Dec. 12, 1939. T. W. J. WILLCOX 2,183,286

STRAPPING MACHINE

Filed May 18, 1938 2 Sheets-Sheet 1

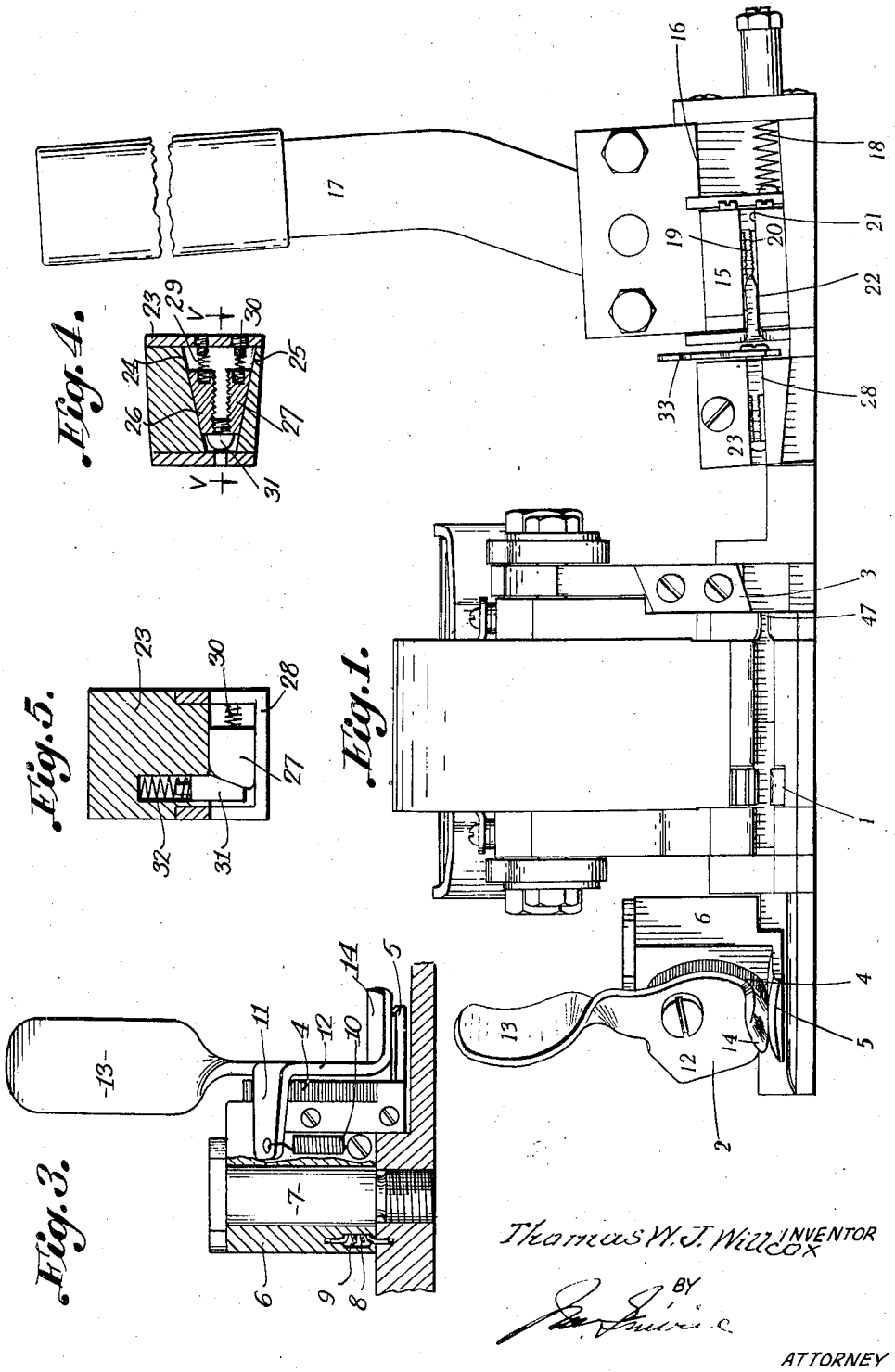

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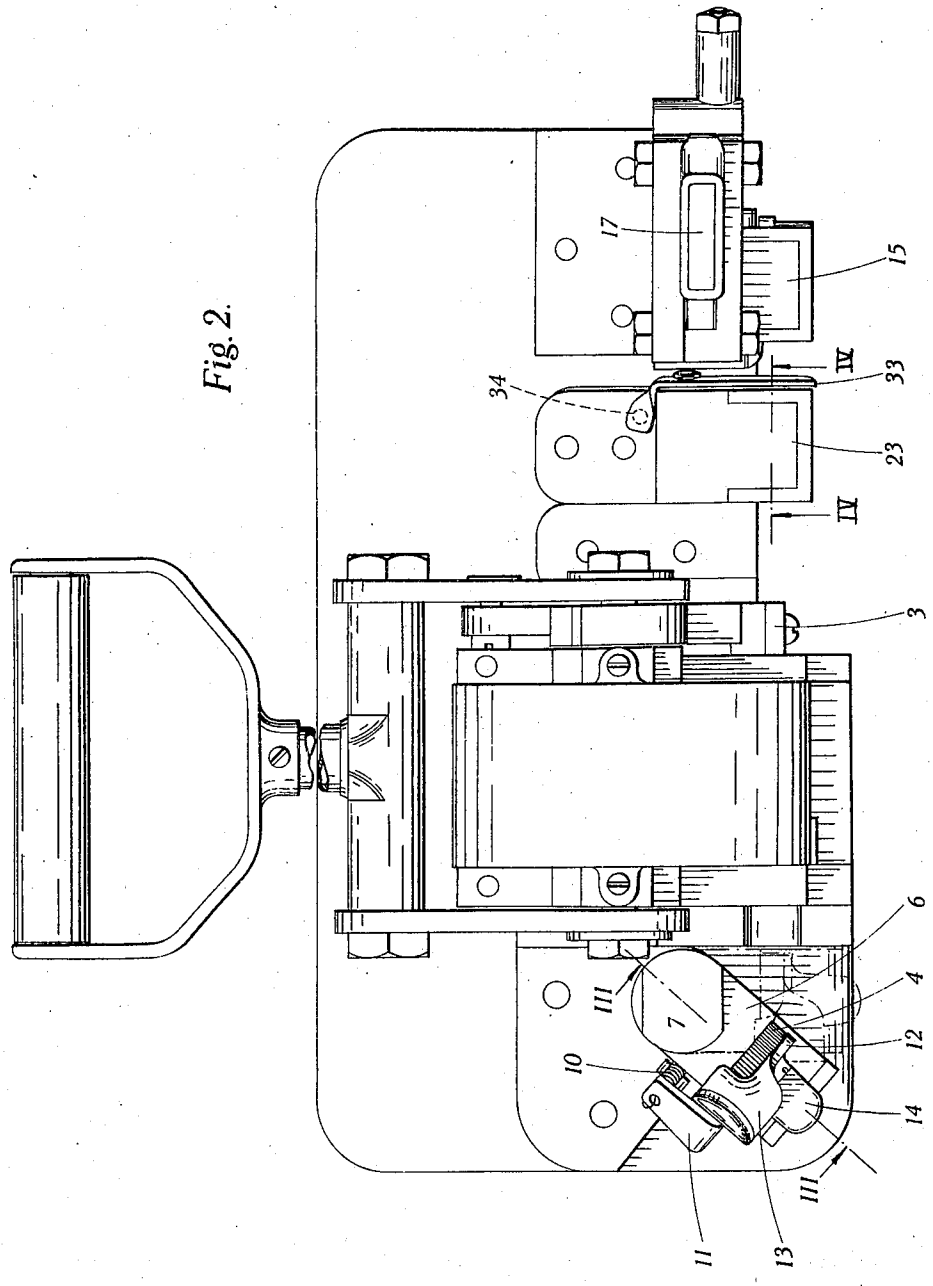
Fig. 2.



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STRAPPING MACHINE

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14 Claims. (Cl. 140—93)

This invention relates to strapping machines and is more specially concerned with the gripping and tensioning of the strapping material used therein.

It is an object of the invention to provide, for gripping one end of a length of strapping material in a strapping machine, a device which is movable from a position in which the insertion of the strapping material is facilitated to a position in which it holds the gripped strapping material in operative relation to the joint-forming mechanism of the machine.

Another object is to provide a gripping device which is mounted upon the base of the machine for pivotal movement about a vertical axis from a position such that the strapping material can be inserted axially from the front of the machine to a position such that the gripped strapping material is properly presented to the joint-forming mechanism.

It is a further object to provide a gripping device comprising a pair of gripping members, the mutual approach of which is prevented by a member which is actuated to release them upon strapping material being inserted between the jaws.

With the above and other objects in view, the invention consists in the improved combinations and arrangements contained in the embodiments now to be described in detail, and features of which are set out in the claims which follow.

In the drawings:

Fig. 1 is a front view of the machine,

Fig. 2 is a plan view of the machine,

Fig. 3 is an elevation of a detail, partly in section on the line III—III of Fig. 2,

Fig. 4 is a section on the line IV—IV of Fig. 2 and,

Fig. 5 is a section on the line V—V of Fig. 4.

The machine has the usual slotted twisting pinion 1 and a gripping device 2 for the free end of the wire is situated on one side of the pinion (on the left as seen in Fig. 1) and a tensioning device on the other side: a wire severing device, including a cutter 3, is provided between the pinion and the tensioning device.

The gripping device 2 for holding the free end of the wire comprises a pivoted gripping member, in the form of an eccentrically mounted wheel 4 with a serrated edge, which is spring-pressed to cause it to tend to pivot to bring its gripping surface into contact with an anvil 5, a portion of the upper surface of which slopes downwardly away from the pinion towards a vertical stop 46 (see Fig. 3).

The anvil is formed integrally with a member 6 which is arranged for limited pivotal movement about a vertical axis and is spring-pressed to pivot away from the pinion. The gripping member 4 is mounted on the member 6, so that, when the member 6 is in the normal position shown in Fig. 1 and in full lines in Fig. 2, the wire which will afterwards run from the gripper to the pinion may be pushed endwise into position from the front of the machine at an angle of about 45° to the pinion axis.

Fig. 3 illustrates the construction of the pivoted member 6 and associated parts. As shown, the member 6 is mounted for pivotal movement about the axis of a bolt 7 and is urged toward its normal position by a spring 8 which is housed in an annular recess 9 in the member 6 and has its opposite ends anchored in holes in the member 6 and the base of the machine respectively.

The spring provided to press the gripper member 4 toward gripping position is shown at 10 with one end secured to the member 6 and its other end secured to a portion 11 projecting rearwardly from a plate 12 which is secured to the front face of the member 4.

The plate 12 has also an upwardly extending portion 13, which acts as a trigger for the release of the wire at the end of the tying operation, and a lower forward projection 14 between which and the anvil 5 the outer bight of wire may pass on its way from the adjacent edge of the package to its second insertion in the slot of the twisting pinion.

The tensioning device comprises a pair of gripping devices, that remote from the twisting pinion being slidable in the longitudinal direction of the wire to apply tension thereto, and the other stationary and capable of holding the wire to maintain the tension during the return stroke of the moving device.

The moving gripping device comprises a member 15 mounted for movement in a slot 16, the axis of which is inclined slightly upwardly with relation to the axis of the twisting pinion, a handle 17 being provided whereby the member 15 may be moved against the action of a spring 18 which tends to return it toward the stationary device.

The movable member 15 has formed within it upper and lower internal surfaces which converge toward the end of the member adjacent to the stationary device. Upper and lower gripping jaws 19 and 20 respectively having correspondingly inclined upper and lower surfaces respec-

tively are arranged to slide in contact with these surfaces and each has a spring urging it toward the stationary device so that the jaws tend to be pushed into mutual contact by the inclined surfaces. The adjacent surfaces of the jaws are serrated.

The jaws are slightly bevelled so that a wire may be easily inserted between them when introduced sideways through a slot 21 provided in the front of the member 15. In order to facilitate the introduction of the wire between the jaws, a fixed cam or projection 22 is provided to engage the jaws when the member 15 is in its normal position, that is its position nearest the stationary device, as constrained by the spring 18; the function of the cam or projection is to cause the jaws to slide relatively to the inclined internal surfaces of the member 15, against the action of their respective springs, to such an extent that they can be forced apart at least to the extent of the smallest dimension of the wire to be inserted. Preferably, the edges of the jaws adjacent to the stationary device are bevelled so that the cam or projection engages between them and forces them apart.

The stationary device comprises a member 23 similar to the member 15 of the movable device and having upper and lower internal surfaces 24 and 25 respectively converging toward the twister pinion; upper and lower jaws 26 and 27, having serrated surfaces between which the wire may be inserted sideways by way of a slot 28 in the front of the member, are arranged to slide against the converging surfaces as in the movable device and are similarly spring-pressed, by springs 29 and 30, so as to tend to approach each other.

In this case the ends of the jaws adjacent to the twisting pinion are inclined in plan as shown in Fig. 5. The springs 29 and 30 normally hold the jaws in contact with the inclined face or taper of a plunger 31 which is mounted in a hole 32 in the back wall of the space in which the jaws are mounted and is spring-pressed so as normally to project toward the front of the machine into the paths of the jaws. The arrangement is such that the jaws are normally held by the plunger in such positions relatively to the surfaces 24 and 25 that their gripping surfaces may be easily forced apart to a distance greater than the minimum dimension of the wire.

In the use of the machine, the operator pushes the end of a wire drawn from a coil between the anvil 5 and the left hand gripping member 4, the latter pivoting as required against the action of the spring 10, until the end of the wire contacts the stop 46.

The end of the wire is now held fast by the gripping device, any tendency of the wire to move in the direction of withdrawal causing the gripping member to pivot to grip it more tightly, and the operator places the adjacent portion of the wire in the slot of the twisting pinion and passes the wire through a holding slot 47 and round the package or the like to be tied: when he pulls the wire tight the member carrying the gripping member and anvil is caused to pivot about its vertical axis, to take up the position shown in dotted lines in Fig. 2, so that the wire gripped therein comes into line with the slot in the pinion. The arrangement is such that, when the gripping device is in this position the outer, that is the forward, edge of the gripping member is situated substantially in the vertical plane passing through the axis of the pinion with the result that a properly gripped wire is correctly positioned in the slot of the twisting pinion.

The gripped portion of the wire, more-over, takes up a position appropriate to define the end of the knot, that is to say, it comes to lie as far to the left of the pinion as the holding slot 47, which defines the other end of the knot, lies to the right. The pivotal arrangement of the gripper thus not only facilitates the insertion of the wire but also makes it possible, without waste of wire, to insert a wire axially into a gripper which defines one end of the knot.

The wire is then passed under the members 15 and 23 of the tensioning device, round the package and between the anvil 5 and projection 14 of the plate 12, to be inserted a second time into the slot of the twisting pinion and into the slot 47.

The portion of the wire between the slot 47 and the coil is then pressed sideways through the slots 28 and 21 of the members 23 and 15, the pressure on the plunger 31 pushing it out of the paths of the jaws 26 and 27, which are thus allowed to slide along the inclined surfaces, under the action of their springs, to grip the wire tightly and prevent any backward movement of the wire during the return movement of the movable gripper of the tensioning device.

Various other arrangements operable by the wire could be used to keep the jaws 26 and 27 open and prevent them from gripping the wire until the latter has been fully inserted between them.

A wire-retaining hook 33 is provided between the movable and stationary grippers of the tensioning device and has an inclined face upon which the wire operates, when pushed sideways to enter the slots 21 and 28, to cause it to pivot, against the action of a spring indicated in dotted lines at 34 in Fig. 2, to allow the wire to pass behind its hook portion.

At the completion of the tying operation, when the wire has been severed adjacent to the twisted knot, the end of the wire coming from the coil can be easily removed from the machine, without any necessity to raise the wire-retaining hook, by pulling it toward the coil, when it will be able to slide freely between the jaws of the movable and stationary gripping devices. The end portion of the wire will be found to be free of any serious damage by the tensioning device and ready for insertion in the pivoting gripper device at the beginning of the next tying operation.

The end of the knot on the left hand side of the twisting pinion is defined by the anvil 5, in conjunction with the gripping member 4 and the plate 12, whilst a holding slot 47 is provided for defining the end of the knot on the right of the pinion.

The advantage of the pivoted gripping device is especially apparent when oval or flat strapping material is used: such material can be bent about its major axis only with difficulty so that it is not possible to resort to the expedients ordinarily employed for facilitating the axial insertion of a round wire, such as arranging the gripping device with the opening between its gripping surfaces permanently inclined at an acute angle to the front of the machine, the wire being bent after insertion to bring it into operative relation with the joint-making mechanism.

It is to be understood that a specific form of apparatus has been described above by way of example and that various modifications may be made without departing from the invention.

I claim:

1. A gripping device for forming part of a strapping machine of the type comprising joint forming mechanism for joining overlapping portions of a length of strapping material, said gripping device serving to hold one end of a length of strapping material and being mounted for movement from a normal position to provide for insertion of the end of the strapping material endwise in a direction inclined to that of the strapping material when in normal position in the strapping machine, to an operative position to place the strapping material in line with the joint forming mechanism of the machine, the change in position of the gripping device from the normal position for the insertion of the material to the operative position of the material in line with the joint forming mechanism being secured by the action of drawing the material round and pushing it in position in the joint forming mechanism in a direction transverse to its longitudinal axis.

2. A gripping device for holding the end of a length of strapping material in a strapping machine, said gripping device being conveniently movable from a forwardly facing normal position to provide for the ready insertion of the strapping material endwise from the front of the machine to a final operative position in which the longitudinal axis of the material runs straight to the joint forming mechanism of the strapping machine, the change in position of the gripping device from a normal to an operative position by moving the strapping material beyond the gripping device toward and pushing it into operative position in the strapping machine.

3. A construction as defined in claim 1, including a stop for limiting the endwise insertion of the strapping material.

4. A construction as defined in claim 1, wherein the direction of insertion of the strapping material when the gripping device is in normal position is inclined at approximately 45° to the direction of the strapping material when the gripping device is in operative position.

5. A construction as defined in claim 1, wherein means are provided to influence the gripping device to movement from the operative to the normal position.

6. A strapping machine including a base member, joint-forming mechanism for joining the overlapping portions of a length of strapping material and a gripping device for holding one end of the strapping material pivotally mounted upon said base member and comprising an anvil member, a gripping member, means for urging said gripping member toward said anvil member, and a stop member for limiting the axial insertion of strapping material between said anvil member and said gripping member.

7. A strapping machine including a base member, joint-forming mechanism for joining the overlapping portions of a length of strapping material and a gripping device for holding one end of the strapping material pivotally mounted upon said base member and comprising a gripping member with a serrated edge, a plate secured to the front of said gripping member and having a forwardly projecting portion for setting a limit to the upward movement of a second bight of the strapping material and an anvil member beneath said gripping member and said forwardly projecting portion of said plate.

8. In a strapping machine, a device for gripping strapping material comprising a pair of mutually inclined surfaces a pair of jaws mounted between said surfaces, spring means urging said jaws to move along said mutually inclined surfaces in the direction to cause them to approach each other, a member mounted for sliding movement in a direction at right angles to the direction in which said jaws are urged to move by said spring means, a spring tending to urge said member into the path of said jaws, said member and said jaws having co-operating inclined surfaces which come into mutual contact when said member is in the path of said jaws.

9. In a strapping machine, a tensioning device for strapping material comprising a stationary gripping device and a movable gripping device, said movable gripping device comprising a gripping member, a second gripping member, spring means urging said second gripping member to approach said first gripping member and a member operable to prevent said second gripping member from approaching said first gripping member as said movable gripping device reaches the end of its travel in the direction toward said stationary gripping device.

10. In a strapping machine, a tensioning device for strapping material comprising a stationary gripping device and a movable gripping device, said movable gripping device comprising a pair of mutually inclined surfaces which incline toward each other in the direction toward said stationary gripping device, a pair of gripping jaws mounted between said surfaces, spring means tending to urge said jaws to move along said inclined surfaces in the direction toward said stationary gripping device, and a member which engages said jaws as said movable gripping device reaches the end of its travel in the direction toward said stationary gripping device and acts upon them to oppose the action of said spring means.

11. In a strapping machine, a tensioning device as claimed in claim 10, said member which engages said jaws being a cam member which spreads said jaws apart.

12. A strapping machine comprising joint-forming mechanism for joining the overlapping portions of a length of strapping material and a tensioning device for tensioning the strapping material, said tensioning device comprising a stationary gripping device and a movable gripping device, said stationary gripping device comprising a pair of gripping jaws and a member arranged to keep said jaws apart until released by the insertion of strapping material between said jaws from the front of the machine in a direction transverse to its longitudinal axis, said movable gripping device comprising a pair of gripping members and a member arranged to engage said gripping members and spread them apart as said movable gripping device reaches the end of its travel in the direction toward said stationary gripping device.

13. A strapping machine comprising joint-forming mechanism for joining overlapping portions of a length of strapping material, a gripping device situated on one side of said joint-forming mechanism and mounted for pivotal movement about a vertical axis, and a gripping device mounted on the other side of said joint-forming mechanism and comprising a pair of jaws, means tending to urge said jaws together and means for hindering the mutual approach of said jaws until tripped by the insertion of strapping material between said jaws from the front of the ma-

chine in a direction transverse to its longitudinal axis.

14. In a strapping machine, a tensioning device for strapping material comprising a stationary gripping device and a movable gripping device, said stationary gripping device comprising a pair of gripping members, spring means for causing the mutual approach of said gripping members and means operable upon withdrawal of strapping material from between said gripping members to prevent their mutual approach under the action of said spring means, and said movable gripping device comprising a pair of gripping members, spring means for causing the mutual approach of said gripping members and means for preventing mutual approach of said gripping members under the action of said spring means when said movable gripping device is in the normal position to which it returns at the end of the tensioning operation.

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