

[54] **APPARATUS FOR JOINING
TOGETHER TWO CONTINUOUS
STRANDS**

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[58] Field of Search.....57/3, 6, 10, 11,
57/17, 18, 22, 160

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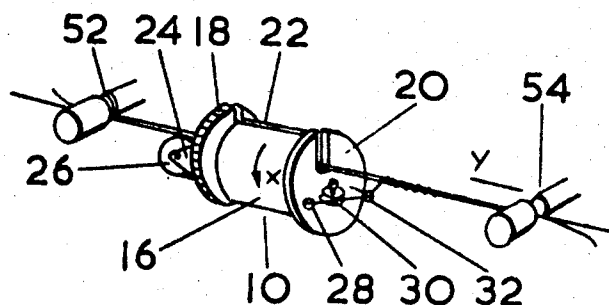
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[57] **ABSTRACT**

Apparatus for wrapping a thread about the overlapping portion of two continuous strands, e.g. two macrofil tire yarns, to form a joint, wherein a thread supply means is movable in a rotary path about the overlapping portion of the strands by a first drive means, and a second drive means is operable to impart relative movement between the overlapping portion of the strands and the thread supply means longitudinally of the strands.

3 Claims, 7 Drawing Figures



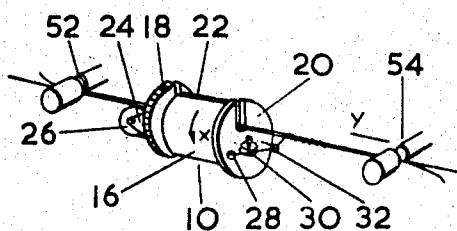


Fig. 1

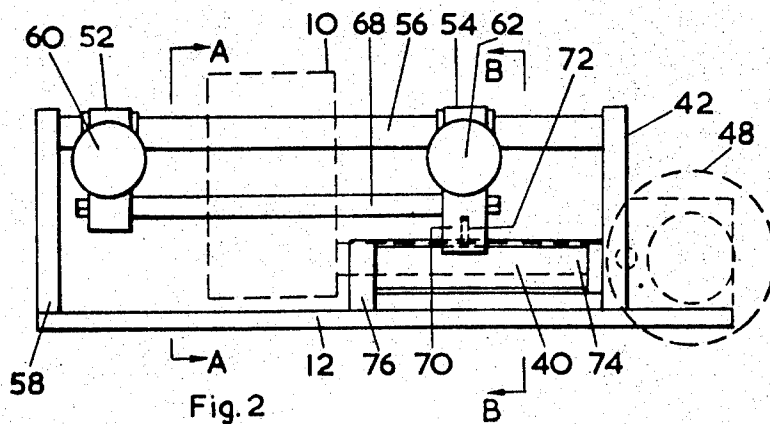


Fig. 2

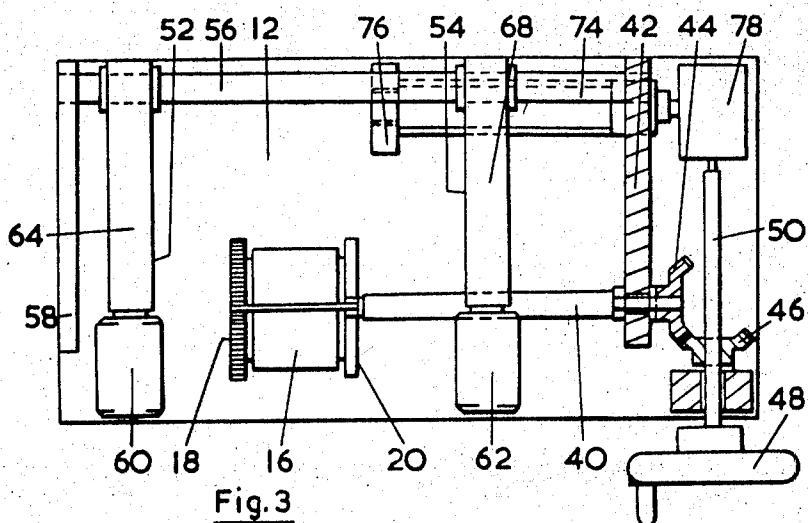


Fig. 3

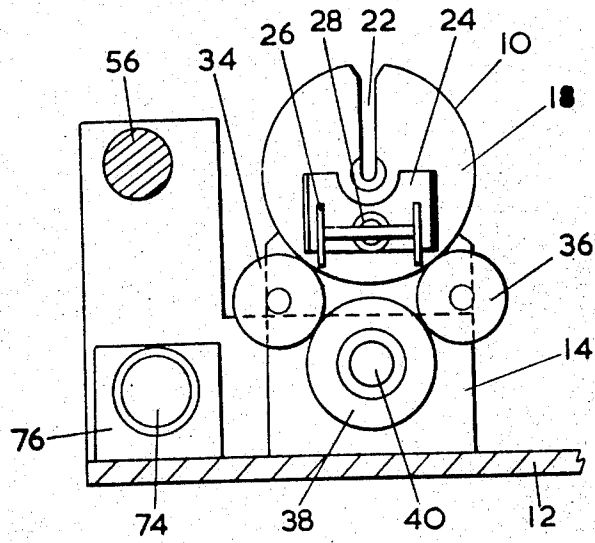


Fig. 4

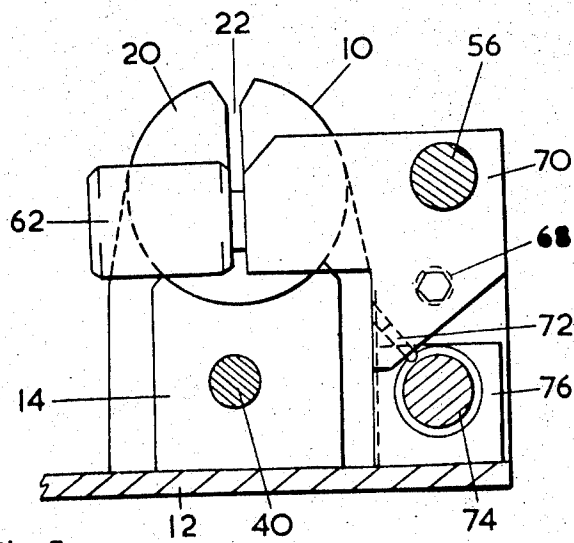


Fig. 5

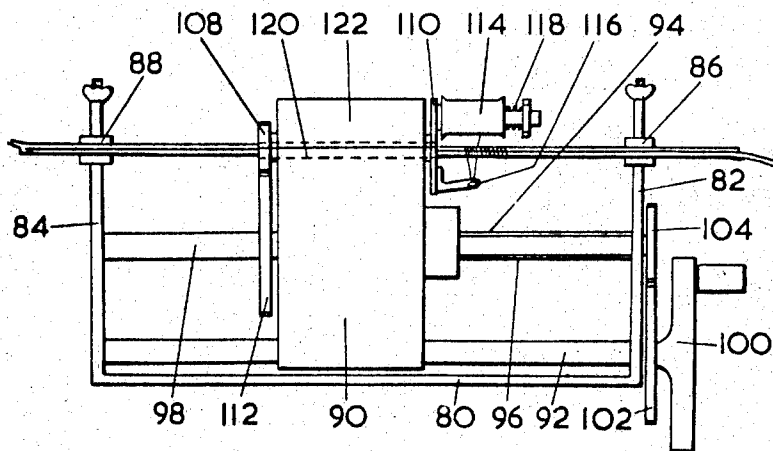


Fig. 6

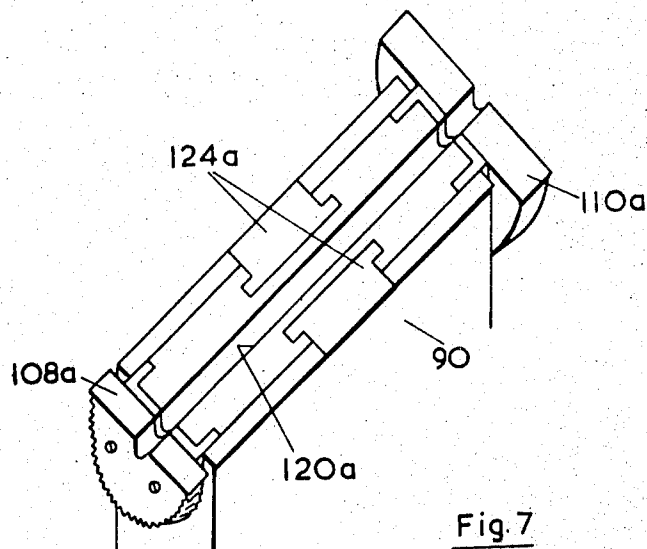


Fig. 7

APPARATUS FOR JOINING TOGETHER TWO CONTINUOUS STRANDS

The present invention relates to apparatus for wrapping a thread about the overlapping portion of two continuous strands arranged in overlapping engagement.

By the expression "two continuous strands" is meant two monofilaments, or two yarns composed of monofilaments, or two multifilament yarns.

By "overlapping engagement" is meant that the end portions of the strands are arranged in a side-by-side overlapping relationship and, if desired, have a low level of twist imparted thereto. Alternatively, in the case when the strands are composed of monofilament and multifilament yarns, the monofilaments or filaments at the end portions of each yarn may be intermingled together to provide overlapping engagement.

According to the present invention, apparatus for wrapping a thread about the overlapping portion of two continuous strands arranged in overlapping engagement, comprises:

- a. means for securely holding the overlapping portion of the strands and maintaining the overlapping portion under tension;
- b. thread supply means;
- c. first drive means operable to move the thread supply means in a rotary path about the axis of the overlapping portion of the strands; and
- d. second drive means operable to effect relative movement between the overlapping portion of the strands and the thread supply means in the direction of the axis of the overlapping portion of the strands.

In a modification of the apparatus of the invention, the first drive means is operable to effect a rotary motion to the means for securely holding the overlapping portion of the strands, whereby said overlapping portion is rotated about its axis, and the thread supply means is maintained in a stationary position.

Preferably, the overlapping portion of the strands is securely held and maintained under tension by a pair of spaced-apart, screw clamps.

The thread supply means is preferably a bobbin of thread which is freely rotatably mounted on the apparatus so that the thread may be readily unwound therefrom.

Advantageously, the first and second drive means are synchronized and may be driven, for example, by manual or electrical operation.

The invention will be further described by way of example with reference to the accompanying drawings, wherein:

FIG. 1 is an isometric view of a preferred embodiment of an apparatus according to the invention, from which parts have been omitted for convenience;

FIG. 2 is a longitudinal side elevation of the apparatus of FIG. 1;

FIG. 3 is a plan view, partially in section, of the apparatus of FIG. 2;

FIG. 4 is a sectional view along the line A — A of FIG. 2;

FIG. 5 is a sectional view along the line B — B of FIG. 2;

FIG. 6 is a longitudinal side elevation of an alternative embodiment of the apparatus according to the invention; and

FIG. 7 is a perspective view of part of the apparatus of FIG. 6.

Referring to FIGS. 1 to 5 of the accompanying drawings, an apparatus according to the invention comprises a rotary member, generally designated 10, mounted on a base 12 by means of supports 14. The rotary member 10 comprises a cylindrical element 16 having a toothed gear wheel 18 co-axially and fixedly mounted at one end thereof and an circular plate 20 co-axially and fixedly mounted at the other end thereof. The rotary member 10 has a radially disposed slot 22 extending longitudinally thereof.

The gear wheel 18 carries a support bracket 24 for a bobbin 26, and a bore 28 extends from the bracket 24 and runs longitudinally through the rotary member 10. A pulley guide 30 and an eyelet guide 32 are mounted on the plate 20.

The rotary member 10 is rotated by means of drive imparted thereto through gear wheels 34, 36 from a gear wheel 38 fixed mounted on a rotary drive shaft 40. The drive shaft 40 is journaled in the supports 14 and a support 42 and is caused to rotate by drive transmitted via bevel gear wheels 44 and 46 from manually operable hand wheel 48 mounted on a drive shaft 50.

A pair of clamping members 52 and 54 are slideably mounted by means of bearings on a stationary shaft 56 which is supported at its ends by the support 42 and a support 58. The clamping members 52, 54 having clamping heads 60 and 62 threadably mounted in the horizontally extending limbs 64 and 66, respectively, thereof. A bar 68 is bolted to each clamping member to enable them to move together in unison.

The dependent limp 70 of the clamping member 54 carries a peg 72 which engages in a continuous helical groove in the peripheral surface of a rotatable drive shaft 74. The drive shaft 74 is journaled at one end in the support 42 and at the other end to support 76. The drive shaft is connected through the intermediary of a reduction gear box 78 to the drive shaft 50.

In operation, two continuous strands, for example two 500 denier polyester monofilaments, to be joined are arranged in a side-by-side overlapping relationship. The overlapping portion of the strands is placed in the slot 22 of the rotary member 10 and is clamped under tension by the clamping members 52 and 54. (See FIG. 1). A continuous thread on the bobbin 26 is passed through the bore 28, round the pulley guide 30 and through the eyelet guide 32. The thread is then tied securely to the overlapping portion of the strands at a position adjacent the clamping member 54. The operator then turns the hand wheel 48 which results in rotation of the rotary member 10 about its axis in the direction of the arrow X (FIG. 1) whereupon the thread is wrapped about the overlapping portion of the strands. Simultaneously, rotation of the drive shaft 74 moves the peg 72 and this causes the clamping members 52 and 54 to slide along the shaft 56 in the direction of the arrow Y (FIG. 1). When the clamping members 52 and 54 reach the end of their traverse the operator stops turning the hand wheel, cuts the thread and secures the free end of the thread to the overlapping portion of the strands. The clamping members are returned to their initial position by turning them leftwards (as viewed in FIG. 5) and upwards to disengage the peg 72 from the groove of the drive shaft 74 and then sliding them along the shaft 56. The clamping members are then lowered to re-engage the peg 72.

Referring to FIGS. 6 and 7, an alternative embodiment of the apparatus according to the invention, comprises a base 80 having two upright supports 82, 84 having screw clamping members 86, 88 thereon.

A carriage 90 is slidably mounted on a stationary guide bar 92 which extends between and is fixedly mounted on the supports 82, 84. The carriage 90 threadably receives the threaded portion 94 of a drive shaft 96. The drive shaft 96 is journaled at its ends in the supports 82, 84 and has a plain portion 98. Drive is imparted to the drive shaft 96 from a manually operable hand wheel 100 via gear wheels 102 and 104.

The carriage 90 houses a rotary shaft 106 which, externally of the carriage, is fixedly connected at one end to a gear wheel 108 and at the other end to a circular plate 110. The gear wheel 108 engages with a gear wheel 112 which is mounted on the drive shaft 96 to be rotatable therewith. A bobbin 114 of thread is rotatably mounted on the plate 110 together with a thread guide 116. A spring 118 is provided the bias of which on the bobbin 114 is adjustable to enable the tension in the thread, in operation, to be regulated. A longitudinal bore 120 passes axially through the gear wheel 108, the shaft 106, and the plate 110.

The carriage 90 has a lid 122 which is hinged along a line parallel to the axis of the shaft 106. The assembly of gear wheel 108, the shaft 106 and the plate 110 is split about its common center line so that one half of the assembly is mounted in the lid 122 and the other half is mounted in the lower portion of the carriage 90. FIG. 7 shows the lower half of the assembly when the lid 122 is removed. The half gear wheel 108a and the half plate 110a are keyed to the half shaft 106a, the latter being held in position by bearings 124a.

A spring catch (not shown) is used to hold the lid firmly in the closed position.

In operation, two strands arranged in side-by-side overlapping relationship are laid along the half bore 120a (FIG. 7) when the lid 122 is in its open position, and are held under tension by the clamping members

86, 88. The lid 122 is then closed and the spring catch applied.

Thread from the bobbin 114 is passed through the guide 116 and secured to the overlapping portion of the strands. Manual operation of the hand wheel effects rotation of the plate 110 whereupon the bobbin 114 rotates and wraps the thread about the strands. Simultaneously, the carriage 90 is moved leftwards (as viewed in FIG. 6) along the guide bar 92. At the end of the carriage's traverse the thread is cut by the operator and secured to the strands.

If desired, the apparatus of the invention may be driven other than by manual operation, for example it may be driven electrically.

What we claim is:

1. Apparatus for wrapping a thread about the overlapping portion of two continuous strands arranged in overlapping engagement, comprising:

a. means for securely holding the overlapping portion of the strands and maintaining the overlapping portion under tension;

b. thread supply means,

c. first drive means operable to effect a rotary motion to the means for securely holding the overlapping portion strands, whereby said overlapping portion is rotated about its axis, and the thread supply means being maintained in a stationary position, and

d. second drive means operable to effect relative movement between the overlapping portion of the strands and the thread supply means in the direction of the axis of the overlapping portion of the strands.

2. Apparatus according to claim 1, wherein the thread supply means is a bobbin of thread which is freely rotatably mounted on the apparatus so that the thread may be readily unwound therefrom.

3. Apparatus according to claim 1, wherein a pair of spaced-apart, screw clamps constitute the means for securely holding the overlapping portion of the strands.

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