Nov. 24, 1936. D. D. HUYETT 2,061,578

DETONATOR LEG WIRE ASSEMBLY AND METHOD OF WINDING THE SAME

Filed Dec. 8, 1934

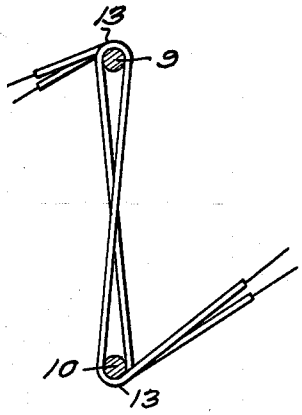


Fig. 1.

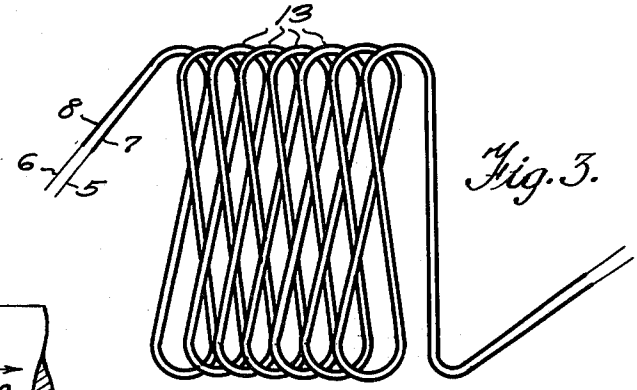
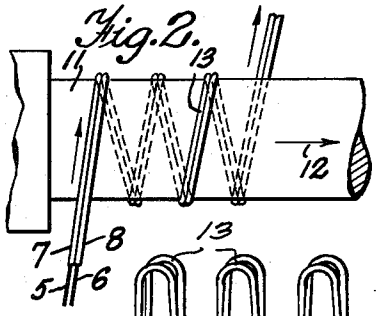
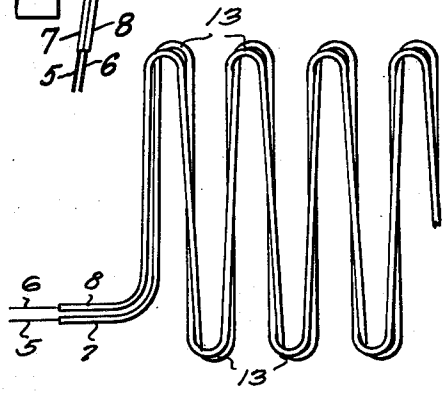


Fig. 3.

Fig. 2.





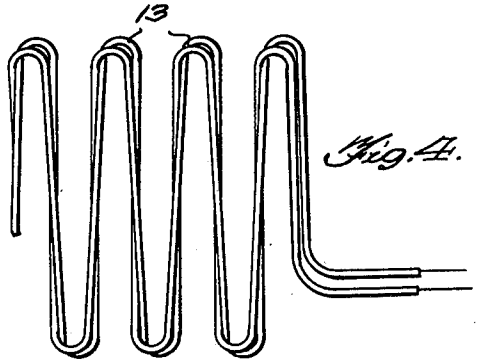


Fig. 4.



Fig. 5.

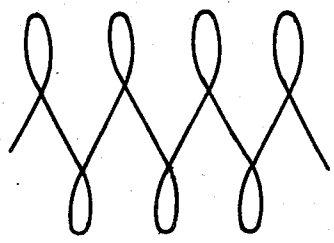


Fig. 6.

Inventor

DANIEL D. HUYETT,

By Samuel Herrick

Attorney

Patented Nov. 24, 1936 2,061,578

UNITED STATES PATENT OFFICE

2,061,578

DETONATOR LEG WIRE ASSEMBLY AND METHOD OF WINDING THE SAME

Daniel D. Huyett, Wilmington, Del., assignor to Atlas Powder Company, Wilmington, Del., a corporation of Delaware

Application December 8, 1934, Serial No. 756,711

5 Claims. (Cl. 140—71)

This invention relates to a method of winding the leg wires of detonators and it has for its object to provide leg wires wound to bundle formation for convenient packaging and in such manner as to insure the opening out of the leg wires without kinking of the same.

Other advantages of the invention will be set forth in the detailed description which follows.

In the accompanying drawing, Fig. 1 is a front view of a pair of spaced pins about which the leg wires are wound in a figure 8 path.

Fig. 2 is a greatly magnified plan view of a part of the uppermost pin of Fig. 1.

Fig. 3 is a perspective view of a leg wire bundle consisting of a group of figure 8 loops.

Figure 4 is a view of the bundle illustrated in Fig. 3 but with the opposite ends of the leg wires drawn away from each other to begin to open the bundle.

Fig. 5 is a plan view of a portion of a single one of the wires.

Fig. 6 is a diagrammatic view illustrating a method of figure 8 winding, which brings about the kinking that it is the object of the present invention to avoid.

Like numerals designate corresponding parts in all of the figures of the drawing.

The electric blasting caps employed in mining, quarrying, and like operations have a pair of leg wires 5 and 6 attached to them, said leg wires being covered with insulation, as indicated at 7 and 8, except where they are left bare at one end for attachment to the detonator and are left bare at the other end for connection to the main firing cable. It is common practice to wind these leg wires to form a bundle of loops for convenient packaging and in the patent of David F. McFarland, 1,983,141, issued December 4, 1934, there is illustrated a detonator package in which the leg wires are wound to form a bundle consisting of a group of figure 8 loops and wherein the winding is conducted in a continuously advancing path so that each loop lies in a plane separate from the plane of any other loop; whereby intertangling of the respective loops is avoided.

A primary feature of the present invention resides in winding detonator leg wires to form a plurality of figure 8 loops, the winding being carried out in a continuously advancing path so that every loop lies in non-intertwined relation with every other loop and wherein during the winding the wires are given such a set as will tend to cause them, when released from the restraining packaging means to move toward open position in that direction which, if continued, will result in the wires being drawn out to straight line position without kinking. The importance of the foregoing may be best appreciated by comparing Figs. 4 and 6. If the opposite ends of the wire illustrated in Fig. 4 be drawn away from each other, the entire length of wire may be drawn out to straight line position without kinking or tangling while if the same wires were grasped and drawn upon in such manner as to move the right-hand ends of the wire toward the left and the left-hand ends of the wires toward the right, we would get the result illustrated in Fig. 6 and in which there would be a kinking at every bend of the wire.

In carrying out the invention, the wires are wound upon the mandrels or pins 9 and 10 through a continuously advancing figure 8 path from the rear end of the pins as indicated at 11 toward the forward ends of the pins as indicated by arrow 12. The wires are wound with such longitudinal tension about the mandrels as to impart a permanent set to the bends 13 of the loops, at the point where they pass about the pins or mandrels and by referring to Fig. 5 it will be seen that, due to the crossing of the wires to form the figure 8 bundle the bends are pitched in the same direction and forwardly with respect to the direction of the winding of the wire. The result is that when the winding is completed we have a bundle consisting of a group of figure 8 loops which lie in planes separate from each other and wherein the connecting bends between the loops have been given a permanent set at an angle to the general plane of the whole group of loops and are pitched toward the forward end of the group of loops, the axes of said bends lying at a decided angle with respect to the general direction of the length of said group of loops. In packaging the detonators with their attached leg wires, it is customary to bind the group of loops firmly together, or, as in the McFarland patent aforesaid, bind the whole group of loops to or about the detonator. A restraining or tying means is placed about the whole group of loops and they are held in the form of a snug or compact bundle until the time of use arrives, at which time the miner or other user removes the restraining means, which may consist simply of the free ends of the wires wrapped about the center of the group or may consist of a housing pasteboard tube, such as illustrated in the McFarland patent. The method of winding herein described insures that when the restraining means is removed the coils or loops will tend, by reason of the manner of winding described, to

move in that direction which if continued will bring about the extension of the loops to single strand formation without crossing at any of the bends and consequently without the kinking which would result from such crossing as indicated in Fig. 6.

In carrying out the winding herein described, the wire is permitted, while being given the necessary longitudinal tension, to pass freely through the winding shuttle so that no cross sectional twist or torsion is imposed upon the wires at any point. I have found that if any torsional twist is imposed upon the wires during winding, it tends to cause the wires to move to crossed position, as indicated in Fig. 6. Therefore, I combine with the provision of the initial set of the bends, freedom from torsional strains. It may seem that there would never be any reason for drawing the left-hand end of the wire in Fig. 4 to the right and vice versa, but it should be remembered that in the absence of any means for determining which way the bundle is to be opened, the operator would have in his hand upon removal of the restraining means merely a group of loops and he would be almost as likely to draw these groups of loops out in one direction as in the other. The present invention aids the operator in determining how to grasp and in which direction to draw upon the group of loops.

Having described my invention, what I claim is:

1. The herein described method of winding detonator leg wires which consists of winding the relatively soft wire commonly employed for said leg wires under tension to form a group of figure 8 loops wherein each loop lies in a plane separate from adjacent loops and wherein the connecting bends between the loops are formed under such tension as to impart a permanent set to the bends of the loops at an angle to the general plane of the whole group of loops and pitched toward the forward end of the group of loops with the axes of said bends lying at an angle with respect to the general direction of the length of the group of loops whereby when said groups of loops are released from restraint they tend to open out in a direction which, if continued, would bring all of the wire to single strand formation without kinking.

2. The herein described method of winding the leg wires of detonators which consists of winding the relatively soft wire commonly employed for said leg wires to form a group of figure 8 loops wherein each loop lies in a plane separate from adjacent loops and wherein the connecting bends between the loops are formed under such tension as to impart a permanent set to the bends of the loops to cause them to lie at an angle to the general plane of the whole group of loops and pitched toward the forward end of the group of loops, said wires being wound under the necessary longitudinal tension but substantially without torsional twist in such direction as would tend to cause the wires to cross at the bends whereby when said groups of loops are released from restraint they tend to open out in a direction which, if continued, would bring all of the wire to single strand formation without kinking.

3. A bundle of detonator leg wires formed of relatively soft wire and consisting of a group of loops wound in a continually advancing direction and in figure 8 form and wherein the bends of said loops have a permanent set at an angle to the general plane of the whole group of loops and pitched toward the forward end of the group of loops so that the axes of said bends lie at an angle with respect to the general direction of the length of the group of loops whereby when said groups of loops are released from restraint they tend to open out in a direction which, if continued, would bring all of the wire to single strand formation without kinking.

4. A bundle of detonator leg wires as recited in claim 3 wherein the said wires are wound under such longitudinal tension as to impart the described set to the wires while leaving them free of torsional set.

5. The herein described method of winding the relatively soft wire commonly employed for the leg wires of detonators which consists of winding said wires to form a group of elongated loops wherein each loop lies in a plane separate from adjacent loops, wherein the connecting bends between the loops are formed under such longitudinal tension as to impart a permanent set to the bends of the loops to cause them to lie at an angle to the general plane of the whole group of loops, but wherein the winding shuttle for the wires engages the same in such manner as to permit the wires to pass freely therethrough without imparting any cross-sectional twist to said wires whereby when said groups of loops are released from restraint they tend to open out in a direction which, if continued, would bring all of the wire to single strand formation without kinking.

DANIEL D. HUYETT.