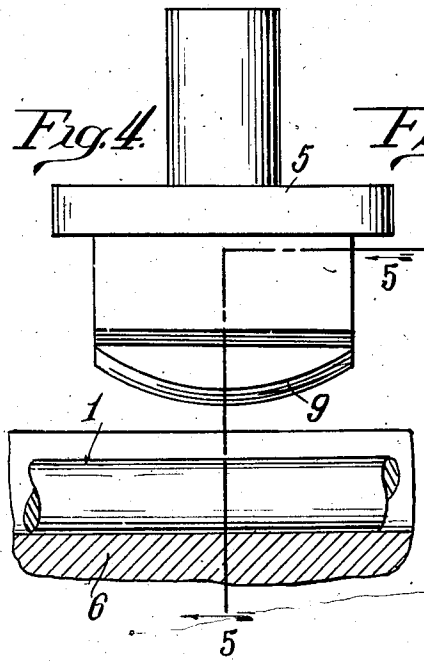


Fig. 5.

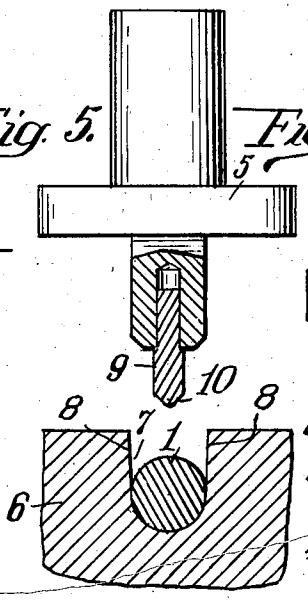
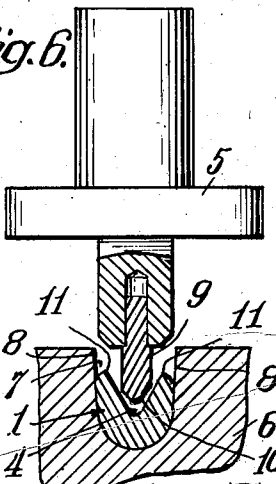


Fig. 6.



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METHOD OF SECURING WIRES TOGETHER

Filed Nov. 6, 1937 2 Sheets-Sheet 2

Fig. 7

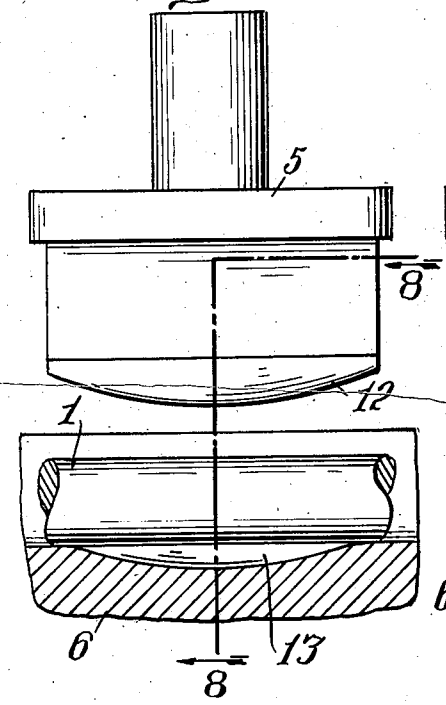


Fig. 8

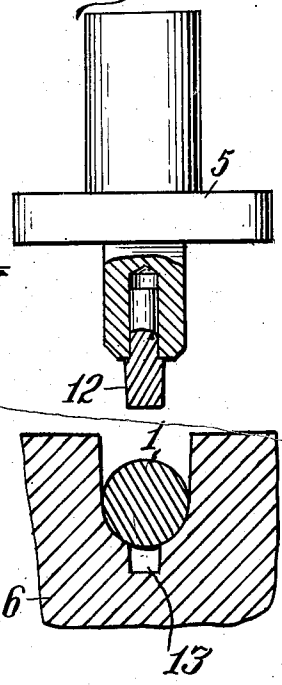


Fig. 9

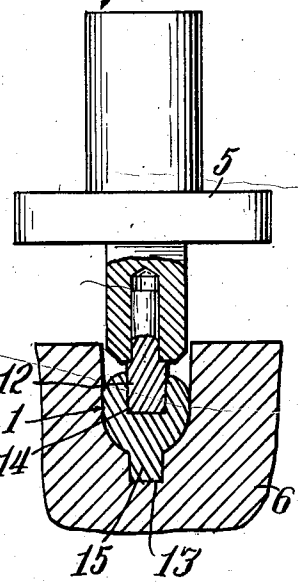


Fig. 10

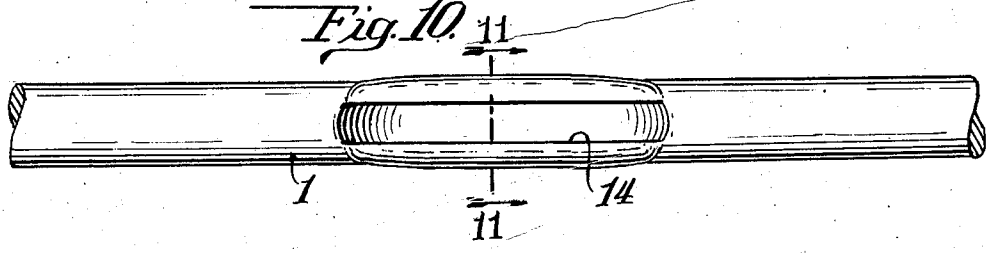


Fig. 11.

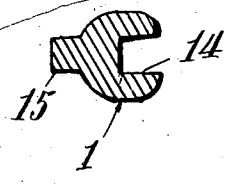
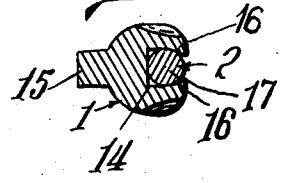


Fig. 12.



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UNITED STATES PATENT OFFICE

2,162,815

METHOD OF SECURING WIRES TOGETHER

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Application November 6, 1937, Serial No. 173,089

2 Claims. (Cl. 140—3)

This invention relates to new and useful improvements in bed spring and method of assembly and more specifically relates to an assembly in which a wire of a given diameter is secured to and held by one of larger diameter such for example as the individual coil springs to the border wire of the bed spring.

In the manufacture of bed springs it is necessary to fasten the tops of the plurality of coil springs positioned along the four sides of the assembly to a rigid border wire or rod of much greater gauge or diameter than that of the springs, which extends completely around the unit.

This has heretofore been done in various ways by either wiring the springs to the rod or by cutting grooves in the rod of sufficient size to receive the wire at the springs or by forming such rods with such grooves and after positioning the springs in the grooves crimping or folding the sides of the grooves over the springs.

The first described method is objectionable because the wiring tends to loosen and presents projections which become caught in the bedding.

The latter methods are objectionable because of the weakening of the border wire due to the removal of material in forming the grooves and the expense involved in so preparing the wire.

The primary object of the invention is to provide such an assembly which does not necessitate the removal of any of the material from the border wire and yet results in a positive gripping of the springs by the border wire at all times.

A further object is to provide such a wire assembly that it is simple and inexpensive to manufacture.

A still further object is to provide a novel method by which a wire or rod of a given diameter can be efficiently secured to a wire or rod of larger diameter.

A further object is to cold work the rod to form a recess for receiving the smaller wire that is strengthened by said cold working.

It is apparent that while this invention is directed primarily to the manufacture of bed springs it may be utilized in many other instances and it is not intended to limit the invention to such use.

Other objects and advantages are readily apparent from an examination of the accompanying drawings, in which

Fig. 1 is a perspective view of a portion of a coil spring secured to a portion of a border wire or rod in accordance with the invention.

Fig. 2 is a sectional view along line 2—2 of Fig. 1.

Fig. 3 is a plan view of a border wire prepared for receiving the spring wire.

Fig. 4 is a side elevation of a punch press utilized in preparing the border wire for assembly in accordance with this invention with the wire in position and the press open.

Fig. 5 is a cross section of the press taken along line 5—5 of Fig. 4.

Fig. 6 is a cross section of the press after the swaging or splitting action is complete.

Fig. 7 is a side elevation of a punch press having a different form of swaging tool and die.

Fig. 8 is a cross-section of the press taken along line 8—8 of Fig. 7.

Fig. 9 is a cross-section of the press of Fig. 7 with movable part depressed.

Fig. 10 is a plan view of a rod after being subjected to the action of the press shown in Figs. 7, 8 and 9.

Fig. 11 is a cross-section of the rod taken along line 11—11 of Fig. 10.

Fig. 12 is a cross section of the rod shown in Fig. 10 after the smaller wire has been positioned in the opening and the sides have been crimped together.

In detail 1 is the border wire and 2 is the coil spring which is to be secured to the border wire. It must be clearly understood that only a portion of the complete bed spring is shown in the drawings but that the unit comprises a plurality of coil springs secured together and to the border wire so as to complete a unit in which the large coil of the springs forms the top of the bed spring.

The method followed in securing the springs to the border wire is to swage or split the border wire 1 to form a recess or opening 4 for receiving a portion of the coil spring 2. It is well known in the art that drawn wire such as used in forming a border wire has a relatively hard outer surface or coating and a softer core. It has been found that if the border wire is subjected to a lengthwise swaging action, as soon as the outer surface of the wire is broken the metal flows away from the initial cut to form a V- or wedge-shaped opening. This is made sufficiently deep so as to receive the spring wire and then the sides of the opening are crimped or bent upon the spring wire to hold it in position as shown at 3, Fig. 2. It is obvious that the smaller wire may be secured within the swaged opening in other ways. For example the sides of the opening may be compressed to pinch the smaller wire and thus hold it in position.

Fig. 3 shows the elliptical appearance of the opening thus formed when viewed in plan.

Fig. 6 clearly shows how the opening is V-shaped in cross-section.

By swaging the border wire 1 as indicated no metal is removed from the wire and the flow of the metal provides sides to the opening that are convenient for crimping or bending upon the coil spring wire 2 to hold it in position as shown in Fig. 2.

Figs. 4, 5 and 6 illustrate a method of performing the swaging operation although it may be done in many different ways utilizing different tools and apparatus and this invention is not limited to the illustrated manner of accomplishing the desired result.

A portion of a punch press is shown in Figs. 4, 5 and 6 in which 5 indicates the movable part of the press and 6 the stationary part. The details of the operating mechanism of the press are not shown as they are familiar to the art and form no part of the present invention.

The stationary part 6 is provided with a recessed half round holder 7 for the border wire 1. The sides 8 are slightly tapered to the top to facilitate the removal of the wire after operation.

The movable part 5 is provided with a curved cutting or swaging tool 9 having a rather blunt edge 10 as clearly shown in Figs. 5 and 6.

With the rod 1 in position in the holder 7 the swaging or splitting action is commenced and as the edge 10 of the tool 9 breaks through the outer surface of the wire 1 the metal flows away from it and the splitting is continued until an opening of the desired depth and length is obtained.

Fig. 6 is a cross section at the center of the cut when the action is complete showing the flow of the metal away from the tool 9 and showing further how the sides 8 of the holding groove 7 cause the metal to move upwardly during the swaging action to form lip or ear portions 11 that extend above the normal surface of the rod 1 and may be conveniently crimped or bent over the spring wire 2 after it has been positioned within the opening 4, thus providing a strengthened gripping portion which will securely hold the smaller wire in position.

It is obvious that in the commercial production of bed springs utilizing this invention a plurality of swaging or splitting machines will be arranged so that simultaneously the border wire will be swaged in the numerous predetermined places to receive the plurality of coil springs adjacent the border wire.

Another method of swaging the larger wire is shown in Figs. 7, 8 and 9. The punch press is the same as shown in Figs. 4, 5 and 6 only that the swaging tool 12 is blunt as illustrated in Figs. 8 and 9 and the holder for the rod is formed with a recess 13 as shown in Figs. 7, 8 and 9. Thus the downward stroke of the press swages the metal it displaces into the recess 13 and causes the sides of the rod to bulge slightly. The protuberance thus formed opposite the recess will be substantially less in height than the depth of the recess as the swaging action compresses the metal. This cold working of the metal hardens and strengthens it so that the portion so treated is even stronger than the untreated portions of the rod. In this manner a recess is formed for receiving the smaller wire without weakening the larger wire.

Fig. 10 shows the plan appearance of a rod so treated having a substantially rectangular opening 14. The displaced metal which was forced into the recess 13 is shown at 15 in Figs. 9, 11 and 12.

The sides 16 of the recess so formed are bent or crimped together so as to hold the smaller wire 17 securely as shown in Fig. 12.

No crimping means is shown as it may be done in various ways familiar to the art and forms no part of the invention.

The word "swage" in any form as used herein means the treatment of the larger wire to form an opening for the smaller wire without removing any of the metal from the large wire. The swaging is preferably done cold so that the metal so treated is hardened and strengthened.

I claim:

1. A method of securing a smaller wire to a larger wire comprising displacing without removing the metal of a portion of the larger wire to form a recess on one side and a protuberance on the other, placing a portion of the smaller wire in said recess and pressing the sides of the recess against the smaller wire to hold it in the recess.

2. A method of securing a smaller wire to a larger wire comprising holding the larger wire after its formation and while cold so as to prevent its bending, displacing without removing the metal of a portion of it to form a recess and to strengthen that portion by compressing the metal, placing a portion of the smaller wire in said recess and pressing the sides of the recess against the smaller wire to hold it in the recess.

EDWIN W. KRUEGER.