

Jan. 13, 1970

B. C. DENT

3,489,043

WEB GUIDING APPARATUS FOR CORRUGATORS

Filed Oct. 23, 1967

2 Sheets-Sheet 1

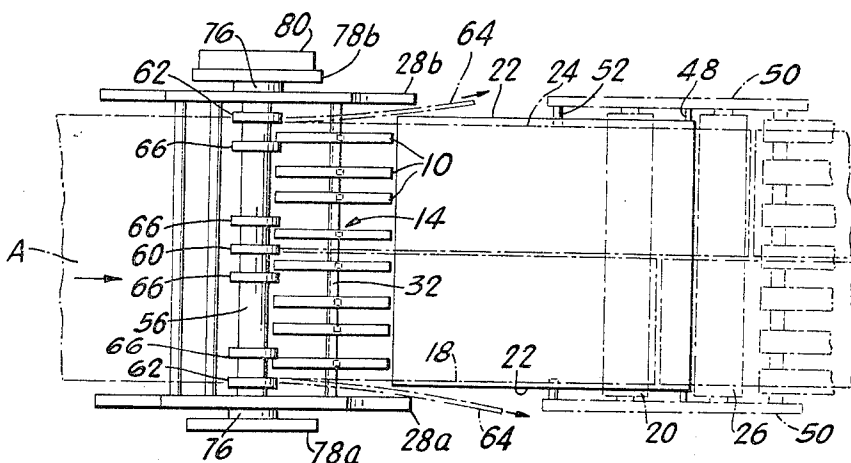


FIG. 3

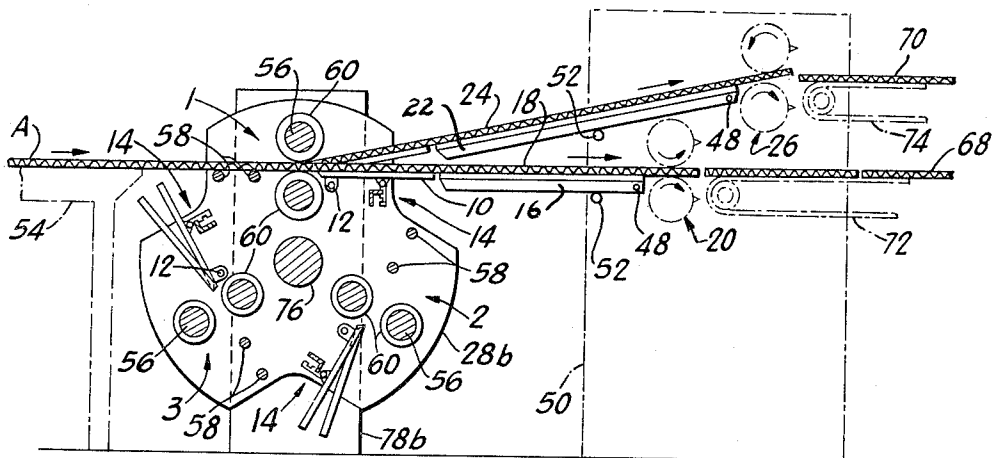


FIG. 1

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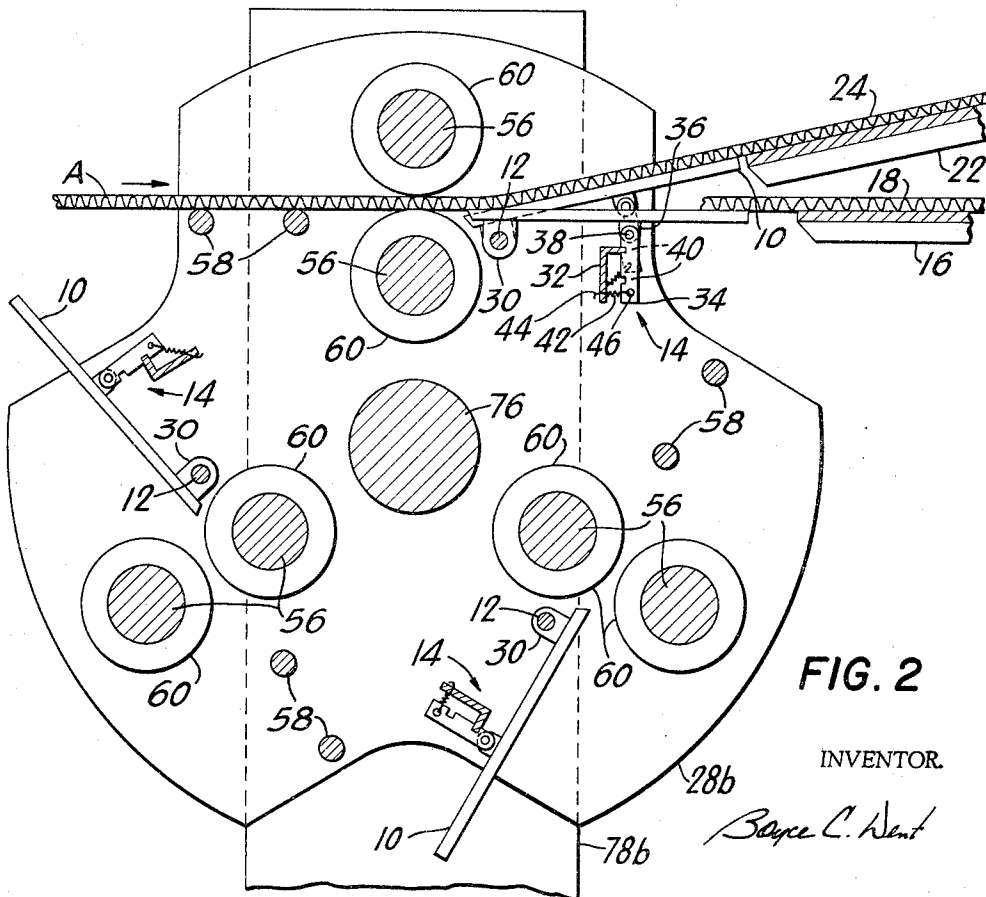
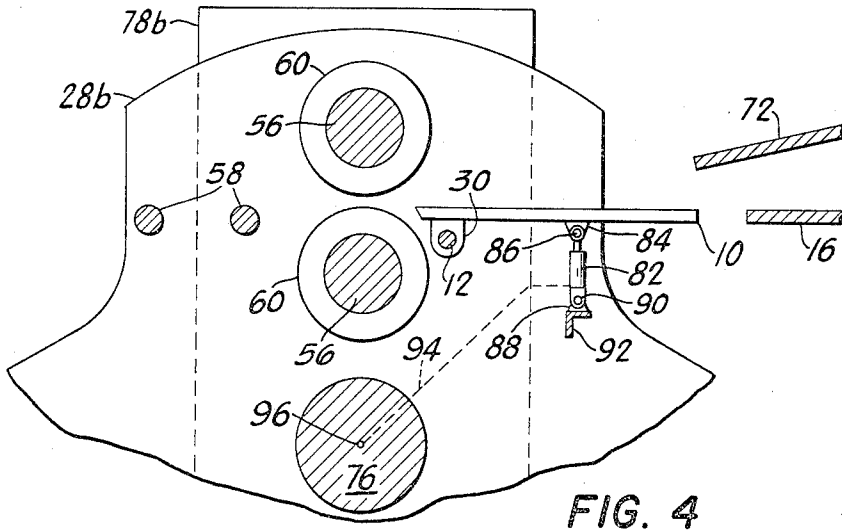
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2 Sheets-Sheet 2



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WEB GUIDING APPARATUS FOR CORRUGATORS
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10 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for guiding streams of parallel moving webs into horizontally diverging paths from a slitter-scoring machine into a transverse cut-off knife in a corrugator comprising a plurality of transversely-spaced slats pivoted at the exit nip of each work station on the slitter-scoring of which selected ones of the slats may be positioned by the operator during set-up of the work station prior to its engagement with the web. Detents are employed to maintain the slats in either of two positions selected. Supports are provided in alignment with both positions of the slats to receive and further guide the streams into the cut-off knife.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates generally to cutting and more particularly to a guide for moving work in association with a rotary cutting tool.

Description of the prior art

Conventional corrugating machines for producing a web of corrugated paperboard include a slitter-scoring machine following the web-forming portion of the corrugator. The slitter-scoring divides the web into two or more narrower streams of corrugated web and forms two longitudinal score lines in each narrower stream. These streams are guided into two or more transverse cut-off knives which cut the webs into selected length blanks.

The cut-off knives are generally arranged with one pair of cooperating cutting rolls positioned above another pair. Each pair may be preset to cut different length blanks from the narrow stream guided into it. Therefore, it becomes necessary to guide one portion of the divided web into the lower cut-off knife and the other portion into the upper cut-off knife. Occasionally, three cut-off knives are provided to cut varying length blanks from three streams of webs.

Of course, the initially formed web is not always divided into narrower streams of the same width. Instead of stopping the production of the web to reposition the slitting and scoring heads on the slitter-scoring to form different widths, a second pair of cooperating slitting and scoring shafts are provided in the slitter-scoring. The slitting and scoring heads on the second pair of shafts are positioned by the machine operator while the first pair is in engagement with the web. When an order change occurs, the initially formed web is transversely cut prior to reaching the slitter-scoring. The upstream portion of the web is then slowed down while the downstream portion continues at its normal pace. Thus, a gap is formed between the portions of the web. Before the slow portion of the web reaches the slitter-scoring, the latter is rotated to bring the second pair of shafts (work station) into engagement with the web.

Sometimes the slitter-scoring is provided with three work stations. The third station normally carries slitting heads for an often repeated order so that frequent repositioning is not necessary.

Conventionally, a plurality of transversely spaced slats are provided between the slitter-scoring and the cut-off

knives. These slats are positioned by the operator, during an order change, to guide one portion of the web to the lower knife and the other portion to the upper knife. The number of slats positioned to guide a stream to the upper knife depends on the width of the web stream.

Conventional slats manually positioned by the machine operator are not satisfactory because it is usually necessary to shut down the machine to allow enough time for positioning. Saunders et al. U.S. Patent No. 3,307,441, provides for the automatic positioning of the slats about their upstream ends into horizontally diverging paths for guiding the narrower web streams into the cut-off knives. Pivoting of the slats is performed by fluid cylinders which are actuated by valves connected to a control station. The valves are energized by push buttons at the control station. Pre-setting of the slats is accomplished by actuating the appropriate push button which is not energized until an order change is initiated. The latter automatic system is expensive because of the numerous controls required. Malfunction of the controls can result in expensive down-time. Order control cards are usually required to enable the operator to properly pre-set the machine.

SUMMARY

The present invention provides for presetting of a set of slats not in use without the need for complex and expensive controls and providing simple mechanical reliability.

In accordance with this invention, a set of slats is provided for each work station of the slitter-scoring machine, e.g., if the slitter-scoring has two work stations, two sets of slats are provided and if there are three work stations, three sets of slats are provided. Thus, the sets of slats are mutually exclusive. When one set is operating, the other is inoperative. The slats for the next work station to be used are positioned by the operator at the same time that he is positioning the slitting and scoring heads in the work station. The slats to be positioned within the set are selected according to the position of the slitting heads which divide the web. When these heads are set, the operator can easily visually determine which slats must be positioned without the need for control cards or the like.

The individual slats of each set are spaced across the width of the slitter-scoring just downstream from the exit nip formed by the slitting and scoring heads of the work station. The slats are pivotable about their upstream ends so that their downstream ends form diverging paths for guiding the web. Thus, the slats to guide one of the streams may be nearly horizontal while the others will be inclined to the horizontal. Detent means are provided for securing the slats in either of two positions.

When the slitter-scoring is rotated during an order change, the preset work station, including the set of slats, is brought into position for dividing the oncoming web and guiding the narrower streams to the respective cut-off knives. The slats are automatically aligned with support guides pivotably mounted adjacent the cut-off knives. Thus, the divided streams are guided by the slats onto the appropriate support guides and into the knives.

The above and further objects and novel features of the invention will appear more fully from the following detailed description when the same is read in connection with the accompanying drawings. It is to be expressly understood, however, that the drawings are not intended as a definition of the invention but are for the purpose of illustration only.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings wherein like parts are marked alike: FIGURE 1 is a side elevation illustrating a triplex slitter-scoring, a duplex cut-off knife, and the sets of slats in the

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slitter-scorer of which the uppermost set is guiding a pair of narrow web streams into the support guides and into the cut-off knife;

FIGURE 2 is an enlarged view of the slitter-scorer of FIGURE 1 illustrating in detail the detent means for securing the slats in first and second positions;

FIGURE 3 is a top view of the slitter-scorer of FIGURE 1 illustrating the transverse location of the slats; and

FIGURE 4 is an enlarged view of the upper portion of the slitter-scorer illustrating another construction of the detent means for securing the slats in position.

DESCRIPTION OF THE PREFERRED CONSTRUCTION

In the preferred construction of this invention, a set of slats is provided for each work station of the slitter-scorer. Each set is identical so that a description of the set shown engaging the web will suffice for all, it being understood that the lowermost set is pre-set while the uppermost set is operating.

The slats 10 are pivotable about a pivot bar 12 from a first or lower position, see upper portion of FIGURE 2, to a second or upper inclined position. A detent assembly 14 secures the slats in the selected position. The slats in the lower position are aligned with a support guide 16 which guides one of the narrow streams 18, see FIGURE 3, to the lower cut-off knife 20. The slats in the upper position are aligned with a support guide 22 which guides the other narrow stream 24 to the upper cut-off knife 26.

Referring now to FIGURE 2, pivot bar 12 spans the distance between sub-frames 28a, 28b of the slitter-scorer and is secured thereto in any convenient manner. Slats 10 include a pivot bracket 30 secured to their upstream ends and encircling pivot bar 12. Conventional shaft collars, not shown, may be placed around bar 12 on either side of bracket 30 to restrain the slats against lateral movement on bar 12.

Detent assembly 14 includes an L-shaped cross-member 32 secure to sub-frames 28a, 28b in any convenient manner. Beneath each slat 10, a detent bar 34 is pivotably mounted to conventional clevis bracket 36 by a clevis pin 38. Clevis bracket 36 is secured to slat 10 by screws or the like (not shown).

Detent bar 34 includes two notches 40 formed to engage one leg of cross-member 32. The notches 40 are spaced so that when the upper notch 40 engages member 32, the slat is positioned in the lower position. When the lower notch 40 engages member 32, the slat is positioned in the upper position. A tension spring 42 connects detent bar 34 to one leg of member 32 to maintain notched engagement of the bar to the member. Spring 42 may have conventional open loops on its ends which are passed through a hole 44 in member 32 and a hole 46 in bar 34. Being flexible, the spring 42 will stretch to allow bar 42 to be in notched engagement in either position. Thus, it can be seen that to position the slats, it is necessary only to move detent bar 34 from one notched position to the other. It should be understood that other detent arrangements are capable of positioning the slats in the desired position. The one shown is selected as a matter of convenience.

As best illustrated in FIGURE 1, the cut-off knife is provided with support guides 16 and 22. Although these guides are illustrated as extending uninterrupted across the width of the cut-off knife, they may readily be constructed as slats similar in nature to slats 10. However, as illustrated, the guides are pivotable about pins 48 in the side-frames 50 of the cut-off knife. Support pins 52 are provided upon which the guides rest. Accordingly, guides 16 and 22 may be pivoted upward and out of the way to permit access to the cut-off knife if required. The lower guide 16 may be made narrower than upper guide 22 so that it will clear the upper pins 52 when pivoted upward. The lower pins 52 will, of course be longer than the upper pins in order to support the narrower lower guide 16. Both guides 16 and 22 may be pivoted past the

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vertical center of pins 48 until they rest against the cut-off knives themselves.

OPERATION

In operation, referring to FIGURE 1, a web A is fed to the slitter-scorer from a feed table 54. Web A is guided between shafts 56 of work station 1 by a pair of guide rods 58 which not only guide the web but connect sub-frames 28a, 28b. Shafts 56 have slitting heads 60 mounted thereon for dividing web A into narrower streams 18 and 24. Trimming heads 62, see FIGURE 3, on shafts 56 trim the usually ragged edges of web A. The trim 64 is disposed of by feeding it into a suction tube (not shown) in the usual manner. Score heads 66 are also provided for impressing score lines in the webs 18 and 24.

The slats 10 for work station 1, having been positioned during a previous order, are in the correct upward and downward positions to guide webs 18 and 24 onto the respective support guides 16 and 22 and thereafter into the respective cut-off knives. The knives transversely cut the webs into the desired lengths to form blanks 68 and 70 in the customary manner. Conveyors 72 and 74 are usually provided for removing the blanks from the cut-off machine.

During the time that an order is running, the operator positions the trimming, slitting, and scoring heads on shafts 56 of work station 2. At the same time, the appropriate slats 10 are placed in the upper or lower position. For example, referring to FIGURE 3, all the slats to the left, looking in the direction of paper travel, of slitting head 60 are raised to the upper position and the slats to the right are lowered to the lower position. Thus, it can be seen that all the slats to the left will support and guide the web which is divided by slitting head 60. Whenever the slitting head 60 is repositioned across the shaft 56, different ones of the slats will be in the upper and lower positions. It should be understood that the web A is sometimes divided into more than two narrower streams. Then, the slats may be positioned to guide the streams into the appropriate cut-off knife.

When an order change is initiated, the web A is severed along the work table 54 as previously described. When the downstream portion of the web clears the slitter-scorer, the latter is rotated to bring work station 2 into position for operating on the web. The slats, having been preset, are in position for guiding the streams 18 and 24 onto the support guides 16 and 22.

Rotation of the slitter-scorer is accomplished in the conventional manner. The work stations 1, 2 and 3 are supported for driven rotation between sub-frames 28a, 28b. The sub-frames are supported on a centrally located trunnion shaft 76 which is in turn rotatably mounted in standards 78a, 78b. An enclosure 80 on standard 78b contains all the conventional drive motors, gears, indexing mechanisms and the like for operating the slitter-scorer.

OTHER CONSTRUCTIONS

The construction shown in FIGURE 2 can be modified to make positioning of the slats more automatic if desired. Such arrangement is shown in FIGURE 4 which illustrates the upper portion of a slitter-scorer. In this construction, fluid cylinders 82, preferably pneumatic, are employed in place of the detent assembly 14. Cylinders 82 are pivotably connected to the underside of slats 10 by a conventional clevis bracket 84 and pin 86. The opposite end of cylinders 82 are pivotably supported by a similar clevis 88 and pin 90 to a structural angle 92 supported between sub-frames 28a, 28b. Air pressure is supplied to cylinders 82 via conventional air lines and fittings 94 which preferably are connected to an air supply (not shown) through a port 96 in trunnion shaft 76 which terminates in a conventional rotary union (not shown) on the end of shaft 76. This type of connection, well known in the art, permits air pressure to be routed to cylinders 82 even though the sub-frames 26a, 26b are rotated dur-

ing changeover to another order. Suitable operating valves connect the supply line 94 to each of cylinders 82.

Thus, to position each slat 10 from the first or lower position to the second or upper position, the operator need only actuate the appropriate operating valve to extend the cylinder 82 thereby raising slat 10. Cylinders 82 may be provided with a spring return so that when the operating valves are returned to the off position, the cylinders will return the slats to the first or lower position.

In summary, the present invention provides a simple, economical, and easily operated means for guiding a number of parallel moving webs into the respective cut-off knives in a corrugator. It possesses dependable mechanical reliability. Pre-setting of the slats is easily accomplished without the need for control cards or the like. The apparatus can be readily adapted to fit existing machines already placed in operation.

Having thus described the invention in its best embodiment and mode of operation, that which is desired to be claimed by Letters Patent is:

I claim:

1. Apparatus for guiding streams of parallel moving webs into horizontally diverging paths, comprising:

a plurality of sets of slats of which any one set is adapted for operative engagement with said streams along the path of travel thereof while the remaining set is out of engagement with said streams, each of said sets including a plurality of slats spaced across the path of travel of said streams during operative engagement therewith; and

pivoting means for pivoting selected ones of said slats within the remaining set of slats out of engagement with said streams,

said selected ones of said slats being pivotable about their upstream ends to an inclined position for guiding one of said streams in a horizontally diverging path with respect to the others of said streams when said remaining set of slats is placed in operative engagement with said streams.

2. The apparatus of claim 1 wherein said pivoting means includes detent means associated with each of said slats operative to secure the slat in either an up or down position.

3. The apparatus of claim 2 wherein said detent means includes:

a cross-member secured beneath the downstream end of each of said sets of slats; and

a detent member secured to the underside of each of said slats adjacent said cross-member and having spaced first and second engaging means for engaging said cross-member to position said slats in either of said up or down positions.

4. The apparatus of claim 1 wherein said pivoting means includes:

fluid actuating means secured to each of said slats and operable to pivot said slats in either an up or down position; and

means for energizing selected ones of said fluid actuating means.

5. The apparatus of claim 1, and in addition:

first and second support guides adjacent the downstream end of the set of slats in operative engagement with said streams, said first support guide in alignment with selected ones of said slats positioned in a substantially horizontal path and said second support guide in alignment with the remaining ones of said slats, said first and second support means guiding said streams of webs in horizontally diverging paths into subsequent processing machinery.

6. The apparatus of claim 5 wherein each of said support guides is pivotably secured adjacent its downstream end whereby its leading end may be positioned out of alignment with said slats.

7. In a slitter-scorer machine having at least two pairs of cooperating shafts for dividing a moving web into streams of parallel moving webs, one of said pairs of shafts being operative upon the web while the other of said pairs is inoperative, the improvement comprising:

a first set of slats associated with one of said pairs of shafts;

a second set of slats associated with the other of said pairs of shafts,

each of said sets of slats having a plurality of slats spaced across the path of travel of said streams of webs and each of said slats being pivotable about its upstream end; and

pivoting means for pivoting selected ones of said slats in the set of slats associated with the inoperative one of said pairs of shafts about their upstream ends to an inclined position for guiding one of said streams of webs in a horizontally diverging path with respect to others of said streams when said inoperative pair of shafts is in the operative position.

8. Slitting and scoring apparatus for a paperboard web, comprising:

a pair of spaced frame members;

a pair of spaced sub-frame members;

a plurality of pairs of rotatably driven support shafts supported between said sub-frame members;

cooperating slitting and scoring members on said support shafts for dividing and scoring said web as the web passes therebetween;

means journalling said sub-frame members for rotation between said frame members for placing one of said pairs of support shafts in position to bring said cooperating slitting and scoring members into operation engagement with said web; and

guide means associated with each of said pairs of support shafts for guiding divided portions of said web into horizontally diverging paths,

each of said guide means including

a plurality of transversely spaced slats underlying said divided portion of said web;

a pivot shaft supported between said sub-frame members adjacent the downstream side of said slitting and scoring members for said guide means about which selected ones of said slats are pivotable to an inclined position; and

detent means for securing the selected ones of said slats in said inclined position.

9. The apparatus of claim 8 wherein said detent means includes a cross-member secured beneath the downstream ends of said slats and a detent member secured to each of said slats adjacent said cross-member, said detent member having first and second engaging means adapted to engage said cross-member for securing each of said slats in a horizontal or inclined position.

10. The apparatus of claim 8 with:

support means adjacent the discharge end of the slats in operative engagement with divided portions of said web, said support means adapted to guide said divided portions of said web to different paths for processing by subsequent machinery.

References Cited

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3,307,441 3/1967 Saunders et al. ----- 83-302

WILLIAM S. LAWSON, Primary Examiner

U.S. CI. X.R.

83-105, 165, 302, 408, 443, 479; 93-58.2; 226-199