July 14, 1970 C. R. STEVENS 3,520,103

APPARATUS FOR TUCKING IN VERTICAL END WEBS OF AN OVERWRAP

Filed May 6, 1968 3 Sheets-Sheet 1

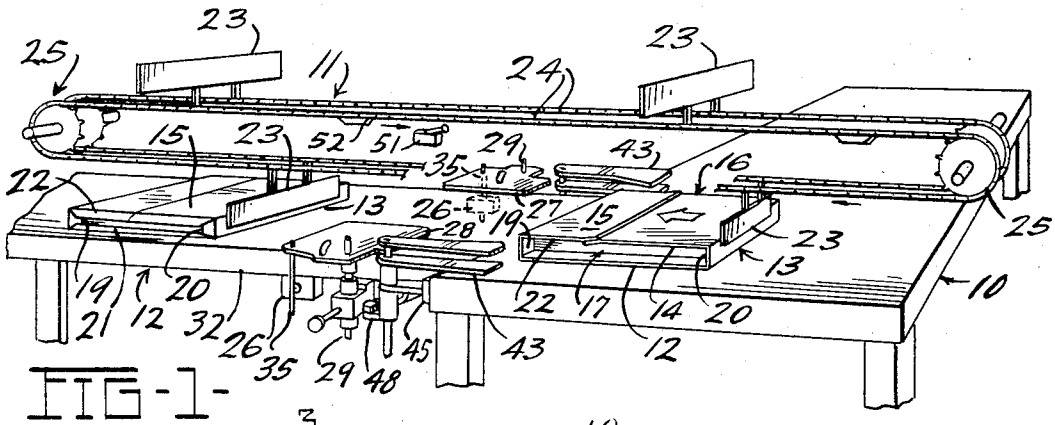


FIG-1-

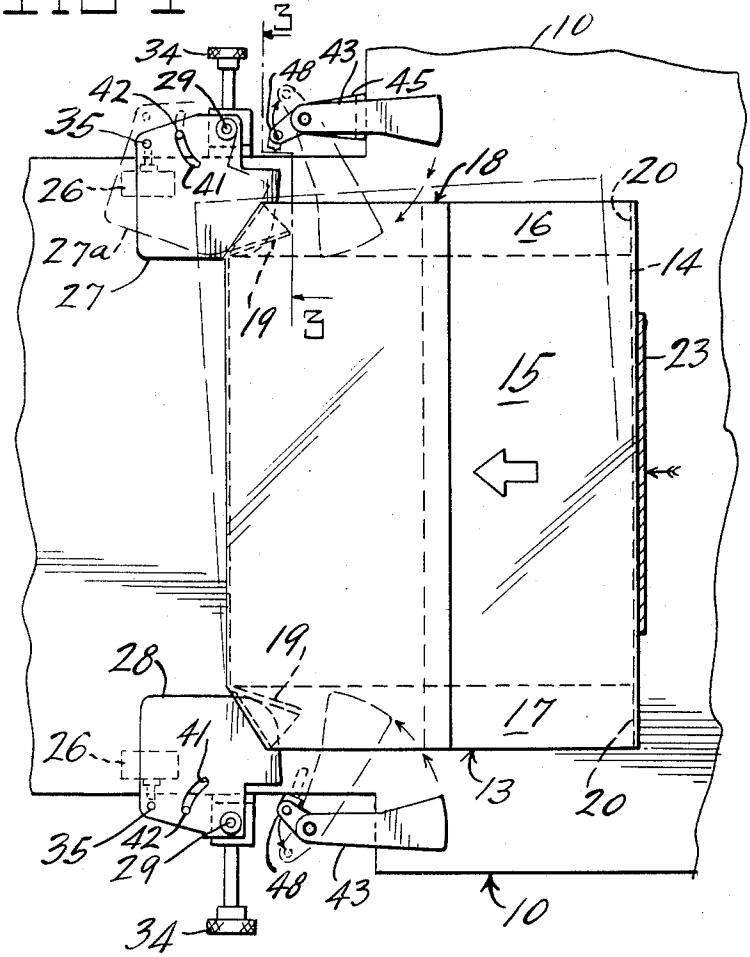


FIG-2-

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APPARATUS FOR TUCKING IN VERTICAL END WEBS OF AN OVERWRAP

Filed May 6, 1968 3 Sheets-Sheet 2

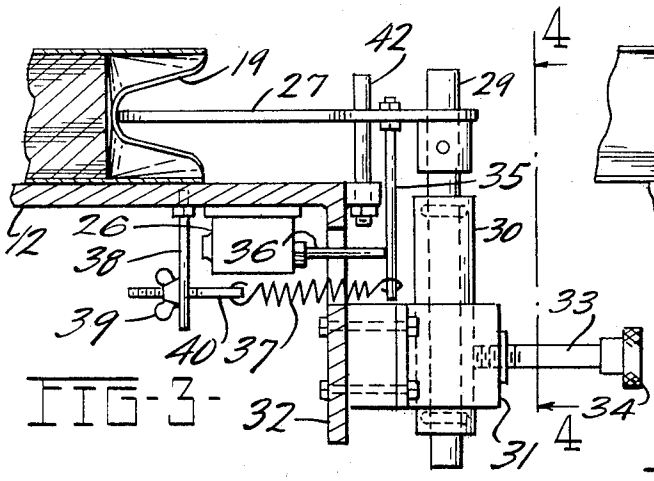


FIG-3-

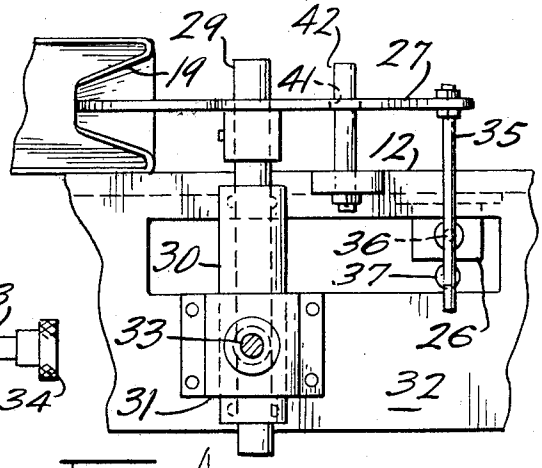


FIG-4-

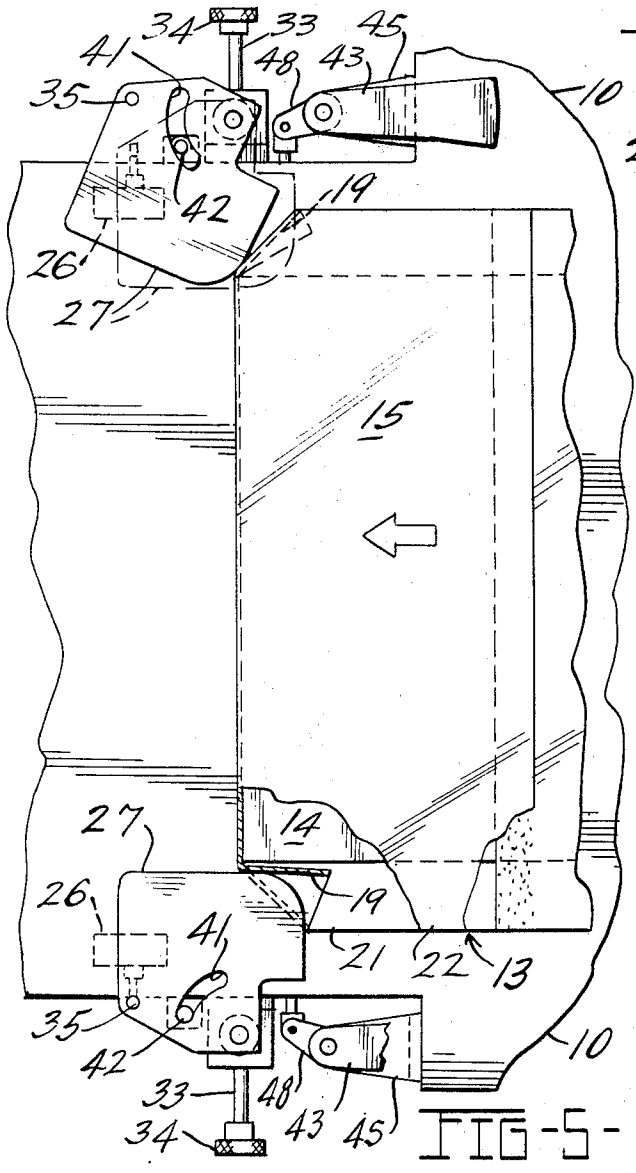


FIG-5-

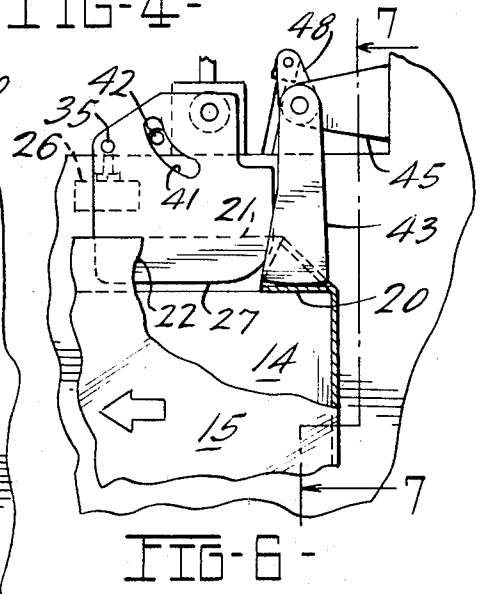


FIG-6-

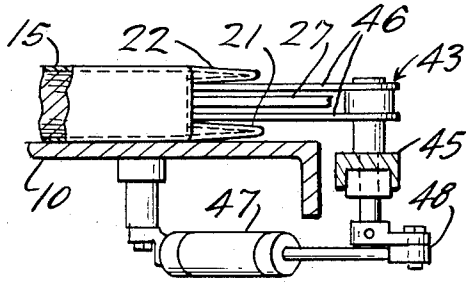


FIG-7-

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APPARATUS FOR TUCKING IN VERTICAL END WEBS OF AN OVERWRAP

Filed May 6, 1968 3 Sheets-Sheet 3

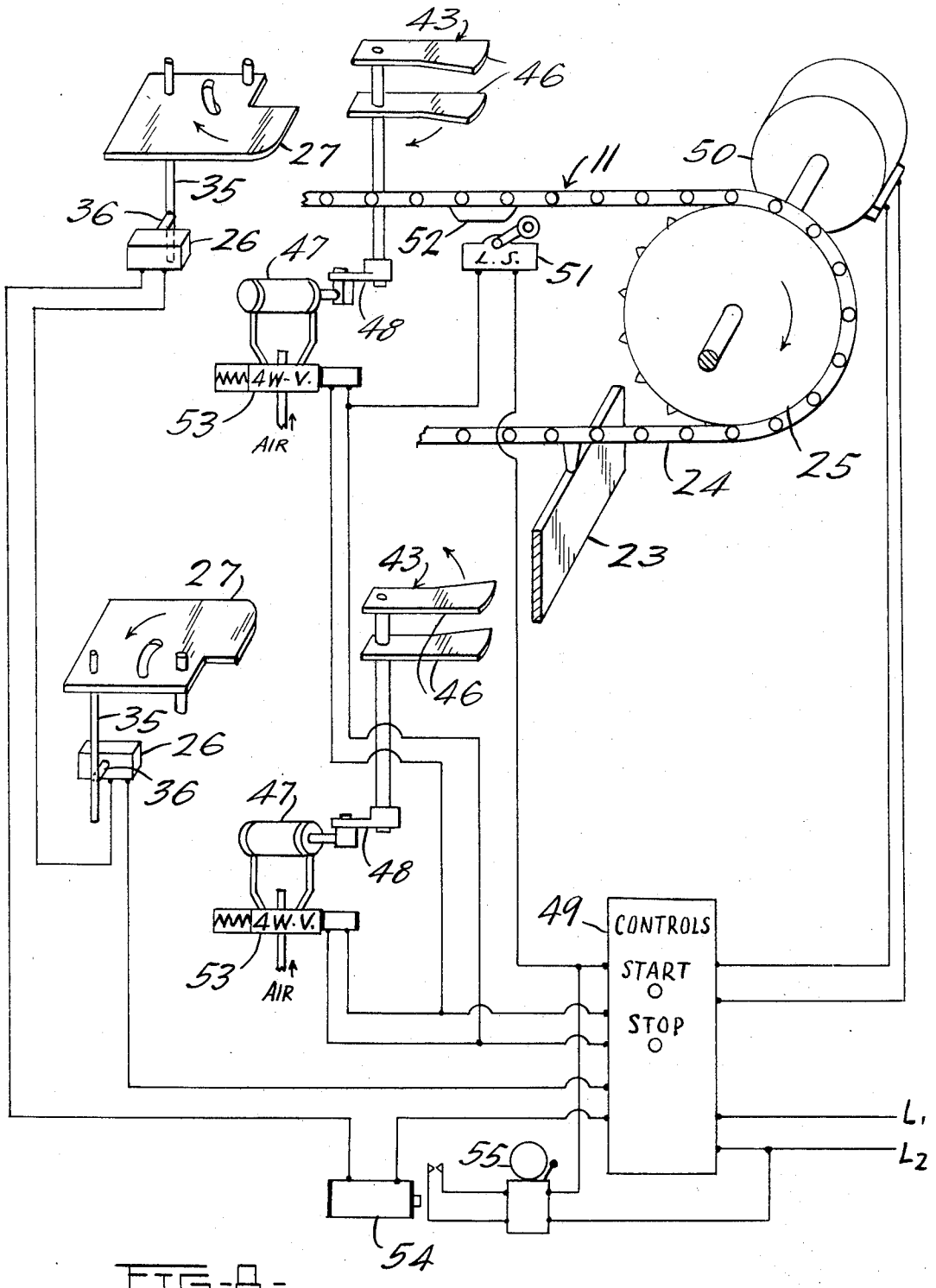


FIG-8-

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3,520,103

APPARATUS FOR TUCKING IN VERTICAL END WEBS OF AN OVERWRAP

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Int. Cl. B65b 7/04, 57/18
U.S. Cl. 53—78 3 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus for tucking in the outwardly protruding ends of an overwrap, particularly a heavy paper overwrap of a rectangular block of sheets of paper such as a ream. The edges of the overwrap are overlapped and sealed in a previous operation and the overwrapped block is introduced into the apparatus for movement along a path perpendicular to the overlapped seal. The apparatus has a conveyor for pushing the girth wrapped reams of paper between a pair of laterally spaced, horizontal plates that are pivotally mounted on vertical axes and that are spaced from each other a distance just slightly larger than the corresponding length of the block or ream of sheets. The plates engage the leading or front vertical web of the portion of the overwrap which extends beyond the block at a level approximately midway between the top and bottom of the block, and tuck the vertical webs of the overwrap horizontally inward between the horizontal webs thereof extending beyond the ream or block of sheets. When either of the plates is engaged by the corner of a canted or not centrally positioned block, it is swung outwardly on its vertical axis. The electrical circuit to the motor for the conveyor comprises two switches which are normally held closed actuators carried by the horizontal tucker plates. When either one of the tucker plates is swung outwardly by the corner of an offset or canted block of sheets, the respective switch opens thus stopping the conveyor so that the operator may reposition the girth wrapped folio or ream in properly centered position on the line between the tucker plates. Rear end tuckers are tripped to tuck in the rear vertical webs of the overwrap just prior to their arrival at the location of the horizontal tucker plates. The conveyor may then move the block through folding shoes or the like which fold the horizontal webs of the overwrap around the tucked in end webs and the block of sheets.

In paper mills it is conventional to cut and stack sheets of paper of determined size in piles, each pile including a number of hundreds or thousands of sheets with indicator slips inserted between each group of sheets, called a folio or block and numbering say, 250 or 500 sheets, so that an operator subsequently can lift such a block of sheets and handle it as a unit.

In my copending application Ser. No. 601,046, filed Dec. 12, 1966, there is disclosed an apparatus for automatically girth wrapping such a block of sheets with an overwrap and for sealing the overwrap along its overlapped edges. Such an overwrap is longer than the block of sheets and the ends of the overwrap extend beyond the edges of the wrapped sheets providing front and rear vertical webs and upper and lower horizontal webs, which must be tucked in and folded to complete the end wraps.

The present application relates to an apparatus for tucking in the vertical webs of the ends of the overwrap both at the leading and trailing edges of the block of sheets, i.e., at the front corners and the rear corners when considered from the standpoint of the direction of movement of the girth wrapped folio, preliminarily to folding the horizontal webs of the ends of the wrapper down and up,

respectively, around the tucked in webs to seal the ends of the wrapped folio.

It is the principal object of the instant invention to provide an end tucker mechanism for such an end wrapping apparatus which comprises a pair of tucker plates spaced from each other a distance only slightly greater than the length of the block of sheets to be wrapped and which is provided with means for automatically stopping the apparatus in the event that a girth wrapped block is offset or canted in the machine so as to otherwise jam the machine by reason of its improper spacing.

It is yet another object of the instant invention to provide an overwrap end tucker mechanism which will automatically tuck in the vertical webs of the ends of the extending portion of a wrapper for a solid block of material such as a block of sheets of paper, and which will stop the apparatus in the event that the object or block of sheets to be wrapped is offset or canted and thus would otherwise jam in the apparatus.

These and more specific objects and advantages of an apparatus embodying the invention will be better understood from the specification which follows and from the drawings, in which:

FIG. 1 is a fragmentary perspective view of a portion of a wrapping apparatus particularly illustrating the overwrap end tucker station;

FIG. 2 is a fragmentary plan view of the end tucker station of such an apparatus and particularly illustrating the operation of the front tuckers embodying the instant invention when a block of sheets is canted, and is shown on an enlarged scale;

FIG. 3 is a fragmentary vertical sectional view taken along the line 3—3 of FIG. 2 and shown on an enlarged scale;

FIG. 4 is a fragmentary view partly in section and partly in elevation taken from the position generally indicated by the line 4—4 in FIG. 3;

FIG. 5 is a fragmentary plan view generally similar to FIG. 2 and illustrating the overwrap and tucker mechanism and its operation in response to an offset girth wrapped block;

FIG. 6 is a fragmentary plan view illustrating the operation of one of the rear tuckers;

FIG. 7 is a fragmentary vertical sectional view taken along the line 7—7 of FIG. 6; and

FIG. 8 is a fragmentary, exploded view illustrating a simplified wiring diagram.

Although the end tuckers embodying the instant invention will be described as they are arranged for the purpose of tucking in the vertical webs of the ends of an overwrap for a block or folio of sheets of paper, particularly one which has previously been girth wrapped as for example by the apparatus shown in my copending application referred to above, it will be appreciated that the overwrap end tuckers embodying the instant invention have utility and may be employed for tucking in the ends of wrappers of objects other than folios of sheets of paper. For this reason, the girth wrapped folio of sheets of paper will be subsequenlty called an overwrapped block and the word block is to be interpreted as comprising the unitary group of sheets or folio of sheets of paper, as well as any other generally similar solid mass about which an overwrap has previously been folded and sealed along one overlapping margin of the overwrap leaving the ends of the overwrap protruding beyond the margins of the block enclosed therein.

An end tucker embodying the invention is a portion of an end folding and closing apparatus which comprises an on-table, generally indicated by the reference number 10, an overhead paddle conveyor, generally indicated by the reference number 11, and a machine table generally indicated by the reference number 12. In a machine for

end wrapping blocks of sheets which have previously been girth wrapped, an operator places a girth wrapped block on the table **10** and, either by eye or by guides, the girth wrapped block should be centered beneath the flight of the conveyor **11**. Such a girth wrapped block is generally indicated in FIG. 1 by the reference number **13** and comprises a block or folio of sheets **14** and an overwrap **15**. The overwrap **15** is longer than the block **14** leaving ends **16** and **17** extending beyond the margins of the block **14**. The overwrap **15** is also overlapped and sealed along a margin as shown by the dotted portion in FIG. 2 indicated generally by the reference number **18**. As can best be seen in FIG. 1, each of the ends **16** and **17** thus has four portions, viz., a front vertical web **19**, a rear vertical web **20**, a lower horizontal web **21**, and an upper horizontal web **22**.

The machine table **12** extends longitudinally away from the on-table **10** and the paddle conveyor **11** extends along across the on-table **10** and above the center of the machine table **12**. The conveyor **11**, comprises a plurality of conveyor paddles **23** spaced from each other on the flights of conveyor belts or chains **24** a distance sufficient to allow an operator to insert a girth wrapped block **13** onto the on-table **10** where it is subsequently engaged by the next one of the paddles **23** to be moved off of the on-table **10** and along the machine table **12**. The conveyor **11** is carried by spaced pairs of sprockets **25** which are mounted by suitable shafts and bearing means above the tables **10** and **12** and is driven at a suitable speed by conventional electric power, such as an electric motor, that is cotnrolled through a conventional wiring circuit. The circuitry for the motor (see FIG. 8) which drives the conveyor **11** comprises stop and start buttons and also comprises a pair of normally closed microswitches **26** (indicated in FIG. 8 as SW1 and SW2). The switches **26** are wired into the circuitry in such fashion that if either of them opens, the motor driving the conveyor **11** will immediately stop.

When the operator places the girth wrapped block **13** on the table **10**, he endeavors to center it beneath the flight of the conveyor **11** so that the ends **16** and **17** extend laterally therefrom the same distance, i.e., so that the girth wrapped block **13** is centered on the machine table **12** and beneath the conveyor **11** when it is first put into the position generally indicated in FIG. 1. In end wrapping a girth wrapped block **13**, it is first necessary to tuck in the vertical webs **19** and **20** between the upper and lower webs **21** and **22** and then to either fold down the upper web **22** and fold up the lower web **21**, or vice versa.

The instant invention relates only to the end tucker operation, i.e., the tucking in of the front and rear vertical webs **19** and **20**.

When the conveyor **11**, through its paddle **23**, moves the girth wrapped block **13** in the direction of the open arrow shown thereon in FIG. 1, the girth wrapped block **13** first passes between and engages a pair of opposed, spaced, tucker plates **27** and **28** which are mounted at opposite sides of the machine table **12** in line to engage the respective front vertical webs **19** on both sides of the girth wrapped block **13**. If the girth wrapped block **13** has properly been centered beneath the conveyor **11**, no problem is likely to result because the innermost opposed edges of the tucker plates **27** and **28** are spaced horizontally from each other a distance slightly greater than the similar length of the block **14** around which the front and rear webs **19** and **20** are to be tucked. Under these conditions, if the block is properly centered, the two tucker plates **27** and **28** engage the front vertical webs **19** and fold them in horizontally as the girth wrapped block **13** is moved therebetween by the conveyor paddle **23**.

Each of the tucker plates **27** and **28** is secured near the upper end of a vertical rocker pin **29** (see also FIGS. 4 and 5) and each of the respective pins **29** is journaled in a sleeve **30**. Each sleeve **30** is carried by a clamping block **31** and each block **31** is mounted on an edge flange **32** of the machine table **12**. The position of each sleeve **30** in its respective clamping block **31** is adjustable vertically in order to align the respective one of the tucker plates **27** or **28** with about the vertical midpoint of the end webs **19** or **20**, or at a level about one-half the height of the particular block **13** in question. The sleeve **30** is held in the adjusted vertical position by a clamping screw **33** provided with a knurled knob **34** which is threaded through the block **31** and engages the exterior surface of the sleeve **30**.

Each of the tucker plates **27** and **28** carries an actuating finger **35** which depends therefrom at a point outside the table flange **32** and in a position to engage a pin **36** of a respective one of the conveyor motor control switches **26**. A coil spring **37** extends between the lower end of the respective finger **35** and a post **38** studded into the underside of the table **12**. Adjustment of the tension spring **37** is accomplished by means of a wing nut **39** threaded onto a pin **40** which extends through the post **38** and is actually connected to the tension spring **37**. The spring **37** holds the respective tucker plate **27** or **28** in its tucking position, i.e., as shown at the lower side of both FIGS. 2 and 5, by engagement between the end of an arcuate slot **41** and a stop post **42** that is erected on the edge of the machine table **12**.

When a block of sheets to be wrapped is either canted relative to the line of travel of the conveyor **11** or off-set relative to that line of travel as shown, respectively, in FIGS. 2 or 5, the respective corner of the block **14** engages one or the other of the tucker plates **27** or **28**. As is illustrated in FIG. 2, where the girth wrapped block **13** is shown as being canted slightly, the tucker plate **28** is functioning to tuck in the lower vertical front web **19** on that side, but poorly, because the web **19** will not be tightly wrapped around the edge of a block **14**. Conversely, however, by reason of the tilting or canting of the block **14**, the upper tucker plate **27** is unable to tuck in its respective vertical web **19** but, instead, has engaged the corner of the block **14** through the overwrap **15**.

As the conveyor paddle **23** continues to move the girth wrapped block **13** forwardly (to the left in FIG. 2), the engagement of the corner of the block **14** with the tucker plate **27** swings the tucker plates **27** around its rocker pin **29** (in a counterclockwise direction) to the position indicated by the reference number **27***a* in FIG. 2 and shown in broken lines. This movement disengages the finger **35** from its respective switch pin **36**, opening that switch **26** and de-energizing the motor for the conveyor **11**. As will later be described with reference to FIG. 8, an audible or visual signal may also be actuated at this point to call the operator's attention to the canted or jammed package or block so that he can correctly position it on the table and re-engage the conveyor motor.

Similarly, as shown in FIG. 5, if an individual girth wrapped block **13** is placed on the table **10** and moved onto the machine table **12** with its center line ofiset from the center line of the conveyor **11**, although squared up therewith, again the particular tucker plate **27** engaged by the corner of the block **14** through the overwrap **15** is swung horizontally to open its respective limit switch **26**.

When the girth wrapped block **13** is correctly positioned, i.e., centered beneath the conveyor **11** and between the two tucker plates **27** and **28**, each of them functions to tuck in the respective one of the front vertical webs **19** of the overwrap **15**. The springs **37** are so adjusted that their tension is sufficient to overcome the resistance of these front vertical webs **19** to being tucked in so that the tucker plates **27** and **28** remain in their innermost positions, holding their respective switches **26** closed so the conveyor **11** moves the block therebetween.

As the girth wrapped block **13** moves in the direction of the arrow indicated, for example in FIG. 5, the tucker plates **27** and **28** hold the front vertical end webs **19**

inwardly in tightly tucked position and the girth wrapped block **13** moves to the position illustrated, in part, in FIG. 6. Rear web tuckers **43** are mounted, one at each side of the machine table **12**, by vertical shafts **44** supported in ears **45** extending outwardly from an edge of the on-table **10** at its junction with the machine table **12**. The normal position of the rear tuckers **43** is shown in FIGS. 1, 2 and 5. Each tucker **43** comprises two vertically spaced, horizontal plates **46** positioned one above and one below the level of the front tucker plates **27** or **28** as the case may be.

After the particular girth wrapped block **13** has had its front vertical webs **19** tucked in as described above, and has been moved by the conveyor **11** to the position illustrated in FIG. 6, air cylinders **47** (FIG. 7) are actuated and, through bell cranks **48**, swing the rear tuckers **43** from normal position (FIG. 5) to tucking position (FIG. 6). The inward movement of the rear tuckers **43** is such that they tuck in the respective rear vertical webs **20** at each corner of the girth wrapped block **13** just prior to the arrival of the rear vertical webs **20** at a point where they would be engaged by the respective leading corners of the horizontal tucker plates **27** and **28**. As can best be seen in FIG. 6, tucking in of the rear vertical webs **20** at this time, and the holding of the rear vertical webs **20** in tucked position for a brief period of time by the two spaced plates **46** of the rear tuckers **43**, allows the tucked in webs **20** to pass inwardly of the edges of the front tucker plates **27** and **28** without entanglements. Immediately after this tucking action and at a time just slightly later than that illustrated in FIGS. 6 and 7, the air cylinders **47** are actuated to retract their respective rods and swing the rear tuckers **43** outwardly to the position illustrated in FIGS. 2 and 5.

Referring now to FIG. 8, a simplified wiring circuit for the apparatus comprises a start and stop and control panel **49** which is connected to power lines L_1 and L_2. The two switches **26** controlled by the front tucker plates **27** and **28** are connected in series with each other and with a conveyor motor **50** and a rear tucker actuating switch **51**. The switch **51** is so located as to be engaged by a lug **52** on the conveyor chain **24** when the block **13** reaches the rear tucker position. Closing the switch **51** actuates 4-way air valves **53** to cause the cylinders **47** to swing the rear tuckers **43** inwardly. If either of the switches **26** is opened by a canted or offset block (as described above), a relay **54** is dropped out of circuit allowing its contacts **55** to close and actuating an audible or visual signal such as a bell **55**.

Having described my invention, I claim:

1. Apparatus for tucking in the front and rear vertical webs of the protruding ends of an overwrap which has been girth wrapped around a rectangular block and sealed along overlapping margins of the overwrap, said apparatus comprising, in combination, a pair of opposed, horizontal, front tucker plates that are positioned on opposite sides of a path extending perpendicularly to the overlapped margins of said overwrap, each of said front tucker plates having a generally straight inner edge, said front tucker plates being mounted for pivotal movement on vertical axes between inner operating and outer stop positions, the inner edges of said front tucker plates being parallel and spaced horizontally from each other in operating position a distance only slightly greater than the length of said block along the overlapped margins of said overwrap, a conveyor extending along said path for moving girth wrapped blocks therealong with the protruding ends of the overwrap aligned with said front tucker plates, a motor for driving said conveyor, an electrical circuit for said motor, a switch in said circuit associated with each of said tucker plates, means on said tucker plates for holding said switches closed when said tucker plates are in operating position, and means for resiliently retaining said tucker plates in operating position.

2. Apparatus according to claim **1** and means for adjustably positioning said tucker plates vertically relative to the height of the girth wrapped block.

3. Apparatus according to claim **1** and a rear tucker associated with each of said front tucker plates, each of said rear tuckers comprising a pair of arms located, respectively, above and below the level of said front tucker plate, said rear tuckers being movable between outer rest positions and inner tuck positions adjacent said front tucker plates and means for moving said rear tuckers to tuck positions just prior to the arrival of the rear vertical webs of the ends of the overwrap at the edges of said front tucker plates.

References Cited

UNITED STATES PATENTS

2,713,761	7/1955	Abramowski	53—378
2,783,600	3/1957	Olson	53—378

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U.S. Cl. X.R.

53—378