July 21, 1942. W. R. SCHINDLER 2,290,386

MACHINE FOR MANUFACTURING TYING MEMBERS

Filed Aug. 2, 1940 2 Sheets-Sheet 1

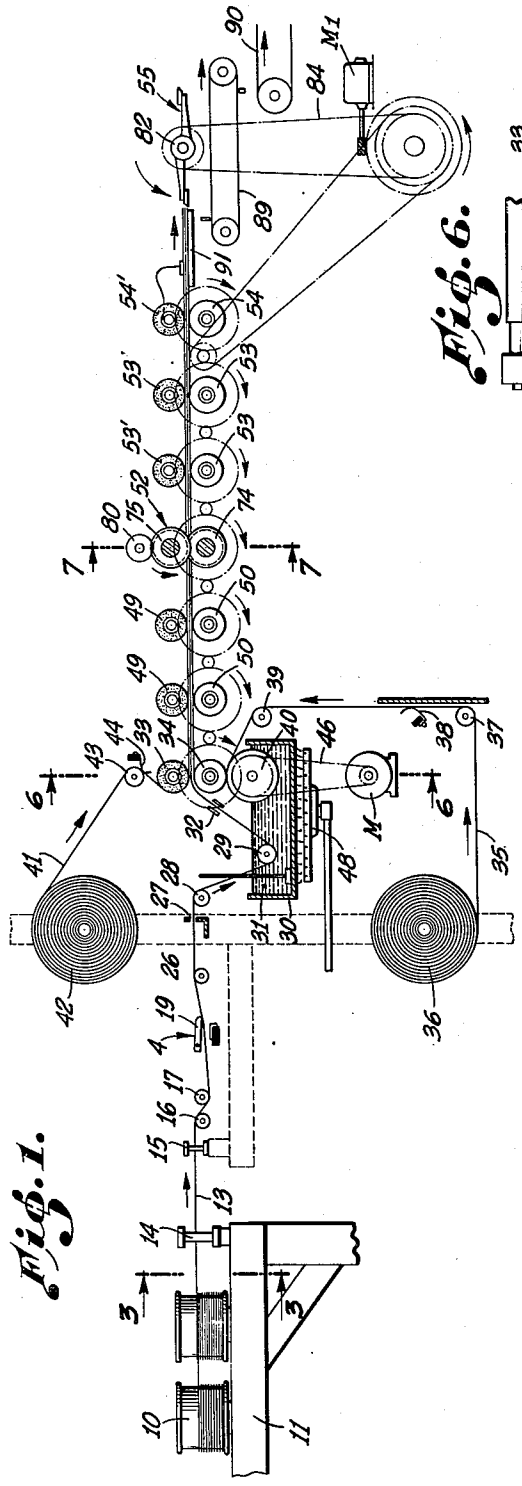

Fig. 1.

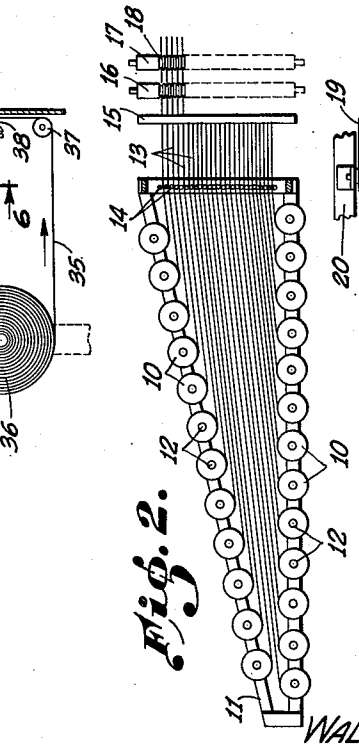

Fig. 2.

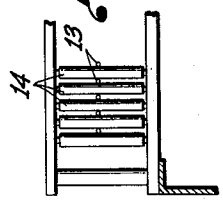

Fig. 3.

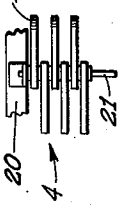

Fig. 4.

Fig. 5.

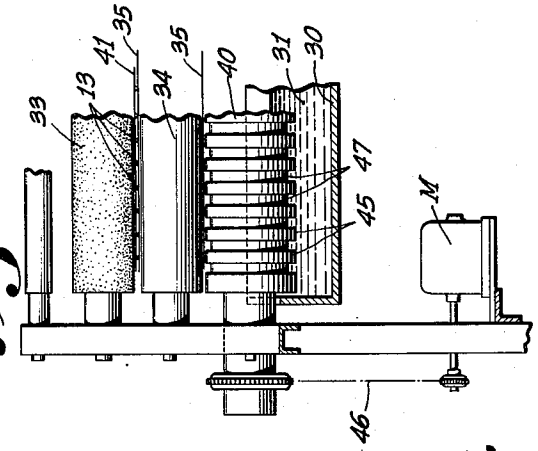

Fig. 6.

WALTER R. SCHINDLER,
INVENTOR

BY Lyon & Lyon

ATTORNEYS.

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Filed Aug. 2, 1940 2 Sheets-Sheet 2

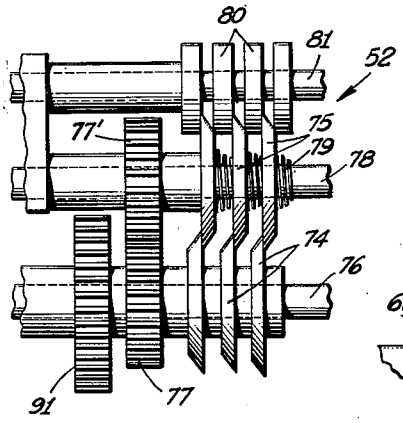

Fig. 7.

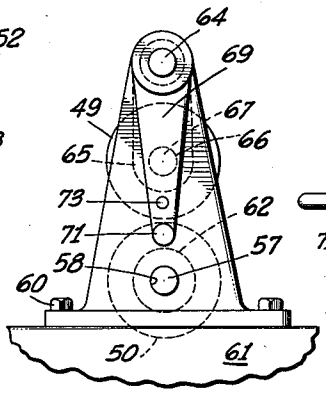

Fig. 8.

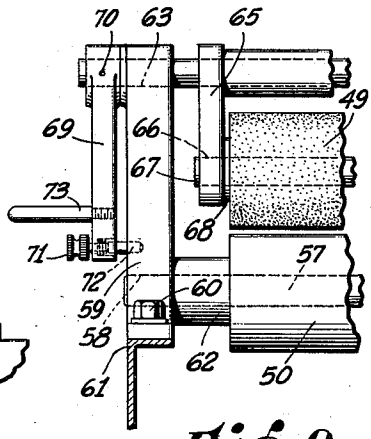

Fig. 9.

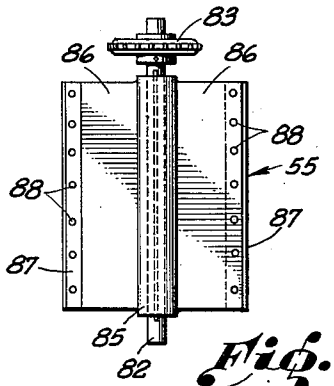

Fig. 10.

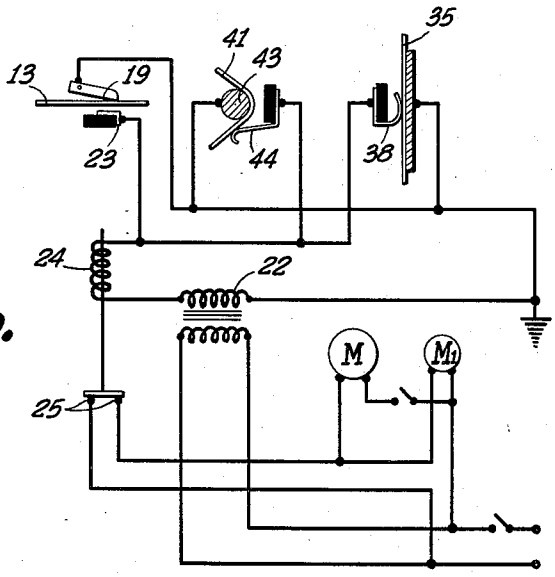

Fig. 11.

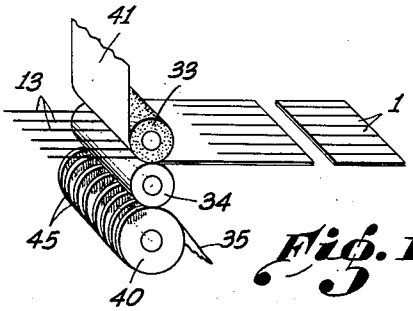

Fig. 12.

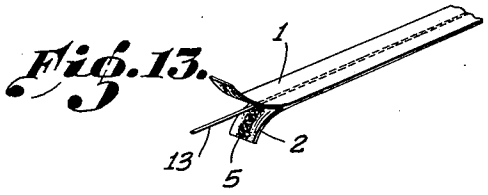

Fig. 13.

BY

WALTER R. SCHINDLER,
INVENTOR
Lyon & Lyon
ATTORNEYS.

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UNITED STATES PATENT OFFICE

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MACHINE FOR MANUFACTURING TYING MEMBERS

Walter R. Schindler, Los Angeles, Calif.

Application August 2, 1940, Serial No. 349,384

4 Claims. (Cl. 154—1)

My invention is a machine for the manufacture of tying members and more particularly for manufacturing a tie member commercially known as a "Twist-Em."

The tying member to which I am referring, known as a "Twist-Em," is composed of two layers of paper held together by asphalt or other waterproof gluing compound and having embedded between the paper and in the asphalt, a thin copper wire.

These tying members are very useful for tying plants to stakes, and bunches of vegetables together and this invention relates specifically to a machine for the manufacture of such a tie member.

A machine constructed in accordance with my invention will manufacture a great number of these individual ties at one time from plain spools of paper and wire. My invention feeds into the asphalt bath the individual strands of wire which are run between two rollers simultaneously with two continuous strips of paper, the strips of paper having previously been tarred with the asphalt at the places where the wires run through. The paper is then compressed together to force the two sheets together with the wire and asphalt between, and then slit into long strips each having a wire down its center, and then a cutting mechanism is employed which cuts off to a predetermined length the strips into individual ties.

I have provided my machine with numerous safeguards which will be more specifically described hereinafter to stop the machine's operation when any of the wires are broken so as to prevent a number of the ties finally manufactured from being defective.

The advantages of my invention are that it is entirely automatic and needs no supervision. The raw paper stock on spools and the wire on spools are inserted in the machine and the only thing necessary is to collect the ties as they come out of the end of the machine and box them.

Other advantages will be apparent from the following description of preferred form of my invention.

In the drawings:

Fig. 1 is a diagrammatic elevation illustrating the complete machine.

Fig. 2 is a plain diagram of the multi-wire spools and method of feed.

Fig. 3 is an enlarged section on lines 3—3 of Fig. 1.

Fig. 4 is a partial plan of the circuit breakers shown at 4 in Fig. 1.

Fig. 5 is a sectional elevation of Fig. 4.

Fig. 6 is a vertical end section of the gluing and pressure rolls on line 6—6 of Fig. 1.

Fig. 7 is a vertical partial end section through rotary slitters line 7—7 of Fig. 1.

Fig. 8 is an end view of typical bearing assemblies of the pressure and other guide rolls.

Fig. 9 is a partial end section of the pressure and guide rolls.

Fig. 10 is a detail of the rotary knife shown at 5 in Fig. 1.

Fig. 11 is a diagram in the electrical circuit which may be used.

Fig. 12 is a schematic view illustrating the glue application slitted portion and length of cut portion.

Fig. 13 is a perspective of the finished product or "Twist-Em" with one end pulled open to show the various parts.

In the preferred form of my invention, I prefer to manufacture 25 individual wire ties or "Twist-Ems" at one complete cycle of operation of my machine, though more or less can be manufactured at one time without departing from any of the features of my invention.

An example of the finished product of the machine of my invention is shown in Fig. 13 and comprises two layers of paper 1 and 2 with a wire core 3 and cementing substance 5, preferably asphalt, as this is waterproof holding and cementing the materials into a single object.

To provide 25 finished ties, it is necessary that 25 individual strands of wire run continuously through the machine. I, therefore, provide the 25 spools 10 of copper wire supported on the long frame 11. The spools are free to rotate on the spindles 12. The individual strands 13 of the wire from the spools 10 are fed through the guides 14 to prevent their entanglement, then under the guide bar 15, over one tension roll 16, and under tension roll 17, these tension rolls 16 and 17 are free to rotate and have the individual grooves 18 for the individual strands of wire 13.

As the breaking of any one of the wires 13 would cause some of the ties of the final product to be without its wire core, and thus necessitate sorting out of defective ties, I provide the circuit breaking mechanism 4, which upon the breaking of any one wire 13, will immediately stop the operation of the entire machine. This circuit breaker is shown in Figs. 4 and 5 and consists of contact bars 19 (one for each wire 13), which are mounted on an insulated mounting 20 and free to pivot at one end on the axle 21 and supported at the other end by the wires 13. The bars 19 and axle 21 are connected to

a source of electrical power such as the transformer 22 and when a wire 13 breaks, the bar 19 pivots on the axle 21 dropping into contact with the angle iron 23 which runs continuously across the bed of the machine to permit all of the bars 19 to make contact with it. When the bar 19 is in contact with the angle iron 23, a circuit is made through a relay 24 back to the transformer 22. The contacts 25 of the relay 24 when opened break the motor circuit of the entire machine and stop its operation.

After passing through the circuit breaker 4 the wires 13 pass over the guide roll 26 through the guide 27 and guide roll 28 and then down and under a guide roll 29 positioned in the tank 30. This tank 30 is filled with asphalt 31 which coats the wires 13. The wires are then fed through the guides 32 which wipe off excess asphalt and between the pressure rolls 33 and 34. At the same time, the strip of paper 35 from the freely rotating spool 36 is fed over the guide roll 37 through the circuit breaker 38, over the guide roll 39 between the pressure roll 34 and the tarring roll 40 and then between the pressure rolls 33 and 34 underneath the wires 13. Simultaneously, the paper strip 41 from the spool 42 is fed over the guide roll 43 through the circuit breaker 44, and between the pressure rolls 33 and 34 above the wires 13.

The circuit breakers 38 and 44 are fingers of spring bronze insulated from the frame of the machine and connected as shown in Fig. 11 in the circuit of the relay 24 so that any tearing of the paper strips 35 and 41 will cause them to ground on the frame, complete the circuit of the relay 24 and thus stop the machine.

The pressure rolls 33 and 34, by the pressure between them, firmly press the two layers of paper and the wires together with the asphalt as a binder. I prefer to make the roll 33 of rubber.

While the entire sheet could be covered with asphalt, it is desirable in the finished product, to only cover a small central portion of the tie with asphalt so as to prevent the user of the tie from getting asphalt on his hands and to prevent the asphalt from coming in contact with the articles to be tied. One of the novel features of my invention is the projections 45 on the tarring rolls 40, one projection for each wire 13. The bottom half of the roll 40 is immersed in the asphalt bath 31 and will be coated with the asphalt when it is rotated by the motor M through the belt drive 46. As only the projections 45 bear against the strip of paper 35, the strip of paper 35 will have individual strips 46 of tar painted thereon by the tarring roll 40, and the wires 13 are led over these particular strips of asphalt by the guide 32. The asphalt used in this machine should be of the type which is not in a liquid form when at room temperature. I, therefore, provide a heater 48 below the tank 30 for maintaining the temperature of the asphalt 31 sufficiently high to keep it in a liquid condition.

Before dividing the material into individual ties, it is desirable to partially cool the asphalt, and, I therefore pass it between a number of cooling rolls 49 and 50. The rolls 49 are of rubber and rolls 50 of steel and they exert a pressure upon the material to further bind the same together as well as cool the asphalt.

The material is then passed through the slitting knives 52 which divide the strips into 25 individual strips. When the cutting roll 52 slits the material into 25 individual strips, it does so intermediate of the strips of asphalt, thus leaving the edges of each of the 25 strips of paper uncovered by the asphalt. These individual strips then pass through a series of complementary steel rolls 53 and rubber rolls 53' (there may be several) and through a final complementary steel roll 54 and rubber roll 54' which is slightly larger in diameter from the other rolls 53 and 53' which provides a tension on the material after it leaves the cutting rolls 52 and prevents its displacement on the rolls 53 and 53'. The roll 54 is driven by a belt from the motor M_1 and the rolls 53, 53', and the cutting roll 52 are driven by any set of gears connected to roll 54 which will cause all rolls to revolve at the same rate. Directly driven by the same motor as the roll 54, but at a predetermined rate, is the cutter 55. This cutter 55 may be made to cut the strips as they come from the roll 54 to any given length.

In Figs. 8 and 9, I show the means by which the various rolls 33, 34, 49, 50, 52, 53, 53', 54 and 54' are journaled to permit the insertion of the wire and paper into the machine, for example, the roll 50 has the axle 57 journaled in the bearing 58 in the frame member 59, bolted by bolt 60 to the main frame 61 of the machine. Between the roll 40 and the frame member 59, is a spacer 62 to prevent side play of the roll 40. The frame member 59 carries a bearing 63 in which the shaft 64 is journaled. Said shaft 64 has a crank 65 rigidly fastened thereon. The crank 65 has the bearing 66 in which is journaled the axle 67 of the roller 39. Between the roller 49 and the crank 65 is a spacer 68 to prevent side play. On the outside of the frame member 59, another crank 69 is fastened to the shaft 64 by a set screw 70. The crank 69 carries at its lower extremity a pin 71 which releasably engages a hole 72 in the frame member 59. When it is desired to load the machine for use, the paper and wire can be pulled through the entire machine by releasing the pin 71 from the holes 72 and by using the arm 73, the crank 69 may be rotated, lifting the roll 49 from its engagement with the roll 50, thus permitting the insertion of the strips of paper 35 and 29 and the wires 13 through the machine between the rollers. After the insertion of this material, the crank 69 is returned to position and the pin 71 permitted to re-engage the hole 72 and lock the rolls 39 and 40 in their operating position.

When the machine is not in operation it is best to rotate all of the rolls on shaft 64 out of engagement with their complementary rolls to prevent flattening of the rubber rolls.

For slitting the strips of paper and wire into long strips, I have provided cutting rolls 52. These rolls consist of blades 74 and 75 mounted on axles 76 and 78 which axles are journaled similarly to the axles 57 and 67.

The blades 74 and 75 are complementary to each other and are of the usual type of rotary disc knives, and are driven in opposite directions by the gears 77 and 77' on the axles 76 and 78 respectively. The gear 91 on the axle 76 is directly driven by the electric motor M_1. This same gear arrangement is used to drive the rolls 53, 53', 54 and 54' in the same direction and these rolls, because of the pressure between them, draw the material, both paper and wire, through the entire machine. The tension between the blades 74 and 75 is maintained by the springs 79.

To keep the blades 75 clean and free of any

possible asphalt, the guards **80** are provided upon the shaft **81**. The shaft **81** is journaled similarly to the shaft **64**.

The cutter **55** comprises an axle **82** having a belt pulley **83** at one end for connecting by a belt **84** with the motor M_1, a hub **85** having webs **86** integral therewith and cutting blades **87** at the extremities of the webs **86**. The cutting blades **87** shear off the tie member by the cooperation of the shear plate **91** at the end of the main frame of the machine.

By using the correct size of pulley **83** and being driven by the same motor M_1 that draws the material through the machine, the length of finished tie can be adjusted to the size desired. If a double length tie is desired, one of the cutting blades **87** is removed from the web **86** by unfastening the screws **88** which maintain the blades **87** on the webs **86**.

The continuous belt **89** whose power is directly taken from a belt connecting with the motor M_1 and has a trip mechanism of the customary type which causes the belt **89** to rotate once for every two complete rotations of the cutter **55**, measures out 100 finished ties and delivers them to another conveyor belt **90** from which they are removed for packaging. By this arrangement, it is not necessary to count the number of ties. Of course the trip mechanism can be altered to change the number of ties counted out.

While I have described the preferred embodiment of my invention, I am not limited to any of the details of construction except as specified in the appended claims.

I claim:

1. In a machine of the class described for uniting two continued strips of paper and a continuous supply of a plurality of wires, means for moving said strips of paper and said wires through said machine whereby the lower of said strips has stripes of asphalt painted on its upper surfaces, means for guiding said plurality of wires through an asphalt paint to coat said wires with asphalt, and means for guiding said wires individually over said stripes of asphalt on said lower strip of paper and below the other strip of paper, pressure means for pressing together said strips of paper and said wires, slitting cutters for longitudinally dividing said strips of paper substantially intermediate said asphalt stripes, and an end cutter for cutting the longitudinally divided strips to a desired length.

2. In a machine of the class described for uniting two continued strips of paper and a continuous supply of plurality of wires, means for moving said strips of paper and said wires through said machine whereby the lower of said strips has stripes of asphalt painted on its upper surfaces, means for guiding said plurality of wires through an asphalt paint to coat said wires with asphalt, and means for guiding said wires individually over said stripes of asphalt on said lower strip of paper and below the other strip of paper, pressure means for pressing together said strips of paper and said wires, and cooling rolls for lowering the temperature and solidifying the asphalt binder, slitting cutters for longitudinally dividing said strips of paper substantially intermediate said asphalt stripes, and an end cutter for cutting the longitudinally divided strips to a desired length.

3. In a machine of the class described for uniting two continued strips of paper and a continuous supply of plurality of wires, means for moving said strips of paper and said wires through said machine whereby the lower of said strips has stripes of molten asphalt painted on its upper surfaces, means for guiding said plurality of wires through a molten asphalt paint to coat said wires with molten asphalt, and means for guiding said wires individually over said stripes of molten asphalt on said lower strip of paper and below the other strip of paper, pressure means for pressing together said strips of paper and said wires, and cooling rolls for lowering the temperature and solidifying the molten asphalt binder, slitting cutters for longitudinally dividing said strips of paper substantially intermediate said molten asphalt stripes, and an end cutter for cutting the longitudinally divided strips to a desired length.

4. In a machine of the class described for uniting two continued strips of paper and a continuous supply of plurality of wires, means for moving said strips of paper and said wires through said machine whereby the lower of said strips has stripes of asphalt painted on its upper surfaces, means for guiding said plurality of wires through an asphalt paint to coat said wires with asphalt, and means for guiding said wires individually over said stripes of asphalt on said lower strip of paper and below the other strip of paper, pressure means for pressing together said strips of paper and said wires, slitting cutters for longitudinally dividing said strips of paper substantially intermediate said asphalt stripes, and an end cutter for cutting longitudinally divided strips to a desired length, and means for immediately stopping said machine if either paper or wire supply is broken.

WALTER R. SCHINDLER.