June 28, 1966 R. F. JOY 3,257,792

WIRE SAWING STRAND AND METHOD OF MAKING

Filed Feb. 10, 1961

Fig. 1

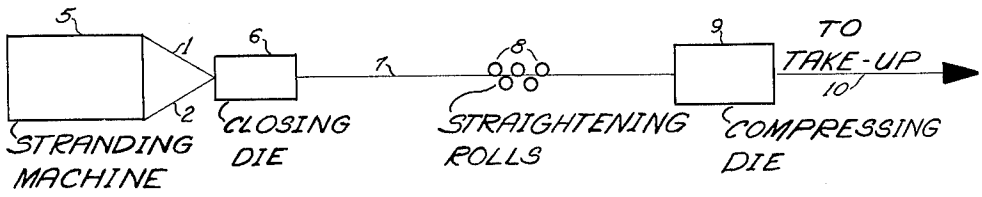


Fig. 2

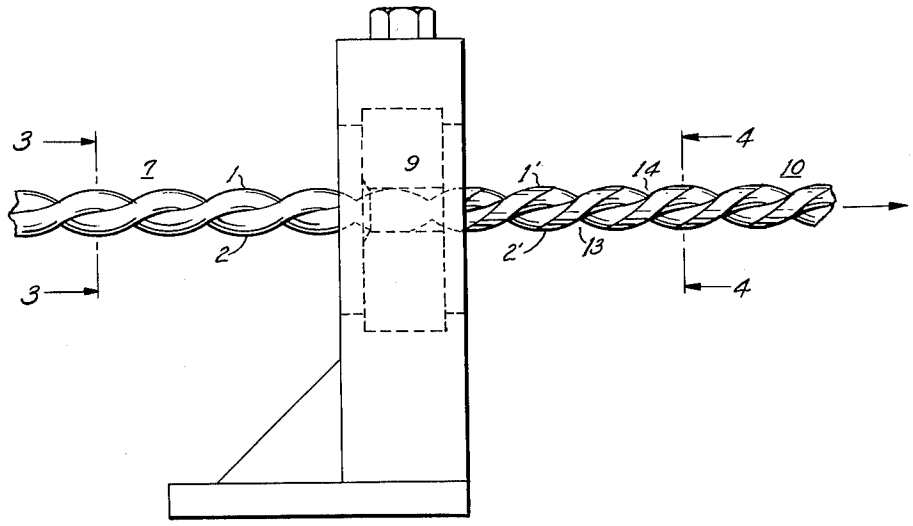


Fig. 3

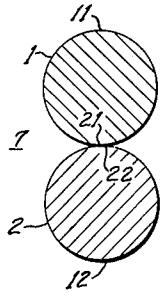
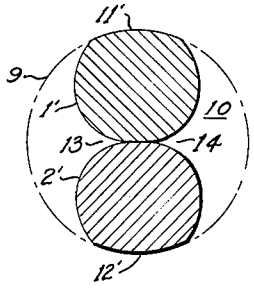


Fig. 4



INVENTOR

Robert F. Joy

BY Nath M Emery Jr.

ATTORNEY

United States Patent Office 3,257,792 Patented June 28, 1966

3,257,792

WIRE SAWING STRAND AND METHOD OF MAKING

Robert F. Joy, Bethlehem, Pa., assignor, by mesne assignments, to Bethlehem Steel Corporation, a corporation of Delaware

Filed Feb. 10, 1961, Ser. No. 88,364
7 Claims. (Cl. 57—139)

This invention relates to an improved wire sawing strand that is particularly useful for cutting blocks of granite, marble, slate, and other materials.

These strands are usually made by spirally twisting round or irregularly shaped strips whereby flutes or voids are provided to carry the abrasive material that actually does the cutting. Customarily, the lay or twist of the strand is reversed at intervals by reversing the direction of rotation of the stranding machine.

An object of the invention is to provide a multiple wire strand that has large abrasive carrying capacity.

Another object is to provide a strand that affords a large surface to initially contact the stone to be cut.

Another object is to provide an inexpensive and simple method of producing the saw strands.

Other objects will become apparent from the following specification and attached drawing which shows the preferred embodiment of the invention.

FIGURE 1 is an elevational view illustrating a stranding machine and die set-up embodying the preferred method of producing a 2-wire saw strand;

FIGURE 2 is an enlarged elevation view of a portion of the 2-wire saw strand, showing the strand before and after shaping according to my invention;

FIGURE 3 is an enlarged cross-sectional view along line 3—3 of FIGURE 2, of a 2-wire strand that has not been compressed;

FIGURE 4 is an enlarged cross-sectional view, along line 4—4 of FIGURE 2, of a 2-wire strand that has been compressed.

Similar reference characters refer to similar parts throughout the several views of the drawing.

With reference to the drawing, FIGURE 1 illustrates a general diagrammatic arrangement of the equipment used to perform easily the objects of this invention as embodied in a two-wire strand. Two standard round wires 1 and 2 pass from the stranding machine 5, which twists the wires, through a closing die 6 to form a strand 7, a portion of which is shown in FIGURE 2. The strand is passed through straightener rollers 8 to equalize the inherent strains from the twisting operation and then passes through a round compression die 9 to form the strand 10, a portion of which is shown in FIGURE 2. Addition of compression die 9 is the only deviation from a normal stranding operation. FIGURE 3 is an enlarged cross-sectional view showing the general shape of the wires 1 and 2 after stranding but before passing through the compression die 9. In FIGURE 4, wires 1′ and 2′ are wires 1 and 2 respectively after they have been compressed. It will be seen that wires 1′ and 2′ have been flattened to a substantially elliptical shape and that their outer surfaces 11′ and 12′ have radii corresponding to the radius of the compression die 9 and larger than the radii of the original round wires 1 and 2. These larger outer surfaces afford more area of working contact when the strand is initially moved across a flat surface of stone and the improved strand 10 will cut efficiently at the start of the sawing operation. It will be noted that the flutes or channels 13 and 14 between the wires are large relative to the working areas 11′ and 12′ and afford very good abrasive carrying qualities.

In order to form a two-wire saw strand of .25″ diameter, the size used most commonly, I prefer to use

a compression die having a diameter of approximately 93% the diameter of the 2-wire strand. However, the diameter of the die may vary between 88% and 98% of the diameter of the strand, depending upon the size and number of wires of saw strand desired.

As an example of my invention, two 0.135″ diameter wires were spirally twisted to form a strand of 0.27″ diameter. This strand was then compressed by a die to form a strand of cross-sectional shape shown in FIGURE 4 and of 0.25″ diameter, a reduction of approximately 7%. This saw strand was made with the lay or twist being reversed every 25 feet in length, and the lay length, the axial pitch or length of one twist, being about 0.9″.

While I have described my invention as embodied in a two-wire strand, the invention is not to be considered as limited to that number of wires.

I claim:

1. A stone saw comprising two wires spirally twisted to form a strand, each of the wires being of substantially elliptical shape in cross-section with a major diameter and a minor diameter, two ends of said minor diameters of said wires being flattened and in contact with each other along the axis of said strand, each of the other ends of said minor diameters of said wires forming an outer surface of said strand, said outer surfaces of each of said wires having a radius equal to the radius of the strand.

2. A stone sawing implement comprising a pair of wires twisted together, each of said wires being substantially ovaliform in cross section, with their major axes extending transverse to the longitudinal axis of the pair of wires, the inner peripheries being substantially flat and parallel to the said major axes, the peripheries adjacent the inner peripheries defining substantial areas for the carrying of water and abrasives.

3. A stone sawing implement comprising two wires only, the wires being twisted together longitudinally to form a strand, each of said wires having at any cross section thereof a substantially ovaliform shape with its major axis parallel to the major axis of the other, the innermost peripheries of the wires being flat and touching each other throughout the length of each inner periphery, the outermost peripheries of said wires being arcuate and lying on the arc of a common circle, the diameter of said circle being smaller than the sum of two second diameters, each of the second diameters being the diameter of a wire of circular cross section having the same areas as each of said wires of the strand, and the transverse peripheries adjacent the inner peripheries defining a recess of substantial area for carrying water and abrasives.

4. A stone sawing implement comprising two wires only, the wires being twisted together longitudinally to form a strand, each of said wires having at any cross section thereof a substantially ovaliform shape with its major axis parallel to the major axis of the other, and its minor axis perpendicular to its major axis, the said ovaliform shape being symmetrical about its minor axis, the innermost peripheries of the wires being flat and touching each other throughout the length of each inner periphery, the outermost peripheries of said wires being arcuate and lying on the arc of a common circle, the diameter of said circle being smaller than the sum of two second diameters, each of the second diameters being the diameter of a wire of circular cross section having the same area as each of said wires of the strand, and the transverse peripheries adjacent the inner peripheries defining a recess of substantial area for carrying water and abrasives.

5. A wire stone sawing strand comprising two wires stranded together with relatively deep spiral channels

between adjacent wires on the outer periphery of the strand, a cross section of each wire taken in a plane normal to the longitudinal axis of the strand being non-circular and including a substantially circular outer portion having its center essentially on the longitudinal axis of said strand, a flat inner portion at the line of contact with the other wire in the strand, and convex arcuate portions of substantial length connecting the circular and flat portions, said convex arcuate portions being of greater length than said flat portions, the distance from the bottom of each channel taken on a radius from said longitudinal axis to a circle including said circular outer portions being greater than the length of said flat portions.

6. A method of producing a stone sawing implement comprising the steps of twisting together a pair of wires of circular cross section to form a strand, and then subjecting the twisted wires of the strand to a reshaping operation changing the cross sectional shape of each wire from a circular shape to a substantially ovaliform shape having the same cross sectional area with the major axes of the reshaped wires extending in parallel relation to each other across the longitudinal axis of the strand, the reshaped wires being contiguous with each other, the outer peripheries of said reshaped wires forming cutting surfaces.

7. A method of producing a stone sawing implement comprising the steps of twisting together a pair of wires of circular cross section to form a strand, and then drawing the strand through a circular die, the diameter of

which is less than the sum of the diameters of the wires of circular cross section to change the cross sectional shape of each wire from a circular shape to a substantially ovaliform shape having the same cross sectional area such that the major axes of the reshaped wires extend in parallel relation to each other across the longitudinal axis of the strand, the reshaped wires being contiguous with each other, the outer peripheries of said reshaped wires forming cutting surfaces, the diameter of said die being such that substantial recessed areas spiralling between the wires are retained.

References Cited by the Examiner

UNITED STATES PATENTS

251,114	12/1881	Hallidie	205—16.2
2,156,652	5/1939	Harris	125—21
2,856,914	10/1958	Dessureau	125—21
2,876,761	3/1959	Stevens	125—21
2,884,692	5/1959	Haase et al.	57—156

FOREIGN PATENTS

665,719	10/1938	Germany.
14,121	8/1891	Great Britain.

MERVIN STEIN, *Primary Examiner.*

RUSSEL C. MADER, FRANK E. BAILEY, FRANK T. BURROUGH, *Examiners.*

J. E. PEELE, *Assistant Examiner.*