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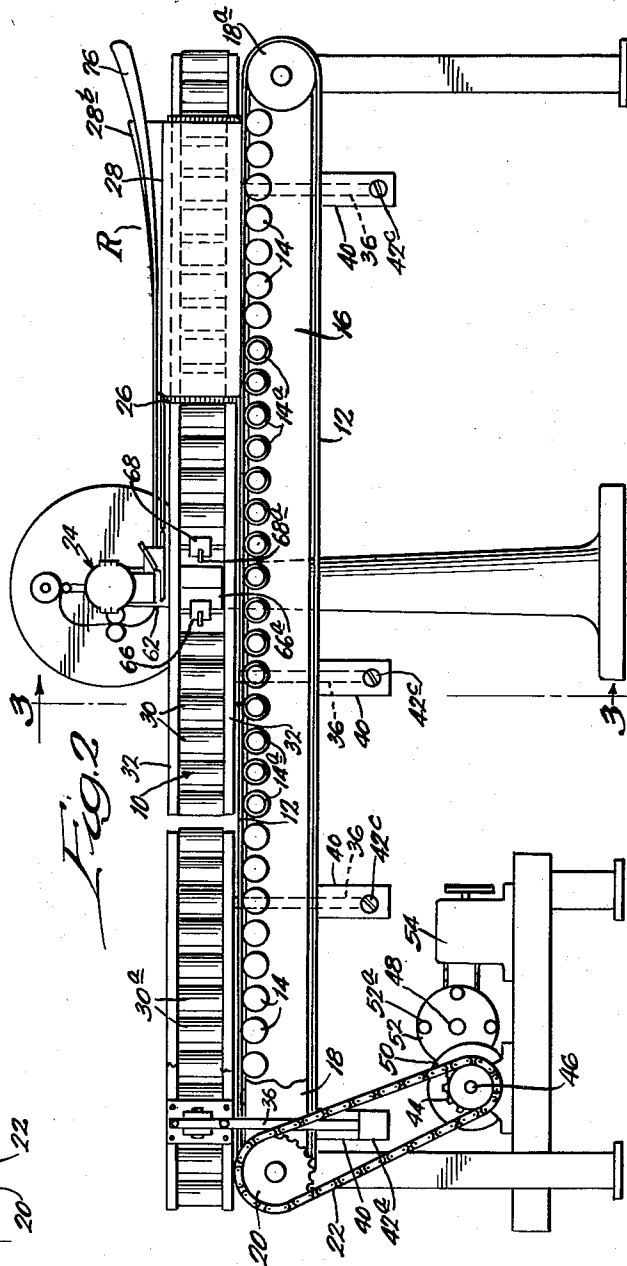
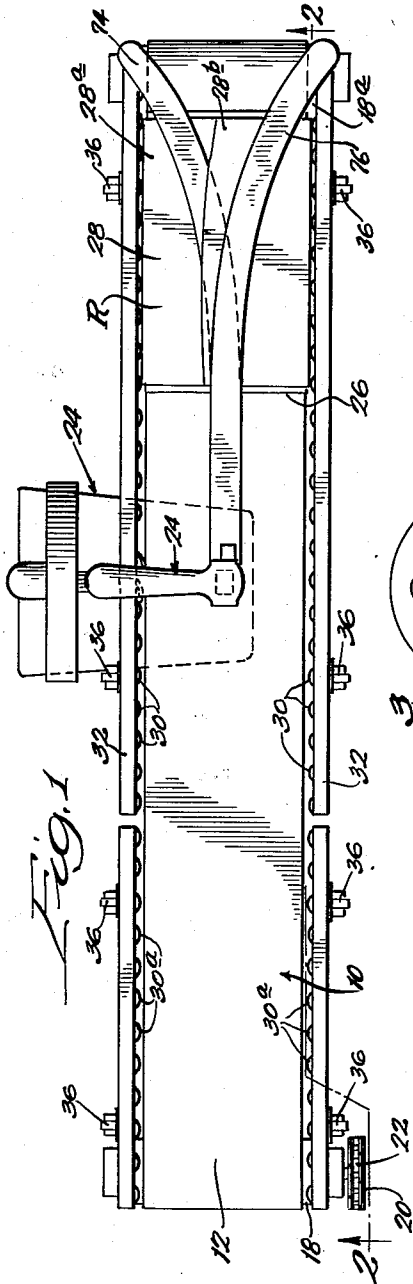
O. M. TUBBS

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STAPLE STITCHING MACHINE

Filed Sept. 17, 1949

3 Sheets-Sheet 1



INVENTOR:
Orville M. Tubbs,
BY *Dawson, Conner, Booth and Spangenberg,*
ATTORNEYS.

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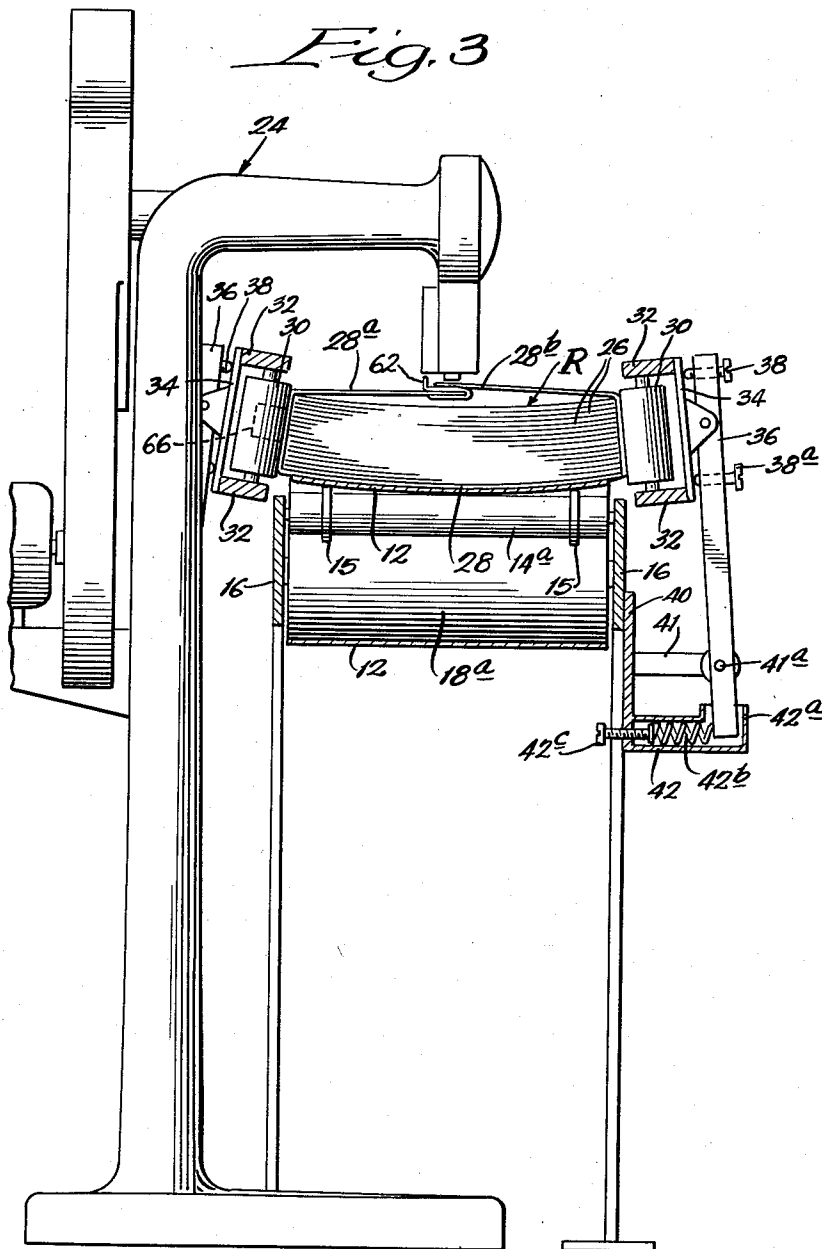
O. M. TUBBS

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STAPLE STITCHING MACHINE

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3 Sheets-Sheet 2



INVENTOR:
Orville M. Tubbs.
BY *Davson, Ames, Brothman & Spangenberg,*
ATTORNEYS.

UNITED STATES PATENT OFFICE

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STAPLE STITCHING MACHINE

Orville M. Tubbs, Chicago, Ill., assignor to Inland Wire Products Company, Chicago, Ill., a corporation of Illinois

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4 Claims. (Cl. 1—2)

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My invention relates to an improved mechanism to secure a wrapping, such as a cardboard sheet, snugly about a bundle of sheets of roofing or like flexible material.

It is desirable to encase bundles of roofing in snug cardboard wrappings for shipment and storage. However, to maintain the roofing sheets in the bundle, it is necessary to secure the wrapping snugly in place. In accordance with the present invention, the cardboard wrapping for the roofing bundle is stitched or stapled in position by a plurality of spaced staples while the roofing is in a cupped or bent condition. When the bundle is subsequently released, the roofing resumes the flat condition and the wrapper is drawn taut across the bundle. The result is a snug bundle of roofing that may be easily handled and exhibits no tendency to fall apart.

It is therefore a general object of the present invention to provide an improved mechanism to secure a wrapper about a bundle of roofing.

A further object of the present invention is to provide a mechanism automatically operable to secure a wrapper about a bundle of roofing by means of a plurality of substantially uniformly spaced stitches.

Yet another object of the present invention is to provide an automatic mechanism to cup a bundle of roofing so that the wrapping may be stitched in position to assume a taut condition when released.

Still another object of the present invention is to provide an improved mechanism to stitch an object in uniformly spaced stitches.

Further it is an object of the present invention to provide a complete apparatus operative to accept bundles of newly manufactured roofing and secure a wrapping snugly on them, all automatically.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, may best be understood by reference to the following description taken in conjunction with the accompanying drawings, in which:

Figure 1 is a top plan view of a mechanism constructed in accordance with the present invention;

Figure 2 is a cross-sectional view taken along axis 2—2, Figure 1;

Figure 3 is a cross-sectional view along axis 3—3, Figure 2;

Figure 4 is an enlarged fragmentary top plan view of the drive mechanism for the apparatus of Figure 1;

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Figure 5 is a cross-sectional view through the axis 5—5, Figure 4;

Figure 6 is a schematic circuit diagram of the apparatus of Figure 1.

Referring now to Figures 1 and 2, there is shown generally at 10 the carrier or track defining mechanism that conveys the bundles of roofing in intermittent forward movements to receive the stitches. The carrier consists of a belt 12 that rides on a plurality of support rollers 14 carried by the side rails 16. At the ends of the machine the belt 12 rides over cylindrical pulleys 18 and 18a.

Pulley 18 acts as a drive pulley to impart intermittent forward motions to the belt 12. To this end, pulley 18 is attached to the sprocket 20 which is driven by the chain 22. Chain 22 is driven in intermittent motion by means described in further detail hereafter to impart to the belt 12 the desired intermittent movements.

A bundle of roofing is shown generally at R, Figures 1 to 3. In Figures 1 and 2, the bundle is shown approaching the stitching machine 24 and in Figure 3, the bundle is shown being stitched. As seen in the figures, the bundle of roofing is made up of a plurality of sheets of roofing material 26 and a cardboard wrapper or casing 28 that encircles the bundle. The casing has flaps 28a and 28b that are folded over each other and stitched together to define a sleeve snugly surrounding the bundle.

In accordance with the present invention, the central rollers 14a are provided with portions of increased diameter at points spaced from their central portions. This is best seen in Figure 3, where the portions of increased diameter are indicated at 15. These portions may, for example, comprise rings of metal or other suitable material slipped over the rollers and secured at the desired positions by friction or other suitable means.

As shown in Figure 3, the enlarged portions of the rollers 14a defined by the rings 15 support the side portions of the belt 12 at higher levels than the center thereof. The belt is thus cupped and the roofing thereon assumes the mating cup-shaped condition shown in the figure.

If desired, the rollers 14a may be tapered to provide a reduced diameter at their center portions to provide the desired cupping of the belt 12.

It is a characteristic of asphalt type roofing material that it is readily bent immediately after manufacture and conforms quickly to the shape of an irregular support surface. Consequently, as bundles of freshly made roofing are placed on the right hand end of the belt 12, they quickly

collapse at the center to conform to the cup-shaped configuration of the belt 12.

The bundle of roofing is further urged to the cupped condition shown in Figure 3 by the fences defined by rollers 30. These rollers are carried by the spaced rails 32 which are in turn carried by the cross plates 34. The latter plates are each pivotally attached to corresponding support arms 36. As shown in Figure 3, a pair of stop screws 38 and 38a are threadably received in the support arms 36 and bottom against the corresponding cross plate 34 to secure the rollers 30 in adjustable positions of tilt.

The adjustable tilt provided by the screws 38 and 38a permits accommodation of the mechanism to different kinds of bundles. It also avoids the need for predicting in advance the exact tilt required.

The support arms 36 are each carried by a corresponding support bracket 40 depending from the side rail 16. Each support bracket has an extending arm 41 with a pin 41a which receives the arm 36 for rockably supporting the arm. A sleeve 42 also extends from the depending brackets 40 and on its outer end defines a cup portion 42a in which the end of the arm 36 loosely fits. A spring 42b bottoms against the adjusting screw 42c and the end of arm 36 to bias the arm 36 in direction to cause the rollers 30 to come together.

The rollers 30 define a fence conforming to the shape of the sides of the bundle R as the bundle cups on the rollers 14a. This is shown in Figure 3. These rollers thereby aid the rollers 14a and assure that the roofing cups as desired.

The rollers 30a define a fence similar to that defined by rollers 30 and are supported in the same manner. However, the pressure on rollers 30a (exerted by springs 42b) is less than the pressure on rollers 30 to permit the bundle of roofing to flatten out as it approaches the end of the machine.

Intermittent motion is imparted to the chain 22 by the mechanism shown generally in Figure 2 and in greater detail in Figures 4 and 5. As shown, the chain 22 is driven from sprocket 44 carried by shaft 46. This shaft is driven from the shaft 48 by the intermittent drive mechanism defined by the cam plate 50 and the roller drive plate 52. The roller drive plate 52 is driven at uniform angular velocity by the motor 54 through belt 56, speed reducer 58, and chain 60.

As shown in Figure 5, the cam plate 50 has four radial grooves 50a spaced 90 degrees relative to each other. Wheel 52 has four rollers 52a spaced 90 degrees relative to each other near its outer periphery. The rollers 52a are positioned to ride in the grooves 50a so that as the shaft 48 is rotated the rollers 52a successively ride into the grooves 50a. Since the angular velocity of the rollers 52a relative to the shaft 46 varies from zero in the position shown in Figure 5 to a maximum value when shaft 48 has rotated 45 degrees, the cam plate 50 is driven in intermittent quarter turn rotations when the shaft 48 is driven at uniform angular velocity.

In accordance with the present invention, the stitcher 24 is actuated in unison with the dwells or pauses in the intermittent motion of the belt 12. This stitcher may be any one of several types and includes a solenoid 60, Figure 6, which, when energized, actuates the stitcher to drive a staple through any material in the anvil shown generally at 62, Figure 3. This solenoid is energized from source of electromotive force 62 by a series of three switches 64, 66, and 68, Figure 6.

The switch 64 is a normally opened switch that is successively closed in unison with the dwell periods of the belt 12. This is accomplished by the cam actuating mechanism shown in Figure 5. As shown, a rocker arm 70 is rockably supported from the switch 64 and operates when rocked toward the switch to depress the actuating pin 64a to close switch 64. The cam disk 72 is mounted on the shaft 48 and has four lugs 72a, each adapted to engage the arm 70 and rock that arm to depress pin 64a and close switch 64.

The lugs 72a are spaced at 90 degree intervals about the disk 72 and are oriented relative to the shaft 48 so that they close the switch 64 when a roller 52a is about to ride into a groove 50a. Since this is the period of dwell of the shaft 46 and the belt 12, the switch 64 is actuated in unison with the period of dwell of the belt and the roofing bundles it carries.

The switches 66 and 68 are mounted at spaced positions along the carrier 10 as shown in Figure 2. These switches are of the normally open type and carry actuating pins 66a and 68a, respectively. These engage the side of the bundle of roofing and are depressed thereby to close the switches.

Cam guide arms 74 and 76 are provided to fold the flaps 28a and 28b of the wrapper 28 and to guide them into the anvil 62 as shown in Figure 3.

When a bundle of roofing and the encircling wrapper are placed on the right hand end of the mechanism of Figure 1, the belt 12 carries it forward in intermittent movements. During each pause or dwell, the switch 64 is closed but the stitcher 24 is not energized because of the open condition of switches 66 and 68.

When the bundle reaches the switch 68, it closes that switch but the stitcher still remains unenergized because switch 66 remains open. However, when the switch 66 is reached and closed by the bundle, the entire circuit of Figure 6 is closed each time the switch 64 is actuated. Since this occurs upon each dwell of the belt 12 and the bundle of roofing the stitcher 24 places a series of uniformly spaced stitches or staples on the wrapper 28 to secure flaps 28a and 28b together. One stitch occurs for each forward movement of the belt and the spacing of the stitches is determined by the throw of the belt on each movement.

When the bundle of roofing passes the switch 68, the arm 68a is released and the switch is restored to the unactuated or opened condition. At this time the circuit of Figure 6 is opened and further actuations of the switch 64 do not energize the stitcher 24.

The spacing between switches 66 and 68 determines the distance between the front and rear edges of the bundle of roofing and the first and last stitch or staple, respectively.

Since the wrapper 28 is stapled snugly about the actual bundle of roofing, the desired snug fit is achieved even though the bundle contains a few more or a few less than the desired quantity of roofing.

In my copending application entitled Wire Stitching Apparatus and Control Mechanism, S. N. 18,647, filed April 2, 1948, now Patent No. 2,489,207, and assigned to the same assignee as the present invention, I have disclosed and claimed a mechanism having features of similarity with the present invention.

While I have shown and described a specific embodiment of my invention, it will of course be

understood that many variations and modifications may be made without departing from the spirit and scope thereof. I therefore intend by the appended claims to cover all modifications and alternative constructions coming within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a stitcher to secure a wrapping about a bundle of shingles or like flexible material, the improvement comprising means defining a cupped carrier adapted to receive said bundles, means defining sloping fences on each side of the carrier and conforming to the side configuration of the bundles as they travel on said carrier, means operative to move the bundles intermittently along the carrier, and stitching elements fixedly supported relative to the carrier operative to stitch the bundles along lines substantially parallel to the sides of said carrier as they pause between successive movements.

2. In a stitcher to secure a wrapping about bundles of roofing or like flexible material, the improvement comprising a carrier having a cupped bottom configuration adapted to move the bundles intermittently along a predetermined path, fixedly supported elements operative to stitch the wrapping along lines substantially parallel to the sides of said carrier as the bundle passes a predetermined point in the path, spaced switch elements adjacent said point and operative to engage the bundle and be actuated as the bundle passes by, switch elements actuated in unison with the pauses of the bundle, and means operative to energize the stitcher when said switches are simultaneously actuated.

3. In a stitcher to secure a wrapping about bundles of roofing or like flexible material, the improvement comprising a cupped carrier for the bundles having movable elements operative to impart motion to the bundles along a predetermined path, a drive shaft, means operable to

move said elements intermittently as said shaft rotates continuously, a switch operatively associated with the shaft to assume the actuated position when the shaft is in the position of dwell of the carrier, spaced switches operative to engage the bundle at fixed points along the path of travel and be actuated thereby, a stitcher adapted to stitch the wrapping along lines parallel to the said path of travel as the bundle travels along the path and is adjacent the positions of said last switches, and means operative to energize the stitcher when all of said switch elements are actuated simultaneously.

4. In a stitcher to secure a wrapping about a bundle of roofing or like flexible material, the improvement comprising means defining a cupped carrier adapted to receive said bundles, means defining sloping fences on each side of the carrier and conforming to the side configuration of the bundles as they seat on the bottom of said carrier, yieldable elements urging the fences together to hold the bundles against said bottom, means operative to move the bundles intermittently, and stitching elements fixedly supported relative to the carrier operative to stitch the bundles along lines substantially parallel to the sides of said carrier as they pause between successive movements.

ORVILLE M. TUBBS.

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