PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION

Improvements relating to Wire-tying Machines

We, GERRARD INDUSTRIES LIMITED, a British company, and HAROLD JOHN TAPLIN, a British subject, both of Harlequin Avenue, Great West Road, Brentford, Middlesex, do hereby declare the nature of this invention to be as follows :—

This invention relates to wire-tying machines of the portable hand-operated type : more especially it is concerned with machines making helical intertwisted joints.

The commonest forms of machine making this type of joint have a lever for applying the initial tension and a second lever or crank for rotating a twisting pinion to form the joint and for cutting off the wire outside the joint. Where a lever, rather than a crank, is used for twisting, the twisting lever may be connected to the twisting pinion by a pawl and ratchet forming a unidirectional coupling, so that successive throws with intervening idle strokes are used during the twisting operation.

In other arrangements a single throw of the lever is arranged to produce the required number of rotations of the twisting pinion.

With the ordinary three-twist joint, in which a central pinion between a pair of holding slots is so geared that it makes three complete revolutions plus a small overtwist, the single throw arrangement is satisfactory when using the smaller gauges of wire commonly employed.

The present invention is more especially intended to be used for making joints of four or more twists, and in machines according to the invention the work of twisting is performed during both forward and reverse strokes of a twisting lever. In this way it is possible for an operator to make a four-twist-joint with less intensity of effort than that required to make a corresponding three-twist joint in one throw. At the same time, fewer movements are needed than would be needed with alternate idle throws as in other previous proposals.

In an arrangement in accordance with the invention, reversing gears may be used, so that both strokes may be applied to rotating one or more pinions in the same direction ; clearly the exact arrangement will depend upon the form of knot to be made, the idea being to divide up the work to be done in twisting (or in other cases in bending the wires of flattening the joint) the wires between the forward and reverse strokes.

Further, the lever may be geared with a second lever so that one moves forward as the other moves backward, and both hands can thus be applied to the work, and the tendency to push the machine about bodily more easily controlled. The same lever or pair of levers may also be used both for tensioning and twisting, bending or crushing if desired, by incorporating a clutch which can be used to transfer the driving connection, either under the control of the operator or automatically when a predetermined tension has been reached.

Dated the 18th day of August, 1937.

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COMPLETE SPECIFICATION

Improvements relating to Wire-tying Machines

We, GERRARD INDUSTRIES LIMITED, a British company, and HAROLD JOHN TAPLIN, a British subject, both of Harlequin Avenue, Great West Road, Brentford, Middlesex, do hereby declare the nature of this invention 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 wire-tying machines of the portable hand-operated type for making helical inter-twisted wire

joints.

The commonest forms of machine making this type of joint have a lever for applying the initial tension (the initial operation) and a second lever or crank for rotating a twisting pinion to form the joint (the joint forming operation) and often for cutting off the wire outside the joint. Where an oscillating lever, rather than a rotatable crank, is used for twisting, the twisting lever may be connected to the twisting pinion by a pawl and ratchet forming a unidirectional coupling, so that successive throws with intervening idle strokes are used during the twisting operation.

In other known arrangements a single throw of the lever is arranged to produce the required number of rotations of the twisting pinion. In still others rotation of a shaft by means of a crank in one direction operates through one unidirectional coupling to put the initial tension on the tie and rotation in the other direction performs the joint-forming operation through another unidirectional coupling.

The use of to-and-fro oscillations of a lever or like member for the joint-forming operation is preferred by operators to rotating a crank, but possesses the disadvantage that there is, in existing machines essentially an idle alternate stroke if more than one stroke (a single-throw arrangement) is to be used in the actual performance of the operation.

With the ordinary three-twist joint, in which a central pinion between a pair of holding slots is so geared that it makes three complete revolutions plus a small overtwist, the single-throw arrangement is satisfactory when using the smaller gauges of wire commonly employed.

The present invention is more especially intended to be used with the larger gauges of wire or for making four or more twists, and in machines according to the invention the work of twisting is performed during both forward and reverse strokes of a twisting lever. The lever is so connected to the twisting pinion as to rotate it in the same direction during both forward and reverse throws, the connection during one throw being through reversing gearing.

In the complete specification of our co-pending application No. 5917/36, (Serial No. 471,159), there is described the first method which we tried of using both strokes of an oscillating lever to effect the twisting operation, according to which we used two separate twisters and operated one on the forward stroke of the lever and the other on the reverse stroke.

Such a method normally results in a knot which includes two portions in which the wires run parallel between twisted portions. The knot formed is thus somewhat longer and uses more wire than the knot formed by the single pinion arrangement.

In order that the nature of the invention may be made clear and that other parts of it may appear, an example of a wire-tying machine in accordance with it will now be described with reference to the accompanying drawings, in which:

Figure 1 is a front elevation of the machine,

Figure 2 is a similar elevation, partly in section, with certain parts omitted, and

Figure 3 is a plan view of the parts shown in Figure 2.

As shown, a slotted twister pinion 2 is provided in driving engagement with a timing gear 51 which is mounted for rotation about the axis of a shaft 7, borne in bearings in members 8 and 9 upstanding from the base 1.

The timing gear 51 is mounted upon and keyed at 64 to a collar 65 of a bevel wheel 54 which is keyed to the shaft 7 at 62. A further bevel wheel 55 is loosely mounted on the shaft 7, and both bevel wheels 54 and 55 engage a small idler bevel wheel 56, the vertical spindle 57 of which is borne in a portion 58 upstanding from the base 1.

An operating lever 4 is freely mounted upon the shaft 7, by a portion 59 which extends between the bevel wheels 54 and 55. The lever 4 carries a pair of pivoted spring-pressed dogs 60 and 61, which are arranged to engage slots or recesses in the peripheral surfaces of the bevel wheels 54 and 55 respectively. These dogs are so formed that, during the forward stroke of the lever 4 from the position shown in plan in Figure 3, the dog 61 drives the bevel wheel 55 through positive engagement with the slot in that wheel, whilst the dog 60 slides out of the slot in the wheel 54, depressing its spring, and rides over the surface of the wheel which is driven through the train 55, 56 and transmits drive to the timing gear 51 through the key 64.

The directions of rotation of the wheels 54 and 55 are opposed, so that, at the conclusion of the forward stroke of 180° revolution of the lever 4, the dog 60 again slips into the slot which it left at the beginning of the stroke. During the return stroke of the lever 4, owing to the shape of the dogs, the dog 60 drives the wheel 54 through positive engagement with the associated slot, whilst the dog 61 leaves the slot which it has previously engaged and slides over the peripheral surface of the wheel 55 to engage the slot again at the completion of the stroke.

Owing to the alternate driving engagement of the lever 4 with the bevel wheels and the provision of the idler wheel 56,

the direction of rotation of the timing gear, and thus of the twisting pinion 2, is constant.

The shaft 7 is also driven in constant direction and, during the return stroke of the lever 4, operates, by means of a cam 45, a wire-severing mechanism 35 which is arranged to sever the outer bight only of the wire.

A spring-pressed plunger 42 is provided in the member 8 to co-operate with a hole 44 in the timing gear 51 to locate the latter at the completion of the return stroke of the operating lever.

In addition to the joint-forming parts already mentioned, the machine comprises means for locating and retaining the wire during the operation of the machine, means for effecting the initial operation of tensioning the wire about the article to be strapped and means for cutting off the end of the wire, as will appear below.

In the use of the machine, the end of a length of wire, drawn, preferably, from a coil, is passed between a pivoted spring-pressed wire-gripper 13 and the associated anvil 14, to abut against a stop-plate 15 and is gripped by the gripper 13. Its end having thus been located and anchored the wire is inserted in the slot of the twister pinion 2 and in the holding slot 16, and is passed round the article which is to be strapped; the portion which then runs across the top of the article from left to right as seen in the drawings, and leads to the free end, or the coil as the case may be, is inserted in the slot of the twister pinion and the holding slot 16, to lie against the bight of wire already in these slots, and between the pivoted spring-pressed wire-grippers 17 and 18 and their associated anvils 19 and 20. A pivoted wire-retaining latch 21 is provided to retain the wire in position during the operation of the machine.

The gripper 18 forms part of the wire-tensioning mechanism and is carried by a member 23 which is slidably mounted on a shaft 24. The member 23 is formed with a helical cam-face 26 and a similar cam-face 27 of opposite hand is formed on a fixed member 28 on which the gripper 17 is pivotally mounted. A member 29, having an operating handle 30, is mounted on the shaft 24 between the cam-faces 26 and 27 and itself has cam-faces 31 and 32 for co-operating with these cam-faces.

A spring 33 mounted on the shaft 24 between the slidable member 23 and a plate 34 tends to urge the member 23 towards the left and to maintain engagement between the respective cam-faces.

It will be seen from Figure 1 that the pivoted grippers 17 and 18 are self-locking to prevent relative movement of the wire in one direction, that is from right to left as seen in the drawings, but will automatically pivot to allow relative movement in the other direction. Thus when the tensioning handle 30 is rotated about the axis of the shaft 24, the cam action of the faces 26 and 31 and 27 and 32 respectively causes the gripper 18 to move to the right, drawing with it the wire which slides between the grippers 17 and anvil 19. Upon the return stroke of the handle 30, the member 23 is returned toward the left by its spring 33, the gripper 18 sliding over the wire, which is held by the gripper 17, to grip it in a fresh place ready for the next operative stroke of the handle 30. The tensioning of the wire about the article can be continued, by repeated strokes of the handle 30, until the desired tension is obtained, this being determined either by the operator or by an automatic clutch inserted between the member 23 and its operating handle 30.

When the tensioning of the wire has been completed, the operator starts the twisting operation by effecting the forward stroke of the lever 4; the operation is completed by effecting the reverse stroke of the lever.

The machine described could be modified by substituting for the lever 4, which oscillates about an axis substantially parallel to the wire upon which the machine is operating, a lever which oscillates about an axis at right-angles thereto.

Thus, the twisting pinion, could be operated by means of a lever arranged to oscillate about an axis running at right-angles to, say, the axis of the shaft 7 and operatively connected, by bevel wheel drive, to a member mounted upon the shaft 7. This member could transmit drive by means of one-way clutch dogs alternatively to the equivalent of the bevel wheels 54 and 55.

In any of the machines described above, including the modification with the lever oscillating in a plane parallel to those of the wire, duplicated operating levers may be employed. Thus, two levers may be geared together to drive the twisting pinion the levers being arranged to oscillate so that one is moving in one direction when the other lever is moving in the opposite direction. With this arrangement, both hands may be applied to the work and the tendency to push the machine about bodily more easily controlled.

The same lever, or pair of inter-geared levers, used during both strokes for twisting may be used also for the preparatory tensioning by incorporating a clutch which can be used to transfer the

driving connection, either under the control of the operator or automatically when a predetermined tension has been reached.

The above specific constructions are described by way of example, and various modifications may be made without departing from the invention.

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 hand-operated strapping machine having an oscillating lever or the like which is operatively connected to rotate a twisting pinion in the same direction during its oscillations in both directions.

2. A hand-operated strapping machine having an oscillating lever or the like which is operatively connected, by uni-directional clutch devices, to rotate a twisting pinion during its oscillations in both directions, the connection during oscillation in one direction being through reversing gearing.

3. A machine as claimed in claim 2 in which two uni-directional clutch devices each connect the lever or the like to a different bevel wheel, the two bevel wheels being in driving engagement with a common idler bevel wheel.

4. A hand-operated strapping machine having an oscillating lever or the like which is operatively connected to a twisting pinion during its oscillations in both directions substantially as described with or without the modifications or alternatives mentioned or as shown upon the accompany drawings.

Dated the 18th day of August, 1937.

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1. A hand-operated strapping machine having an oscillating lever or the like which is operatively connected to rotate a twisting pinion in the same direction during its oscillations in both directions.

2. A hand-operated strapping machine having an oscillating lever or the like which is operatively connected, by uni-directional clutch devices, to rotate a twisting pinion during its oscillations in both directions, the connection during oscillation in one direction being through reversing gearing.

3. A machine as claimed in claim 2 in which two uni-directional clutch devices each connect the lever or the like to a different bevel wheel, the two bevel wheels being in driving engagement with a common idler bevel wheel.

4. A hand-operated strapping machine having an oscillating lever or the like which is operatively connected to a twisting pinion during its oscillations in both directions substantially as described with or without the modifications or alternatives mentioned or as shown upon the accompany drawings.

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