United States Patent

[11] 3,585,780

[72] Inventor James Elmore
Simsbury, Conn.

[21] Appl. No. 826,509
[22] Filed May 21, 1969
[45] Patented June 22, 1971
[73] Assignee The Stanley Works
New Britain, Conn.

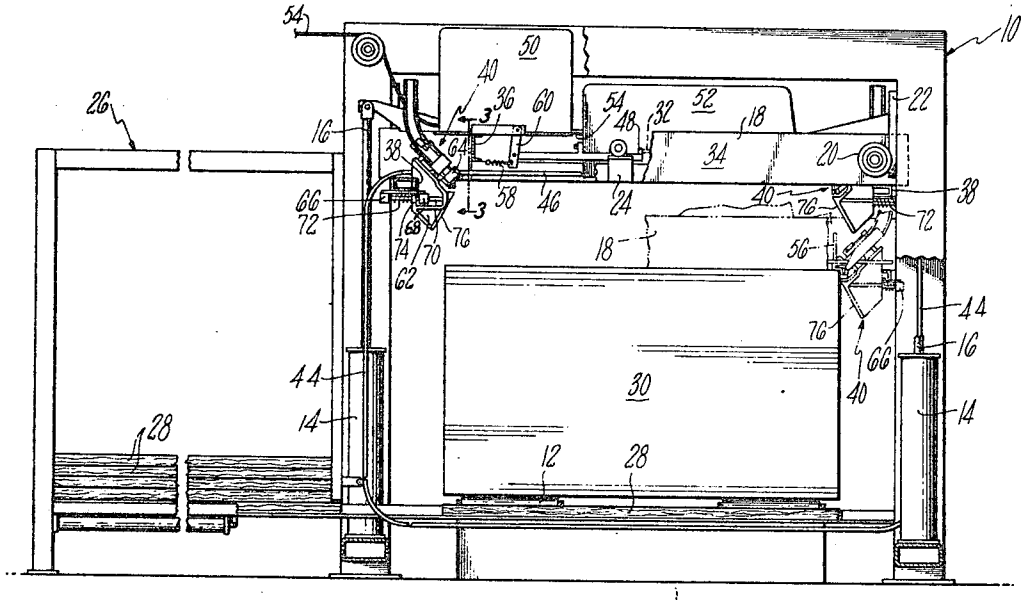
[54] **STRAPPING MACHINE INCLUDING FEEDER FOR EDGE PROTECTORS**
10 Claims, 7 Drawing Figs.

[52] U.S. Cl. 53/124, 53/128, 53/198
[51] Int. Cl. B65b 13/18, B65b 13/20
[50] Field of Search ..... 53/128, 198, 124 D

[56] References Cited
UNITED STATES PATENTS
3,378,987 4/1968 Lems ..... 53/128 X

Primary Examiner—Theron E. Condon
Assistant Examiner—Neil Abrams
Attorney—Prutzman, Hayes, Kalb & Chilton

ABSTRACT: A compression strapping machine for binding large bundles, such as a stack of plywood, includes a hopper fed dispensing device for edge protectors capable of firmly and accurately positioning the protectors between the bundle and the encircling strap for protecting the edges of the bundle from damage. The device includes a leaf spring and dashpot movable with the dispenser for controllably positioning a protector support in alignment with a delivery station, the support receiving and retaining the protector in position prior to tightening of the strapping. The dispensing device is laterally movable to accommodate packages of different width.



PATENTED JUN 22 1971

3,585,780

SHEET 1 OF 3

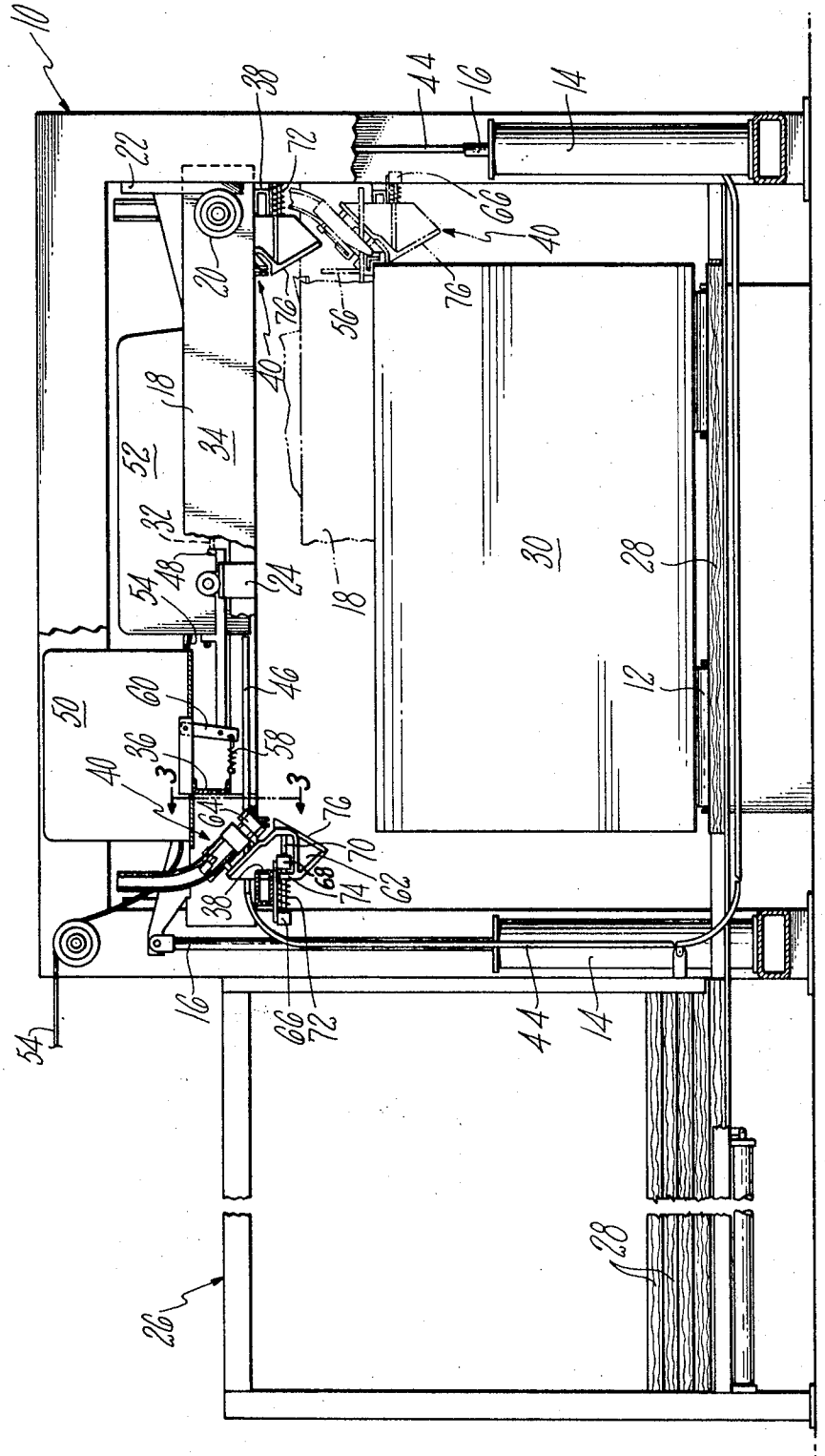


FIG. 1

INVENTOR
JAMES ELMORE

BY Pritzman, Hayes, Kalb and Chilton
ATTORNEYS

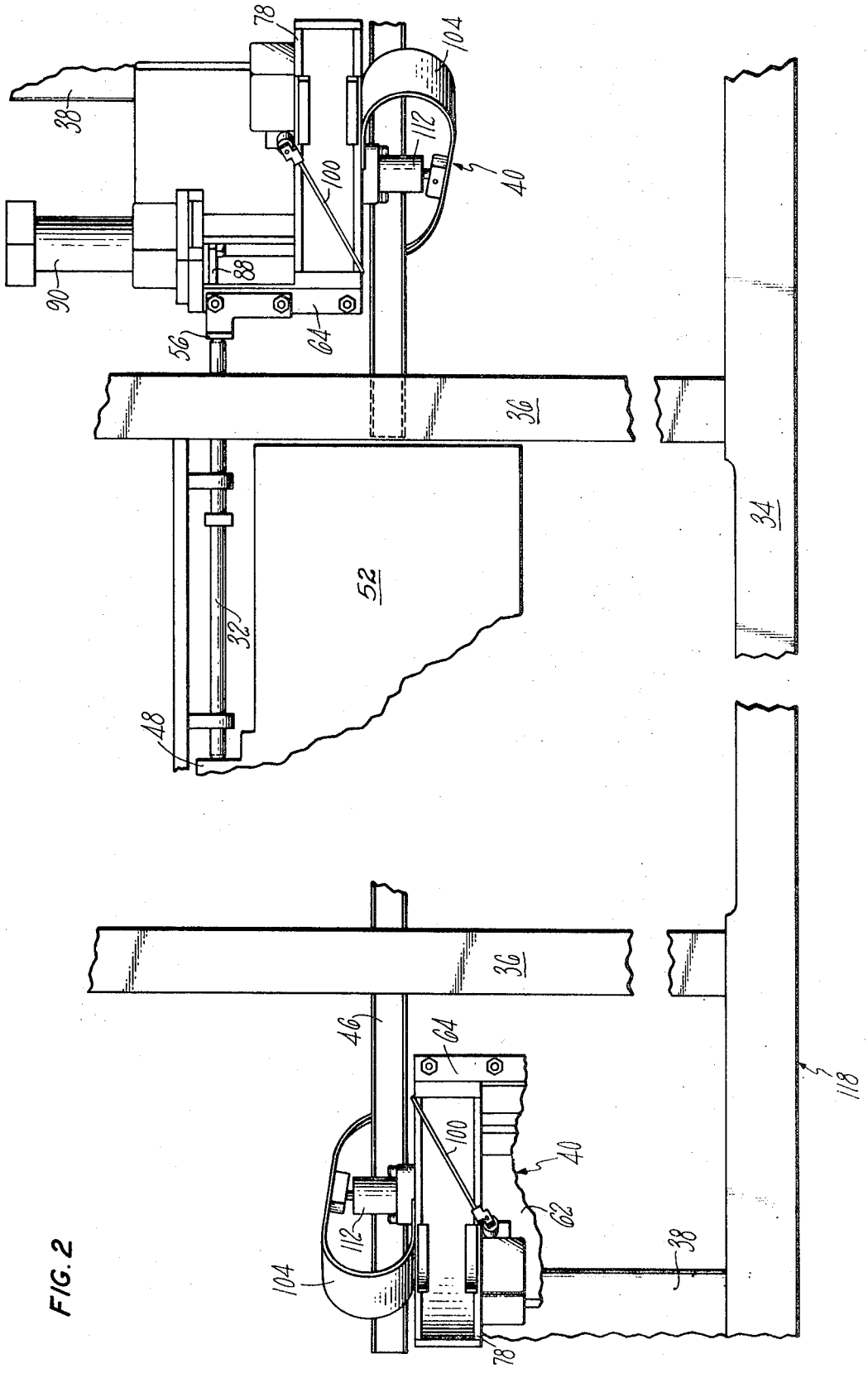


FIG. 2

FIG. 4

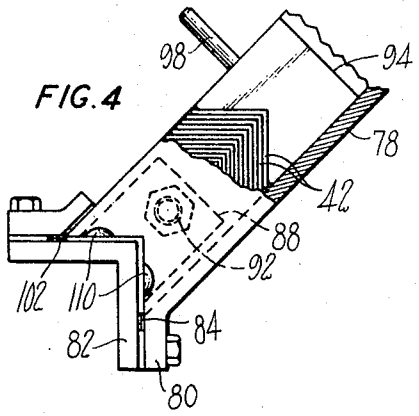
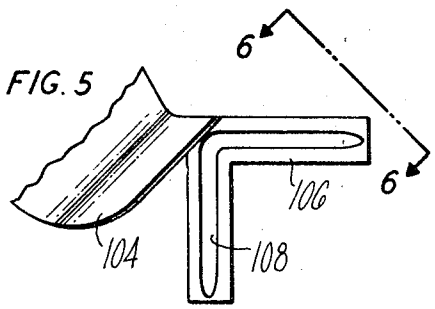


FIG. 3

FIG. 7

FIG. 5



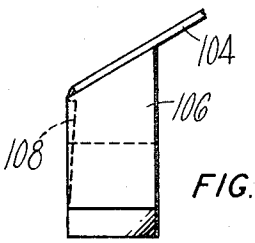


FIG. 6

STRAPPING MACHINE INCLUDING FEEDER FOR EDGE PROTECTORS

BACKGROUND AND SUMMARY OF THE INVENTION

The present invention relates generally to strapping machines capable of securely binding large packages. More particularly, it is directed to a new and improved portion of such machines which supplies and positions edge protectors between the package and the strapping tightly drawn thereabout.

An object of the invention is to provide a machine of the type described including a feeder for edge protectors which automatically and accurately positions protectors on the edge of the bundle being secured and positively prevents misalignment or displacement of the protectors prior to securing the bundle.

Another object of the present invention is to provide a new and improved corner feeder assembly for edge protectors which not only accurately positions the protector but also permits lateral adjustment to accommodate bundles of different width.

Another object of this invention is to provide a simplified yet reliable and durable structure for automatically delivering and retaining edge protectors during the strapping of large packages.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

These and related objects are obtained in accordance with the present invention by providing a strapping machine with feeder assemblies having means for positioning edge protectors between a bundle and the strapping used to secure the bundle. The assemblies include feeders having a delivery station for systematically receiving the edge protectors being dispensed and a stripping station immediately adjacent the delivery station for receiving individual edge protectors therefrom. Each assembly includes an operator for selectively driving an edge protector from the delivery station and releasable retaining means within the stripping station for receiving an edge protector driven from the delivery station by the operator. The retaining means firmly holds the delivered protector within the stripping station until stripped therefrom by the strap being used to secure the bundle.

A better understanding of the objects, advantages, features, properties and relationships of the invention will be obtained from the following detailed description and the accompanying drawings which set forth certain illustrative embodiments and are indicative of the various ways in which the principle of the invention is employed.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a front end view, partly broken away, of a compression strapping machine incorporating the features of the present invention;

FIG. 2 is an enlarged, fragmented, top plan view of the pressure platen and edge protector feeders as assembled in the machine of FIG. 1;

FIG. 3 is an enlarged front view of a feeder assembly of the present invention, taken along the line 3–3 of FIG. 1;

FIG. 4 is an enlarged side view of a feeder's delivery station taken along the line 4–4 of FIG. 3;

FIG. 5 is a side view of a feeder's retaining pad taken along the line 5–5 of FIG. 3;

FIG. 6 is an end view of the pad of FIG. 5 taken along the line 6–6 of FIG. 5; and

FIG. 7 is a fragmentary front view of a feeder's stripping station with an edge protector positioned therein.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now to the drawings in greater detail wherein like reference numerals indicate like parts throughout the several figures, the compression strapping machine of the present invention is shown in FIG. 1 as including a gantry frame 10 housing a strapping station for securely and tightly binding large bundles of plywood sheets and the like supplied to the station by a conveyor 12 passing through the gantry. A pair of hydraulic operators 14 mounted on opposite sides of the conveyor and supported by the gantry frame 10 include drive rods 16 operatively connected to a pressure platen 18 for reciprocally driving the platen toward and away from the conveyor 12. Guide wheels 20 mounted on opposite ends of the gantry-traversing platen 18 ride along side rails 22 of the gantry frame to stabilize the platen in its reciprocal movement between its rest and compression positions, illustrated respectively in full and phantom lines in FIG. 1. On one side of the gantry 10 abutting the strapping station there is provided a suitable batten feeding station 26 equipped for automatically inserting a bottom runner or batten 28 beneath the large bundle 30 waiting to be strapped. As shown, the batten, such as a 2×4 wooden beam, is of sufficient length to fully traverse the entire width of the bundle 30 thereby both protecting the bottom of the bundle and facilitating subsequent movement of the strapped bundle as a single palletized unit.

The pressure platen 18 is a generally rectangular framelike structure consisting essentially of a pair of spaced compression plates 34 fully traversing the opening of the gantry and fixedly interconnected relative to each other by means of a number of transversely extending beams 36. A pair of support flanges 38 depend from diagonally opposed corners of the pressure plate 18 and support a pair of edge protector feeder assemblies, generally designated by the numeral 40 on opposite ends of the platen. As will be explained in greater detail hereinafter the feeder assemblies 40 accurately position L-shaped metal edge protectors 42 on the top edges of the bundle 30 directly above the batten 28 to protect those edges from the securing strapping. A strap-receiving channel or chute 44 of generally U-shaped cross section is supported by the frame 10 at the strapping station and facilitates feeding of the strapping around the bundle 30, portions 46 of the chute being carried by the movable plate 18 for positioning in alignment with the remainder of the chute when the platen 18 is located in its fully retracted rest position. As illustrated in FIG. 2, the chute portions 46 traverse the platen between the compression plates 34 in spaced parallel relationship thereto. Additionally, chute portions 46 substantially abut each of the feeder assemblies 40 thereby enabling the strapping to remove a corner protector 42 from the feeder as the strapping is tightened about the bundle 30.

The pressure plate 18 additionally carries a strapping accumulator 50 and a power strapping head 52 which receive the strapping 54 from a suitable supply roll (not shown) and in turn threadably feed it through the strap-receiving chutes 44 and 46 to fully surround the package within the strapping station. After feeding the strapping about the bundle 30, the pressure platen may be lowered to not only bring the compression plates 34 into firm contact with the top of the bundle but also simultaneously bring the feeder assemblies 40 into engagement with the edges thereof. Each feeder assembly 40 will deliver an edge protector 42 to a stripping station between the bundle 30 and the strapping 54 as the power strapping head 52 quickly and efficiently tightens and seals the strapping about the package. In this manner the top edges of the bundle are protected by the corner protectors while the bottom of the package is protected by the transversely extending batten 28.

Referring particularly to FIGS. 1 and 2, the pressure platen 18 is further provided with a short upstanding track 24 which mounts the power strapping head 52 for limited lateral movement during tensioning of the strapping. In order to assure that this movement of the strapping head 52 does not result in contact with the feeder assembly 40, a push rod 32 is mounted between a side flange 48 of the power strapping head and an upstanding plate 56 carried by the right-hand feeder assembly 40, as viewed in FIGS. 1 and 2. In this manner any movement of the head 52 to the right will cause corresponding lateral

movement in the feeder assembly 40. As soon as the strapping machine completes its strap tensioning, sealing and shearing operations, it is returned to its original position by means of the spring 58 and pivot linkage 60 adapted for this purpose.

As mentioned hereinbefore, the feeder assemblies 40 of the present invention are shown to be securely mounted on a support flange 38 of the pressure platen 18 for positioning edge protectors on the top edges of bundle 30. It will, of course be appreciated that the assemblies are equally well suited for positioning edge protectors on the bottom edges of the bundle. The assemblies 40 are substantially identical and include a support member 62 slidable attached to the flange 38 and a feeder 64 for the edge protectors fixedly secured to the support member 62 for movement therewith. As best shown in FIG. 1, a pair of spaced bosses 66, 68 depend from each flange 38 and slidably mount rods 70 of the support member 62 for limited movement of the assemblies 40 toward and away from each other. In the embodiment illustrated, compression springs 72 are mounted over the slide rods 70 between the outermost boss 66 and a flange 74 of the support member and are operative for constantly urging the support members toward each other while permitting limited outward movement thereof for accommodating packages of somewhat larger width. Each support member 62 also includes a face portion 76 directed generally downwardly and inclined outwardly away from the bundle 30 positioned in the strapping station. Each face portion 76 is dimensioned to laterally accommodate various size bundles and permit contact with the top edge thereof as the platen is lowered. As shown in phantom in FIG. 1, the inclined face portions 76 will cause the feeder assemblies to cam outwardly against the bias of springs 72 as the platen is lowered into contact with wide bundles. As mentioned hereinbefore, the assembly 40 on the right as viewed in FIG. 1 may move laterally outwardly an additional amount during the tensioning operation. Additionally, it will be apparent that powered positioning devices such as pneumatic cylinders may be used in place of the illustrated construction for the purpose of locating the feeder against the package.

Referring now to FIGS. 2—4, each edge protector feeder 64 carried by a support member 62 includes a U-shaped supply hopper or magazine 78 terminating in a flared base portion 80 which, together with an L-shaped bearing block 82 define a narrow delivery station 84 (FIG. 4) communicating with the hopper. An L-shaped slide pr pusher 86 is positioned within the delivery station 84 for reciprocal movement transversely of the hopper and includes an upstanding operating lever 88 connected to a fluid operator 90 through the piston rod 92. A weight 94 may be positioned within the hopper 78 to urge the edge protectors 42 toward the delivery station 84 where the reciprocating operation of the pusher 86 causes their selective separation from the stack and delivery to a stripping station 96 underlying the strapping chute portion 46. As shown, the weight 94 is beneficially provided with an upstanding pin 98 which cooperates with the supply sensing arm 100 to indicate when the supply of edge protectors 42 within the hopper 78 is almost exhausted. Since the size of the opening in the delivery station for receiving the protectors is slightly greater than the thickness of an individual protector, the pusher 86 is provided with a tapered lead edge 102 to assure contact with and delivery of only a single protector during each delivery stroke of the pusher 86.

In accordance with the present invention, the feeder 64 is also adapted to hold an edge protector 42 in the stripping station 96 until it is stripped therefrom by the strapping 54 during tensioning thereof by the power strapping head 52. Accordingly, one end of a leaf spring 104 is securely attached to the side of the supply hopper 78 while the free end thereof carries an L-shaped abutment pad or block 106 for receiving a protector 42 as it is displaced from the delivery station. The spring 104 is appropriately curved to position the pad 106 in alignment with the side of the delivery station and spaced therefrom by a distance equal to about one-half the length of an edge protector. As best shown in FIGS. 5—4, the side of pad 106 facing the delivery station is provided with an L-shaped recess or cradle 108 which tapers outwardly toward the free ends of the pad. Accordingly, as the pusher 86 delivers an edge protector to the stripping station the leading edge of the protector is received within the cradle 108 and moves the pad against the bias of its supporting spring 102 to the position shown in FIG. 7. It will, of course, be appreciated that the delivery stroke of the pusher is of sufficient length to not only remove the protector from the delivery station 84 but also permit the protector to fully clear the bearing block 82 thereby enabling its unobstructed removal from the stripping station by the strapping as it is drawn out of the overlying chute portions 46 and tightened on the bundle 30. In order to prevent misalignment of the edge protector while in the stripping station, a pair of arcuate abutments 110 are provided on the flared terminal portion 82 of the hopper. The pusher 86, of course, is retained in its advanced position and cooperates with both the cradle 108 and the abutments 110 in preventing accidental dislodgment or misalignment of the edge protector from its proper position. As best shown in FIG. 7, the taper of the cradle 108 on the displaced pad 106 facilitates removal of the protector.

In the preferred embodiment of the invention the protectors are rapidly delivered to the stripping station and consequently contact the pad 106 with sufficient force to drive it outwardly beyond a retaining position unless movement thereof is appropriately checked. As shown in FIGS. 2 and 3, a dashpot 112 is advantageously provided for controlling the response of the leaf spring 104 to the driving force of the edge protector. The dashpot is affixed to the side of the supply hopper 78 and includes a piston rod 114 securely attached to the leaf spring 104 to provide the requisite pneumatic damping action and ensure controlled yielding of both the spring and the pad 106 under the driving force of the protector.

As can be seen from the foregoing detailed description, the present invention provides a compression strapping machine which includes a device for accurately delivering edge protectors to predetermined positions on a package and positively retaining those protectors in place from the moment of delivery until tensioning of the strapping has been completed. The device includes a hopper and dispenser movable as a unit with the pressure platen of the machine yet is capable of lateral movement to accommodate bundles of varying width. Additionally, the machine is capable of fully automated operation at high speed with consistently reliable results.

As will be apparent to persons skilled in the art, various modifications, adaptations and variations of the foregoing specific disclosure can be made without departing form the teachings of the present invention.

I claim:

1. A feeder assembly for edge protectors well suited for use in a compression strapping machine defining a strapping station and having a pressure platen reciprocally movable toward and away from a bundle positioned within said station, including a feeder having a delivery station for systematically receiving edge protectors to be dispensed, a stripping station immediately adjacent said delivery station for receiving individual edge protectors from said delivery station, an operator for selectively driving an edge protector from the delivery station toward the stripping station for positioning the edge protector in spaced conforming relationship to the edge of the bundle receiving the protector and releasable retaining means within said stripping station for abuttably receiving an edge protector driven from the delivery station by the operator and firmly retaining the delivered protector within the stripping station in spaced conforming relationship to the edge of the bundle until stripped therefrom by the strapping securing said bundle.

2. The feeder assembly of claim 1 wherein the feeder includes damping means associated with the retaining means for controlling the movement of the retaining means under the driving force of the protector during positioning thereof in the stripping station.

3. The feeder assembly of claim 1 wherein the feeder includes biasing means for urging the retaining means toward the delivery station for receiving and retaining protectors driven from the delivery station and damping means for damping the movement of the retaining means under the driving force of the protector during positioning thereof in the stripping station.

4. The feeder assembly of claim 1 wherein the feeder includes a magazine for edge protectors communicating with the delivery station for continuously supplying edge protectors thereto and the operator includes a reciprocating slide movable transversely of the magazine along the delivery station for delivering a protector to the stripping station and maintaining contact therewith until the protector is stripped therefrom.

5. The feeder assembly of claim 1 wherein the releasable retaining means includes a pad aligned with the delivery station and configured to receive an edge protector and biasing means urging the pad toward the operator for cooperating with the operator in retaining the protector in the stripping station.

6. The feeder assembly of claim 1 wherein the feeder includes a magazine for edge protectors communicating with the delivery station for continuously supplying edge protectors thereto, biasing means mounted on the magazine for urging the retaining means toward the delivery station and a dashpot connected to the biasing means for controlling the movement of the retaining means under the driving force of the protector.

7. The feeder assembly of claim 1 including a support member for the feeder mounted on the platen for limited movement transversely of the bundle within the strapping station, said support member including sensing and positioning means for sensing the location of the bundle and imparting said transverse movement to the assembly for positioning thereof adjacent the edge of the bundle.

8. The feeder assembly of claim 7 wherein said sensing and positioning means includes a cam portion cooperating with said bundle.

9. The feeder assembly of claim 7 wherein the feeder includes biasing means for urging the retaining means toward the delivery station for receiving and retaining protectors driven from the delivery station and damping means for damping the movement of the retaining means under the driving force of the protector during positioning thereof in the stripping station.

10. The feeder assembly of claim 1 in combination with a compression strapping machine having a reciprocably movable pressure platen, the assembly being movable with the platen and transversely thereto to accommodate bundles of different dimension, said assembly including biasing means and inclined cam surface for contacting the edges of the bundle within the strapping station and driving the assemblies against the bias of said biasing means upon movement of the platen toward the bundle.