PATENT SPECIFICATION

Application Date: Sept. 30, 1933. No. 26965/33. **426,556**

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PROVISIONAL SPECIFICATION

Improvements relating to Securing Boxes, Bales and the like

We, GERRARD INDUSTRIES LIMITED, of Victoria House, Vernon Place, Southampton Row, London, W.C.1, a British company, do hereby declare the nature of this invention, which has been communicated to us by Meto G.m.b.H., of 350, Vogelsangerstrasse, Koln - Bickendorf, Germany, a German company, to be as follows:—

This invention relates to securing boxes, bales and the like.

There are in general two main methods at present employed for this purpose. In one of these flat steel band is used and the ends are secured by various forms of sleeve or by interlocking them by crimping or deforming the edges. In the other round steel wire is employed and probably the best known method of joining the ends is by means of a machine in which the overlapping parts of the wires are rotated about one another to form intertwisted portions in one or more of which the twist or multiple helix formed by the interlocked separate helices is right handed and in one or more of which it is left handed. Commonly the ends of the overlapping portions of the wires are held and a slotted pinion is employed at the centre to form the twists which thus comprise a pair of double helices.

The present invention is concerned with an intertwisted joint and differs from the known joints of this type in that the wire employed is of flattened or oval section and is thus more easily bent round by the twisting action to form the helices owing to the reduced resistance to bending relatively to tensile strength: further the joint lies flatter on the box or the like making it less vulnerable to damage by projecting nails and so-forth when the case is moved about. The fact of the wire having a tendency to remain flat on the box or the like combined with the relatively greater effort required to twist transversely a portion of flattened wire formed as a helix about a point near one edge, as compared with rolling a portion of a circular wire helix out from behind the adjacent turn, makes the improved joint somewhat different in its characteristics from the known joints: moreover the reduced strain imposed upon the wire in forming the joint enables a wire with a considerably less elongation and higher tensile strength to be used than is the case with round wire; it being understood of course, that the harder wire is considerably cheaper to produce than the high tensile soft wire.

In a typical manner of carrying out the invention a tie is formed of wire having a more or less oval cross section of which the major axis is in the neighbourhood of one and a half to twice the length of the minor axis. To make a joint the tie is placed about the box or the like with sufficient overlap for the formation of the joint.

One end of a tie cut to length may be notched or bent to form a shoulder for holding it by simply placing it in a slot or it may be otherwise held or gripped: or the wire from which the tie is to be formed may be drawn from a reel and cut to length at any convenient later stage of the operation. The wire may in fact be employed in the same manner as round wire in any appropriate machine proposed for use with round wire. The two overlapping portions of the wire are laid flat in the machine one behind the other and after tensioning the tie the twisting pinion is rotated and the knot formed.

In the completed knot the lengths which lay in the twisting pinion preferably still lie nearly flatwise beside one another (more or less according to the accuracy with which they fit the slot of the pinion) and the twisted portions are of little if any greater diameter than the major axis of the wire.

Dated the 30th day of September, 1933.

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[*Price* 1/-]

COMPLETE SPECIFICATION

Improvements relating to Securing Boxes, Bales and the like

We, GERRARD INDUSTRIES LIMITED, of Victoria House, Vernon Place, Southampton Row, London, W.C.1, a British company, do hereby declare the nature of this invention, which has been communicated to us by Meto G.m.b.H., of 350, Vogelsangerstrasse, Koln - Bickendorf, Germany, a German company, and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

This invention relates to securing boxes, bales and the like.

There are in general two main methods at present employed for this purpose. In one of these flat steel band is used and the ends are secured by various forms of sleeve or by interlocking them by crimping or deforming the edges. In the other round steel wire is employed and probably the best known method of joining the ends is by means of a machine in which the overlapping parts of the wires are rotated about one another to form intertwisted portions in one or more of which the twist or multiple helix formed by the interlocked separate helices is right handed and in one or more of which it is left handed. Commonly the ends of the overlapping portions of the wires are held and a slotted pinion is employed at the centre to form the twists which thus comprise a pair of double helices.

The present invention is concerned with an intertwisted joint. The wire used in making this form of joint for practical purposes has always been somewhat soft. To make a satisfactory 3-twist joint (that is to say a joint in which each of the twists represents nearly three revolutions of one end relatively to the other) it is usual to use a wire with considerable power of elongation before fracture so as to enable the wire to be twisted, without breaking, into a helix of sufficiently short pitch for the three twists to have a satisfactory holding action. In the case of the smaller round wires of 19 gauge to 17 gauge an elongation of about 8% to 14% is the minimum recommended with a view to giving a reasonable certainty of making a satisfactory joint, while an elongation of 15% to 24% is recommended in the case of the larger round wires of from 13 gauge up to 8 gauge.

An object of the present invention is to obtain a considerably more economical strapping by the use of wire of considerably less elongation and possibly higher tensile strength; or alternatively to make it possible to form a joint with more helices of shorter pitch than when using the round wire hitherto commonly employed.

Both objects can be achieved by the employment of wire of flattened or oval section with the bending mainly transverse to the major axis; and the invention comprises thus forming strapping with an intertwisted multiple helical joint from such wire having an elongation much less than that which would be necessary if round wire giving approximately the same strength of tie were used: the elongation may be not more than half and preferably as little as a quarter of that of round wire for making the equivalent tie: for example even in the largest wires within the normal range of twisted ties the utmost elongation may be not greater than 7% while in wires of the commoner sizes it may preferably be less than 5%; the invention further comprises forming strapping with an intertwisted four or more twist multiple helical joint of pitch not exceeding 3 times the major axis of the oval or flattened wire employed. When using a normal three twist joint the elongation of the wire need not exceed 5% for wires of the same areas as the gauges most commonly employed and may with advantage be very much less for smaller gauges; and even with the four or more twist joint of short pitch helices the elongation can be quite considerably below that of the wire normally employed in the intertwisted type of joint. As a general guide to the most useful limits it may be said that wires of area equivalent to 16 gauge and larger up to 8 gauge will normally have an elongation certainly not exceeding 7% while wires of area equivalent to 16 gauge and smaller (and in most cases all those of area equivalent to 13 gauge or less) will normally have an elongation certainly not exceeding 5%. Even when dealing with those small gauges in which round wire of small elongation can be employed without great risk of fracture (since for small gauges the strain occasioned by twisting is relatively less) a wire of oval or flattened cross section as called for by the present invention is advantageous in that it permits a greater number of twists to be effectively used.

Practical considerations make it desirable to have the major axis of the wire in the neighbourhood of from 1½ to 2½ times the minor axis.

It is found that hard high-tensile unannealed wire of strength equivalent to the normal range of twisted ties but of oval or flattened sections can be quite readily bent round by the twisting action to form the helices owing to the reduced resistance to bending relatively to tensile strength, and is therefore suitable for the purposes of this invention. It will be understood that the harder wire is not only considerably cheaper, but that a smaller section can be used to give an equally effective strapping, thus reducing the weight of wire required.

In a typical manner of carrying out the invention a tie is formed of wire having a more or less oval cross section of which the major axis is in the neighbourhood of one and a half to twice the length of the minor axis. To make a joint the tie is placed about the box or the like with sufficient overlap for the formation of the joint.

One end of a tie cut to length may be notched or bent to form a shoulder for holding it by simply placing it in a slot or it may be otherwise held or gripped; or the wire from which the tie is to be formed may be drawn from a reel and cut to length at any convenient later stage of the operation.

The wire may in fact be employed in the same manner as round wire in any appropriate multiple helix twisting machine proposed for use with round wire, but in some cases modified to make more than three complete rotations.

When used with a twisting pinion type of machine the two longitudinally overlapping portions of the wire are laid flat in the machine one behind the other and after tensioning the tie the twisting pinion is rotated (in some cases more than three times) and the knot formed.

In the completed knot the lengths which lay in the twisting pinion preferably still lie nearly flatwise beside one another (more or less according to the accuracy with which they fit the slot of the pinion) and the twisted portions are of little if any greater diameter than the major axis of the wire.

The invention is illustrated by the accompanying drawings wherein:—

Figure 1 shows a typical joint made in accordance with the invention,

Figure 2 is a cross-section of the twist of Figure 1, and

Figure 3 shows some typical cross-sections of tie wire suitable for use in accordance with the invention.

As shown at Figures 1 and 2 the two lengths 1, 2 of the oval tie wire have been intertwisted by means of holding slots at the ends of the knot and a twisting pinion engaging the centre portions 3 and 4. The lengths of wire are laid one behind the other in the holding slots and the slot of the twisting pinion, the slots all being preferably just an easy fit for the minor axis of the wire. It will be observed that a short pitch 4 twist knot has been formed and that the main bending of the wire to form the twists takes place about the major axis. There is also some transverse deformation of the wire tending to make the helices interfit more closely (see Fig. 2) as they are drawn tightly into one another. Some lateral overlap of the portions 3 and 4 is advantageous rather than otherwise, as it tends to diminish sharp corners, and the extent to which it will take place depends upon the section employed and the fit in the slot of the twisting pinion.

Various known sections of wire may be used for carrying out the invention and no claim is made for the wire itself except when used in making the improved intertwisted strapping.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A box or bale strapping comprising a length of wire of more or less oval or flattened cross-section, of major axis 1½ to 2½ times the minor axis surrounding the box or bale and with its ends united by a multiple helix joint in which the bending to form the coils is mainly transverse to the major axis, the wire having an elongation not greater than 5%.

2. A box or bale strapping according to Claim 1, the wire being unannealed.

3. An intertwisted multiple helix tie joint formed from wire of more or less oval or flattened cross-section of major axis 1½ to 2½ times the minor axis bent mainly transversely to the major axis wherein a four or more twist joint of pitch not exceeding 3 times the major axis of the wire is employed, and the wire is unannealed.

4. An intertwisted multiple helix tie joint formed from wire of more or less oval or flattened cross-section having its major axis 1½ to 2½ times the minor axis, the bending of the wire being mainly transverse to the major axis and wherein the wire has an elongation not exceeding one half of the minimum recommended as set forth in the description for round wire giving approximately the same strength of tie.

Practical considerations make it desirable to have the major axis of the wire in the neighbourhood of from 1½ to 2½ times the minor axis.

It is found that hard high-tensile unannealed wire of strength equivalent to the normal range of twisted ties but of oval or flattened sections can be quite readily bent round by the twisting action to form the helices owing to the reduced resistance to bending relatively to tensile strength, and is therefore suitable for the purposes of this invention. It will be understood that the harder wire is not only considerably cheaper, but that a smaller section can be used to give an equally effective strapping, thus reducing the weight of wire required.

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The wire may in fact be employed in the same manner as round wire in any appropriate multiple helix twisting machine proposed for use with round wire, but in some cases modified to make more than three complete rotations.

When used with a twisting pinion type of machine the two longitudinally overlapping portions of the wire are laid flat in the machine one behind the other and after tensioning the tie the twisting pinion is rotated (in some cases more than three times) and the knot formed.

In the completed knot the lengths which lay in the twisting pinion preferably still lie nearly flatwise beside one another (more or less according to the accuracy with which they fit the slot of the pinion) and the twisted portions are of little if any greater diameter than the major axis of the wire.

The invention is illustrated by the accompanying drawings wherein:—

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Figure 3 shows some typical cross-sections of tie wire suitable for use in accordance with the invention.

As shown at Figures 1 and 2 the two lengths 1, 2 of the oval tie wire have been intertwisted by means of holding slots at the ends of the knot and a twisting pinion engaging the centre portions 3 and 4. The lengths of wire are laid one behind the other in the holding slots and the slot of the twisting pinion, the slots all being preferably just an easy fit for the minor axis of the wire. It will be observed that a short pitch 4 twist knot has been formed and that the main bending of the wire to form the twists takes place about the major axis. There is also some transverse deformation of the wire tending to make the helices interfit more closely (see Fig. 2) as they are drawn tightly into one another. Some lateral overlap of the portions 3 and 4 is advantageous rather than otherwise, as it tends to diminish sharp corners, and the extent to which it will take place depends upon the section employed and the fit in the slot of the twisting pinion.

Various known sections of wire may be used for carrying out the invention and no claim is made for the wire itself except when used in making the improved intertwisted strapping.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A box or bale strapping comprising a length of wire of more or less oval or flattened cross-section, of major axis 1½ to 2½ times the minor axis surrounding the box or bale and with its ends united by a multiple helix joint in which the bending to form the coils is mainly transverse to the major axis, the wire having an elongation not greater than 5%.

2. A box or bale strapping according to Claim 1, the wire being unannealed.

3. An intertwisted multiple helix tie joint formed from wire of more or less oval or flattened cross-section of major axis 1½ to 2½ times the minor axis bent mainly transversely to the major axis wherein a four or more twist joint of pitch not exceeding 3 times the major axis of the wire is employed, and the wire is unannealed.

4. An intertwisted multiple helix tie joint formed from wire of more or less oval or flattened cross-section having its major axis 1½ to 2½ times the minor axis, the bending of the wire being mainly transverse to the major axis and wherein the wire has an elongation not exceeding one half of the minimum recommended as set forth in the description for round wire giving approximately the same strength of tie.

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5. An intertwisted multiple helix tie joint according to Claim 4 and having four or more twists.

6. The employment for forming an intertwisted multiple helical joint in which the bending to form the coils is mainly transverse to the major axis of wire of oval or flattened cross-section having its major axis 1½ to 2½ times its minor axis and an elongation not exceeding one half of that recommended for round wire to make a tie of approximately the same strength.

7. The employment for forming an intertwisted multiple helical joint in which the bending to form the coils is mainly tranverse to the major axis of unannealed wire of oval or flattened cross-section having its major axis 1½ to 2½ times its minor axis.

8. The use for strapping boxes bales or the like of a wire tying machine of the slotted twisting pinion type with an oval or flattened wire of area equivalent to that of a round wire between 16 gauge and 8 gauge, of elongation not exceeding 7% and having its minor axis an easy fit in the slot of the twisting pinion.

9. The use for strapping boxes bales or the like of a wire tying machine of the slotted twisting pinion type with an oval or flattened wire of area equivalent to that of a round wire of 13 gauge or less, of elongation not exceeding 5% and having its minor axis an easy fit in the slot of the twisting pinion.

10. The use for strapping boxes bales or the like of a tie wire of oval or flattened section in a wire tying machine of the slotted pinion type adapted to give more than three complete revolutions of the pinion the latter being so arranged as to engage two longitudinally overlapping lengths of the wire, in such manner that after twisting there is some lateral overlap of the portions within the pinion.

11. The improved strapping having the qualities set forth and secured substantially as described with reference to the accompanying drawings.

Dated the 27th day of July, 1934.

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