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[56] **References Cited**
UNITED STATES PATENTS
 2,876,761 3/1959 Stevens 125/21
FOREIGN PATENTS
 470,180 8/1937 Great Britain..... 125/21
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[54] **HELICAL STONE SAWING WIRES**
9 Claims, 5 Drawing Figs.
 [52] U.S. Cl. 125/21
 [51] Int. Cl. B28d 1/08
 [50] Field of Search..... 125/12, 18,
 21

ABSTRACT: A cold rolled helicoidal stone sawing wire having a generally oblong cross section with flat parallel longitudinal side edges and a central concave portion of reduced thickness between portions of maximum thickness. A convex curved portion connects each end of each longitudinal side edge to the adjacent portion of maximum thickness.

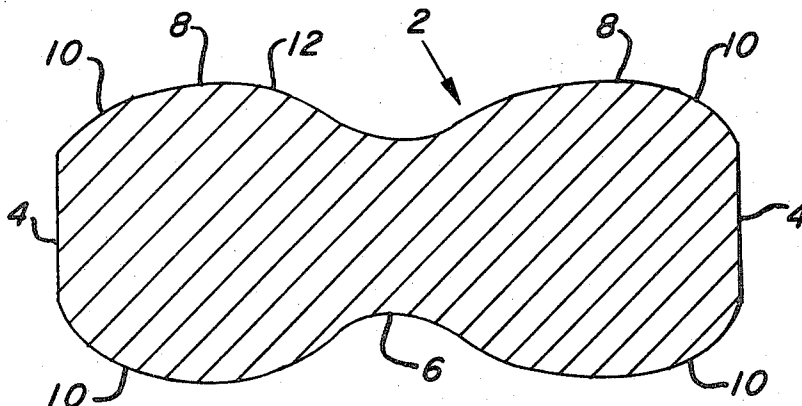


FIG. 1



FIG. 2

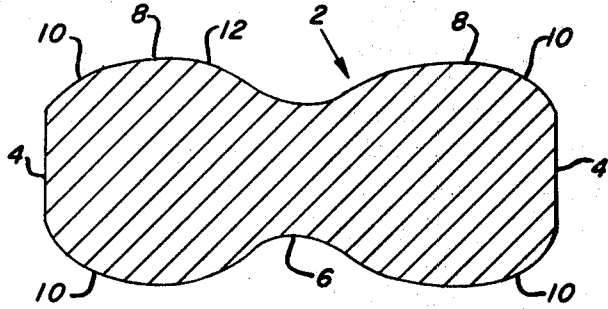


FIG. 3

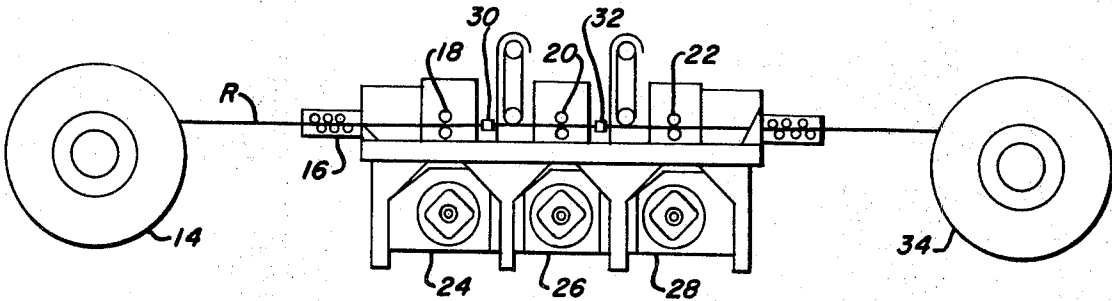
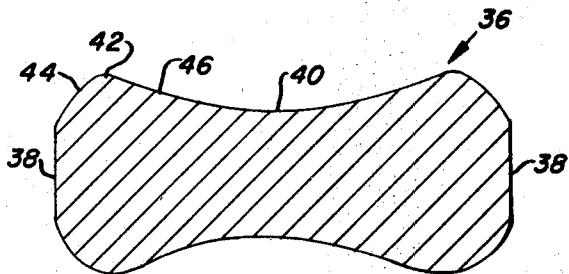


FIG. 4



FIG. 5



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HELICAL STONE SAWING WIRES

This invention relates to helical stone sawing wires and particularly to wires of the general type shown in Stevens U.S. Pat. No. 2,876,761 dated March 10, 1959. While the wires shown in the Stevens patent have been used successfully in cutting stones of various types, they have various drawbacks. They have sharp corners adjacent the cutting surface which makes them difficult to manufacture either by cold rolling and/or drawing. In addition, when the wire is twisted about its longitudinal axis, the sharp corners tend to crack open. Another disadvantage is that the percentage of usable metal for the stone sawing operation is less than half of the total amount of the metal in the wire. In other words, the ratio of available wearing area to the discard area is less than 100 percent and is generally in the neighborhood of 75 percent. A further disadvantage is that due to the process of making the wire, its ductility is such that the pitch cannot be made as short as desired for best operation, especially in the larger sizes.

It is therefore an object of my invention to provide helical stone sawing wires which are relatively inexpensive to manufacture and which can be manufactured without difficulty.

Another object is to provide such wires in which the ratio of available wearing area to discard area is above 100 percent.

A still further object is to provide such wires which have a longer life and which can cut faster than previous wires of this general type.

These and other objects will be more apparent after referring to the following specification and attached drawing, in which:

FIG. 1 is an elevation of the preferred embodiment of my invention;

FIG. 2 is an enlarged cross sectional view of the wire of FIG. 1 drawn to scale and shown prior to twisting about its longitudinal axis;

FIG. 3 is a schematic view of apparatus suitable for making the wires of my invention;

FIG. 4 is a view, similar to FIG. 1, showing a second embodiment of my invention; and

FIG. 5 is an enlarged cross sectional view of the wire of FIG. 4 drawn to scale and shown prior to twisting about its longitudinal axis.

Referring more particularly to FIGS. 1 and 2 of the drawing, reference numeral 2 indicates a stone sawing wire of my invention. It will be seen that this wire, prior to twisting, is generally oblong in cross section and has flat substantially parallel longitudinal side edges 4 which form the cutting edges of the strand. The wire has a central portion 6 of reduced thickness and a portion 8 of maximum thickness between each edge 4 and central portion 6. The central portion 6 has a curved concave surface as shown. A convex curved portion 10 is connected to each end of each longitudinal edge 4 and extends toward the other longitudinal edge to the maximum thickness portion 8 adjacent thereto. A convex curved portion 12 extends from the maximum thickness portion 8 to the central portion 6. It will be seen that the wire has no sharp corners. The particular wire shown in FIGS. 1 and 2 has a width of .286", a maximum thickness of .125" and a minimum thickness of .074" in the central portion.

The wire 2 is preferably made on the apparatus shown in FIG. 3. This apparatus includes a pay-off 14, a roll straightener 16, and roll stands 18, 20 and 22, driven by motors 24, 26 and 28, respectively. The rolls 18, 20 and 22 are shaped to produce the desired cross section. Edge rolls 30 are provided between stands 18 and 20 and edge rolls 32 between stands 20 and 22. The shaped wire is wound on take-up 34. A hot rolled steel rod R having a diameter of .207" which has been subjected to an M.H. patenting process and which has been acid cleaned is wound on pay-off 14. This rod may have any of the usual compositions used in making stone sawing strands. One particular analysis includes .66 percent carbon, .74 percent manganese, .010 percent phosphorus, .033 percent sulphur and .25 percent silicon. The rod R is formed in the rolls 18, 20 and 22 to the shape shown with the edge rolls 30 and 32 forming the strand edge 4. The wire 2 from the

take-up 34 is twisted about its longitudinal axis in the usual manner. I have found that the pitch of this wire can be shorter than that of previous shaped wires of approximately the same size. In the particular wire shown in FIGS. 1 and 2 the pitch is approximately 1.1".

I have found that the straight or flat edges 4 permit rapid sawing of the stone during the life of the wire even from the very beginning of its use and that the short pitch or lay gives faster cutting action. Apparently the increased ductility which permits the much shorter lay is due to the process of manufacturing the wire. In this particular wire, the ratio of available wearing area to discard area is approximately 310 percent which greatly increased the life of the wire. The expected increase in cutting life as compared to a standard stone sawing strand made of a .1875" x .075" rectangular wire twisted about its longitudinal axis is 420 percent. It is also contemplated to further reduce the thickness of the central portion 6 of the wire to increase the percentage of usable wire.

FIGS. 4 and 5 show a second embodiment of my invention in which wire 36, prior to twisting, has flat substantially parallel longitudinal side edges 38, a central portion of reduced thickness 40, and a portion of maximum thickness 42 between each edge 38 and central portion 40. The central portion has a curved concave surface which extends substantially to the portion 42. A convex curved portion 44 is connected to each end of each longitudinal edge 38 and extends toward the opposite longitudinal edge to portion 42. A concave curved portion 46 extends from each portion 42 to the central portion 40. The particular wire in FIGS. 4 and 5 has a width of .254", a maximum thickness of .110" and a central minimum thickness of .071".

The wire of FIGS. 3 and 4 is preferably made in generally the same way as that of FIGS. 1 and 2. Of course, the rolls 18, 20 and 22 have to have a different contour. It is also desirable in some instances to start with the same size rod as for the first embodiment and draw it to approximately .18" round and then patent it before rolling in the apparatus of FIG. 3. The pitch is preferably the same as in the first embodiment. The ratio of available wearing area to discard area of this wire is approximately 193 percent with the expected increase in cutting life of this wire as compared to the standard rectangular helical wire approximately 260 percent.

While two embodiments of my invention have been shown and described, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. A saw wire comprising a metal strip of generally oblong cross section, said strip having flat substantially parallel longitudinal side edges, a central portion of reduced thickness, a portion of maximum thickness between the central portion and each longitudinal edge, and a convex curved portion connected to each end of each longitudinal edge extending toward the opposite longitudinal edge to the portion of maximum thickness, said strip curving inwardly from said maximum thickness portion toward the said central portion.

2. A saw wire according to claim 1 in which the material of the wire is cold rolled steel and the wire is twisted about its longitudinal axis.

3. A saw wire according to claim 1 in which said central portion has a curved concave surface.

4. A saw wire according to claim 3 in which the curved concave surface is connected to the portion of maximum thickness by a convex curved surface.

5. A saw wire according to claim 4 in which the material of the wire is cold rolled steel and the wire is twisted about its longitudinal axis.

6. A saw wire according to claim 5 in which the ratio of available wearing area to discard area of the wire is above 100 percent.

7. A saw wire according to claim 3 in which the curved concave surface extends substantially to said maximum thickness portion.

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8. A saw wire according to claim 7 in which the material of the wire is cold rolled steel and the wire is twisted about its longitudinal axis.

9. A saw wire according to claim 8 in which the ratio of available wearing area to discard area of the wire is above 100 percent.

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