April 18, 1950 M. VAN ANTWERPEN 2,504,473

MACHINE FOR FABRICATING A CUSHIONING PACKAGING STRIP

Filed March 24, 1947 11 Sheets-Sheet 1

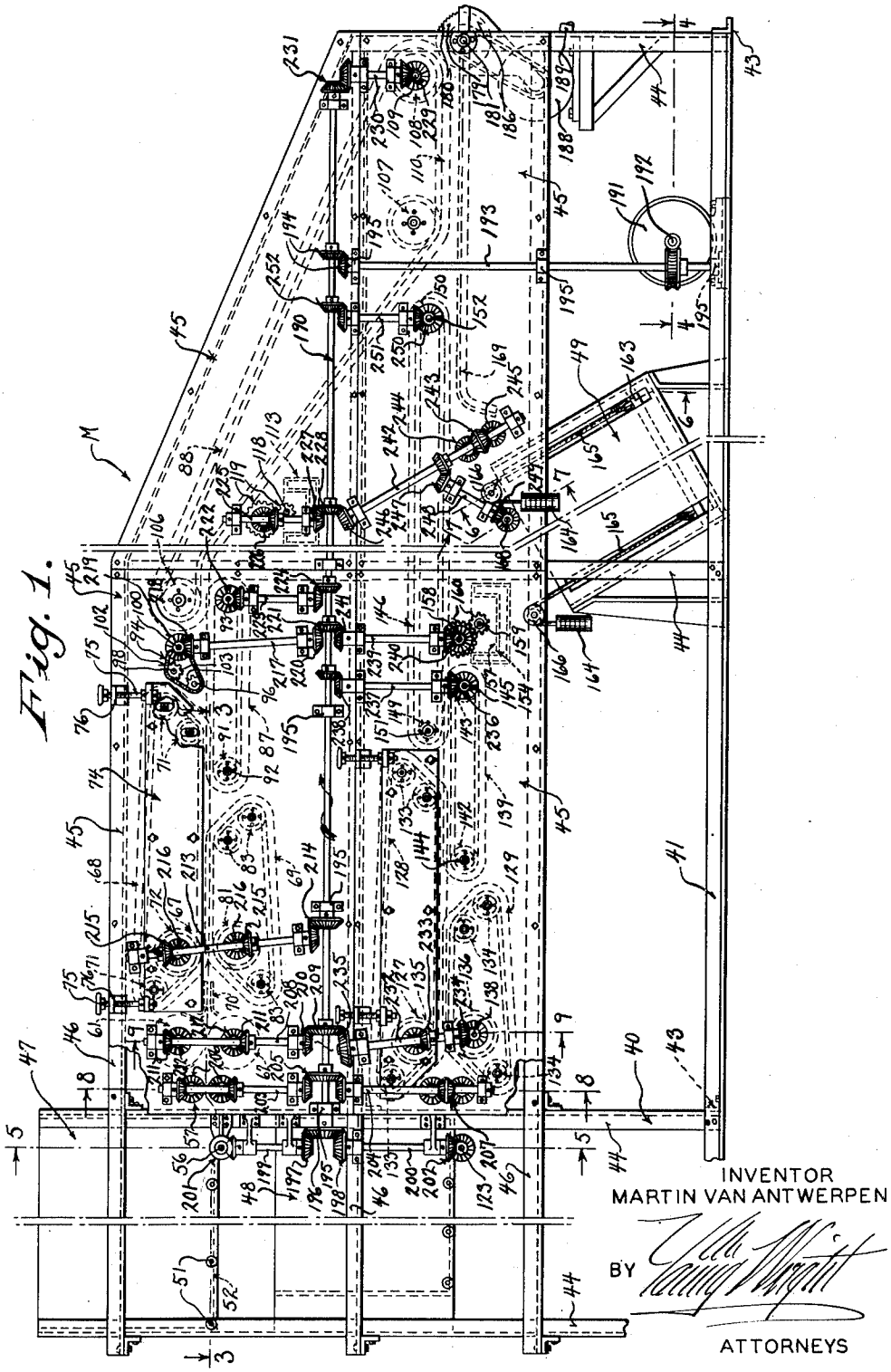

Fig. 1.

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MACHINE FOR FABRICATING A CUSHIONING PACKAGING STRIP

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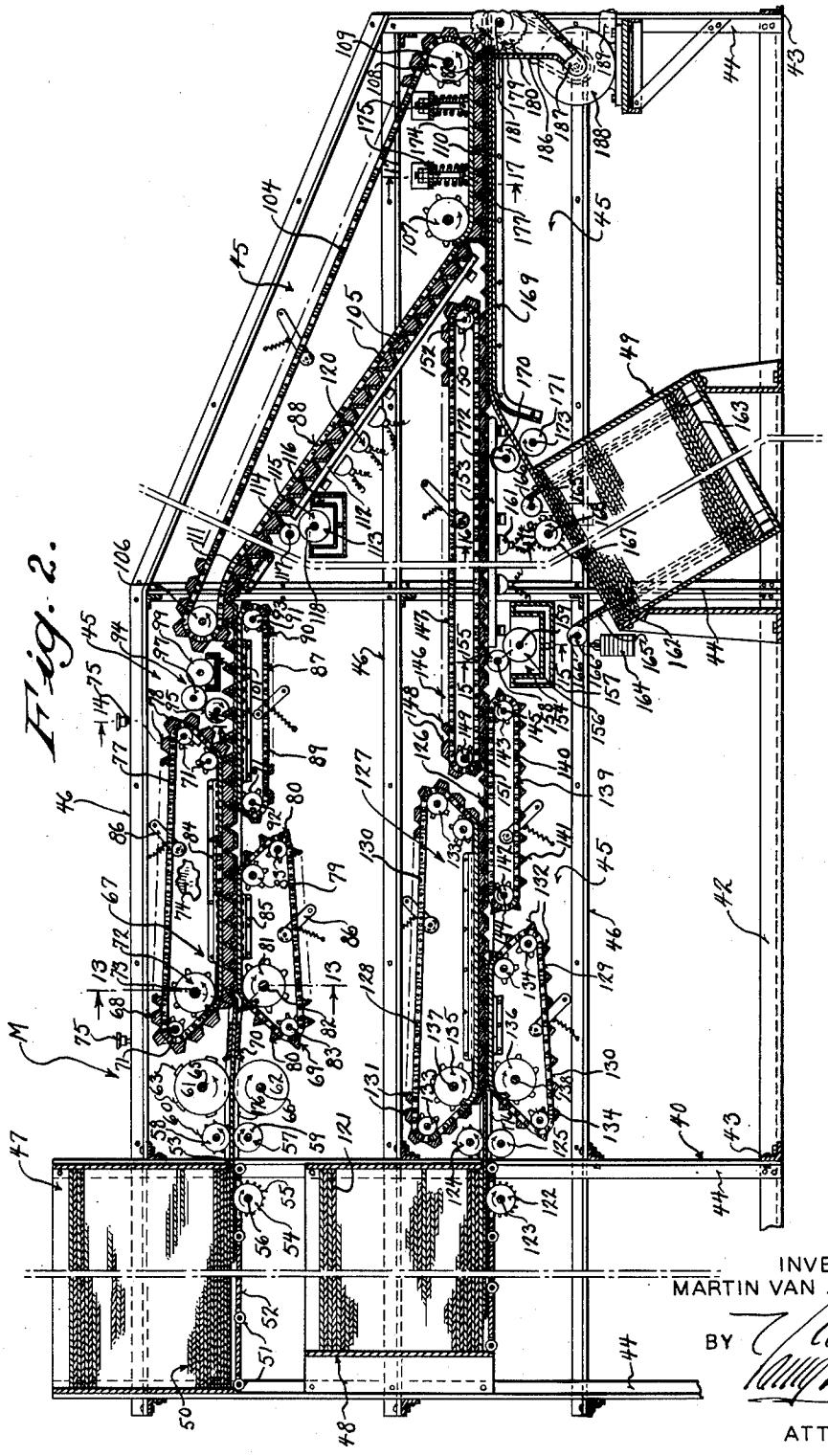
Fig. 2.



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MACHINE FOR FABRICATING A CUSHIONING PACKAGING STRIP

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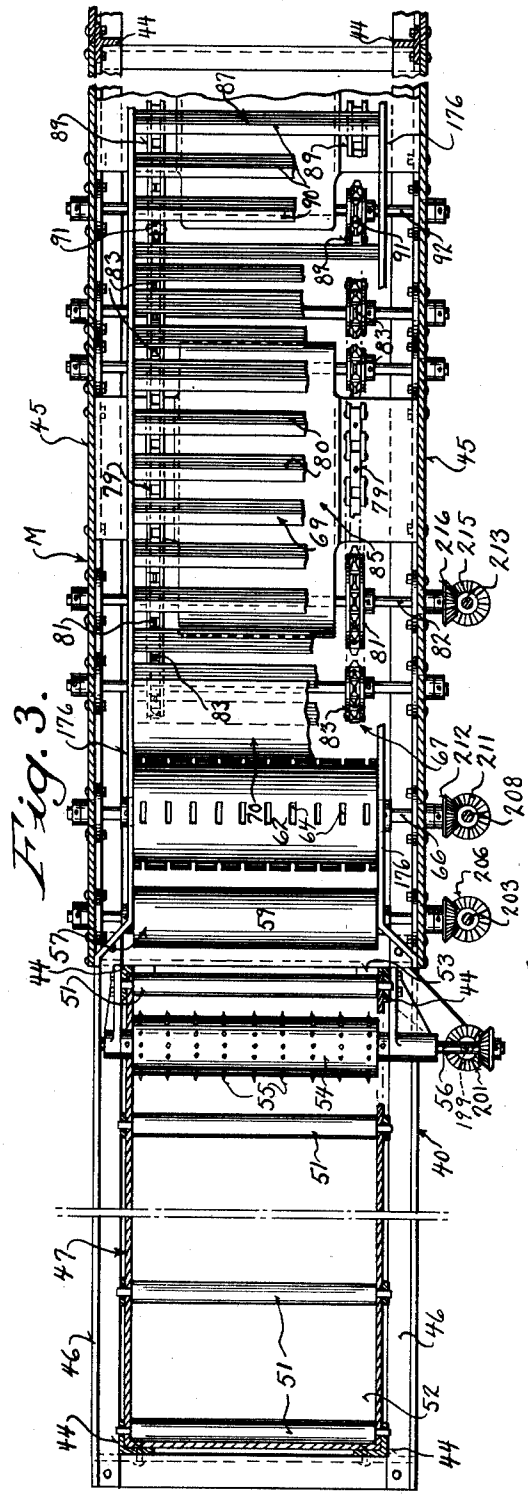

Fig. 3.

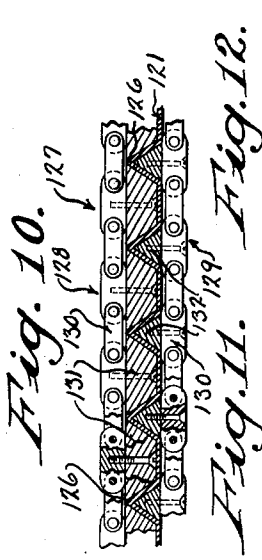

Fig. 10.

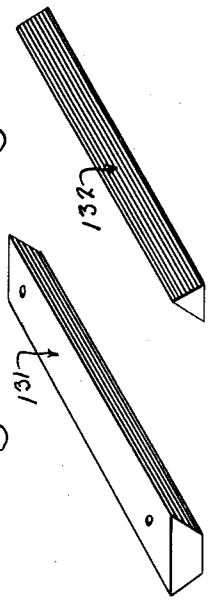

Fig. 12.

Fig. 11.

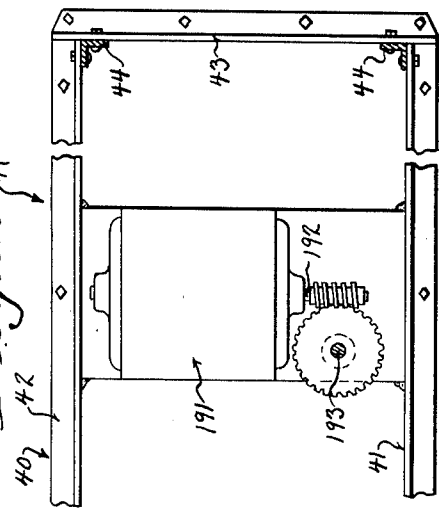

Fig. 4.

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MACHINE FOR FABRICATING A CUSHIONING PACKAGING STRIP

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Fig. 5.

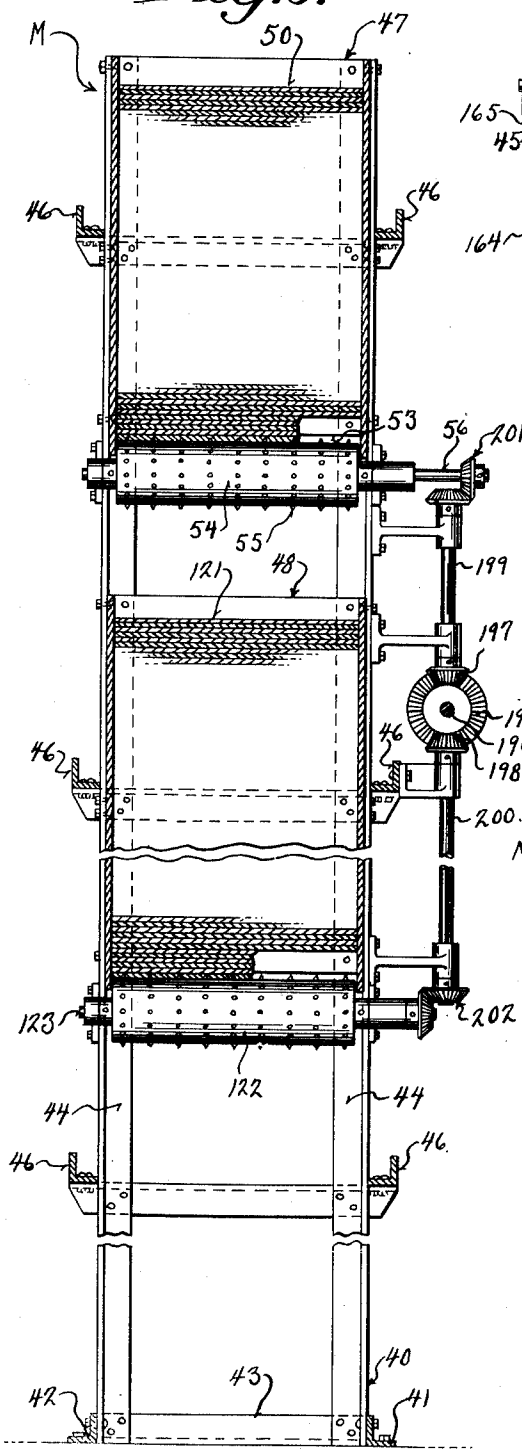


Fig. 6.

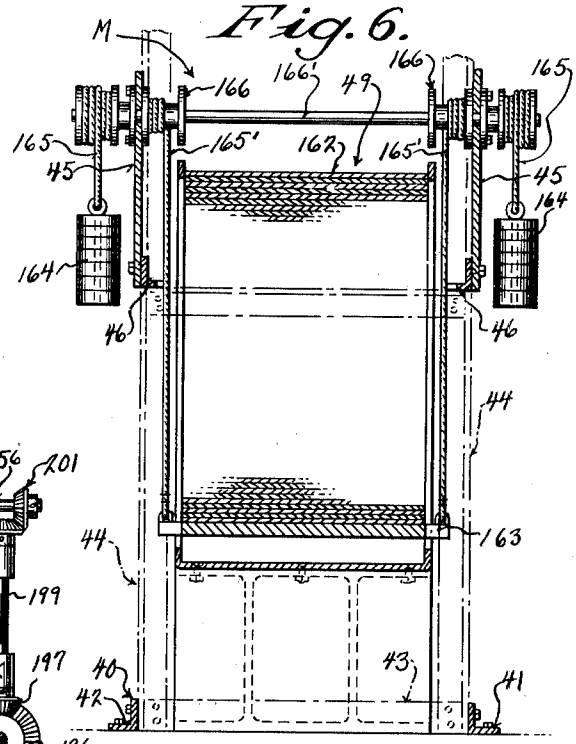
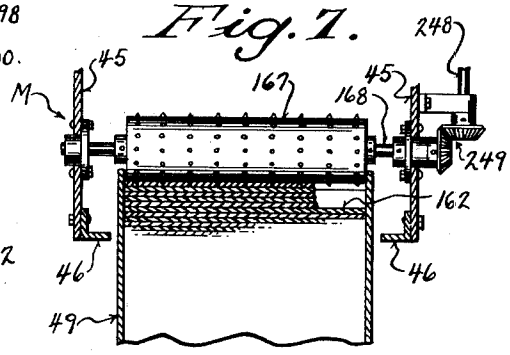


Fig. 7.



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MACHINE FOR FABRICATING A CUSHIONING PACKAGING STRIP

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Fig. 8.

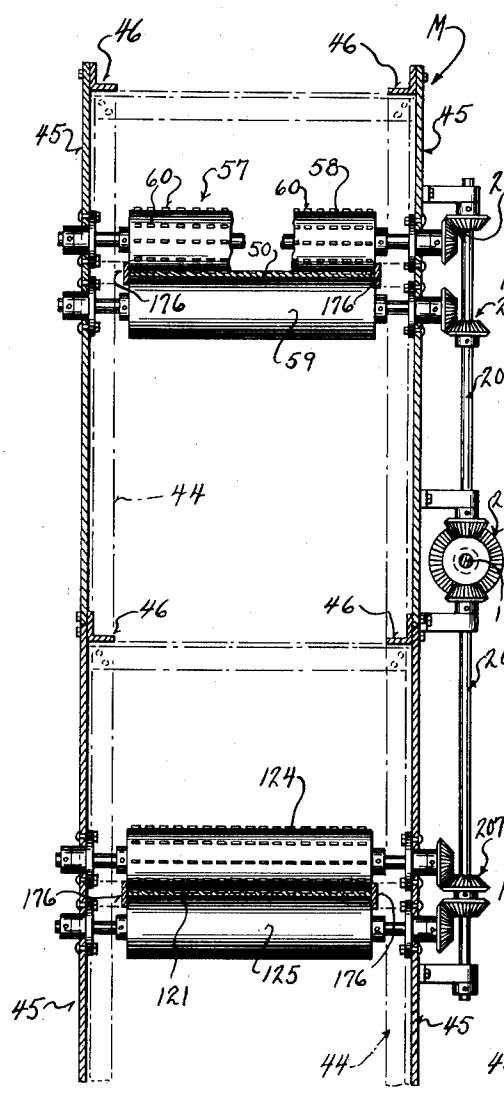
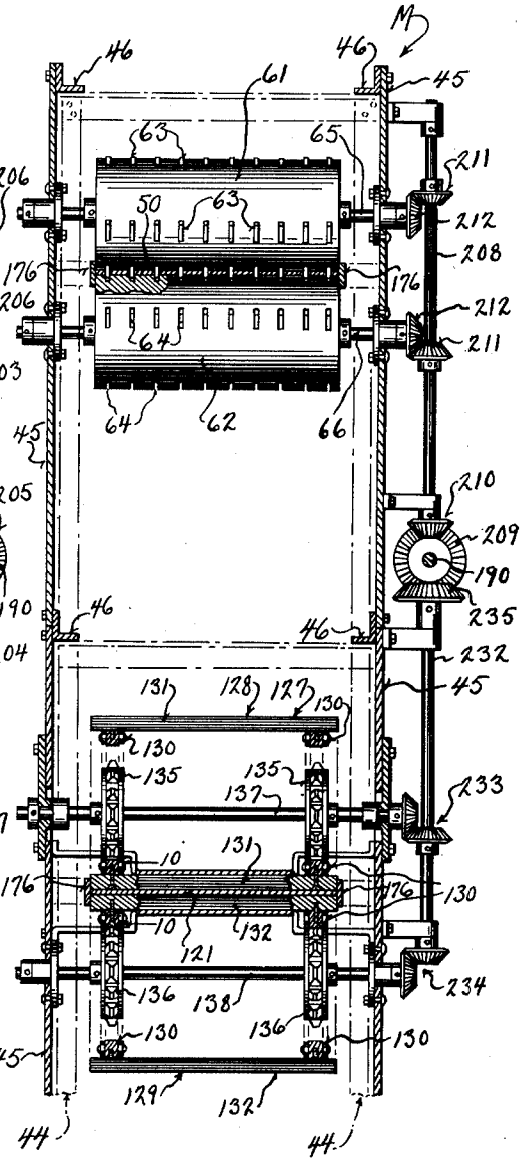


Fig. 9.



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MACHINE FOR FABRICATING A CUSHIONING PACKAGING STRIP

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Fig. 13.

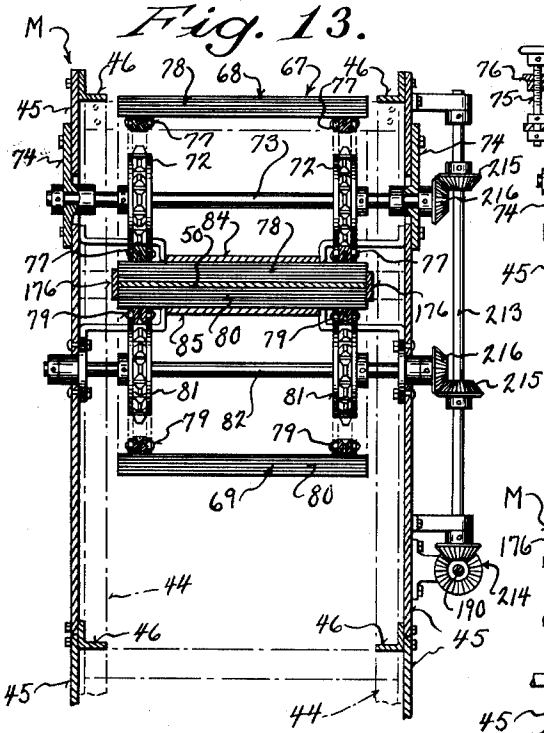


Fig. 14.

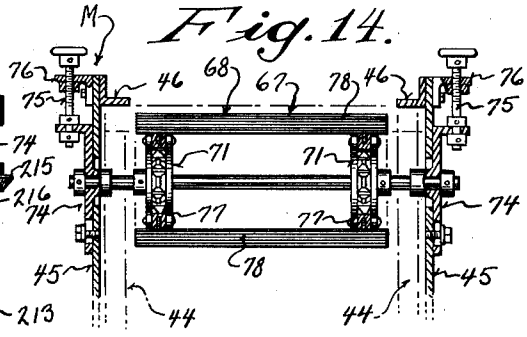


Fig. 15.

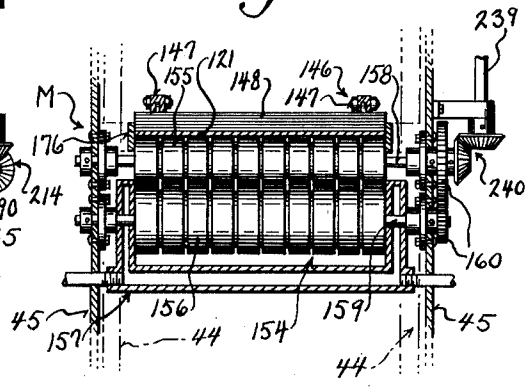


Fig. 17.

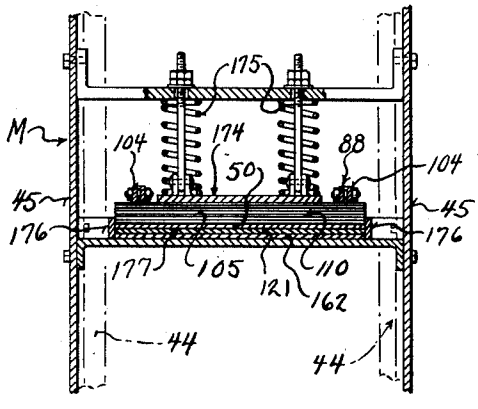
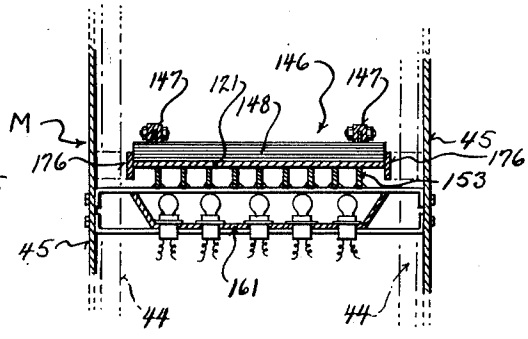


Fig. 16.



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April 18, 1950 M. VAN ANTWERPEN 2,504,473

MACHINE FOR FABRICATING A CUSHIONING PACKAGING STRIP

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Fig. 18.

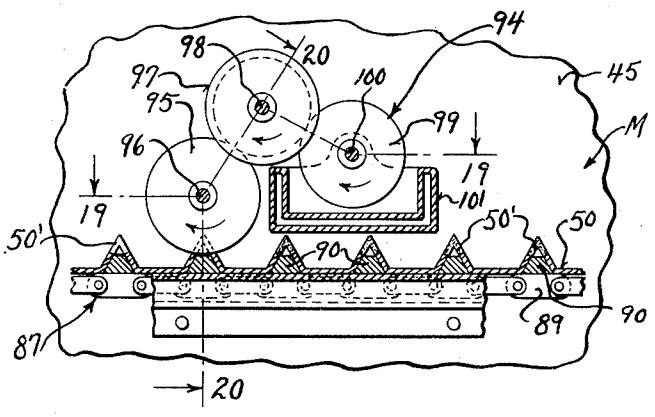


Fig. 19.

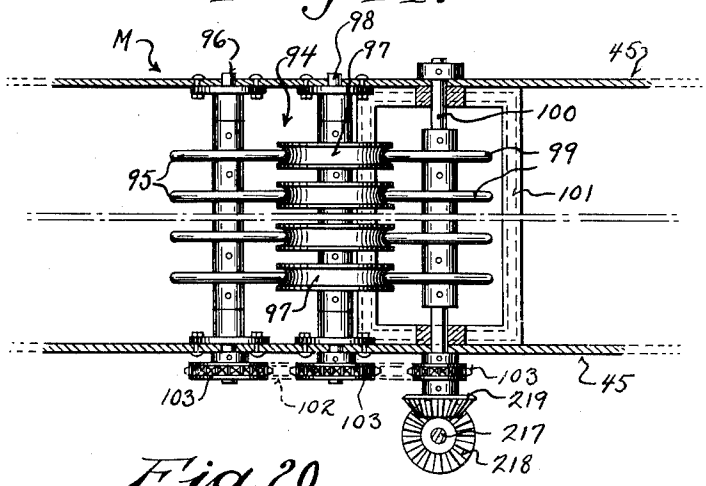
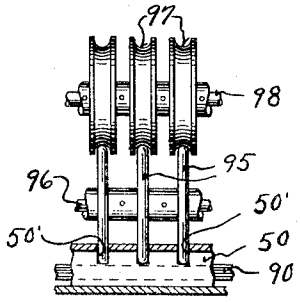


Fig. 20.



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April 18, 1950 M. VAN ANTWERPEN 2,504,473

MACHINE FOR FABRICATING A CUSHIONING PACKAGING STRIP

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Fig. 21.

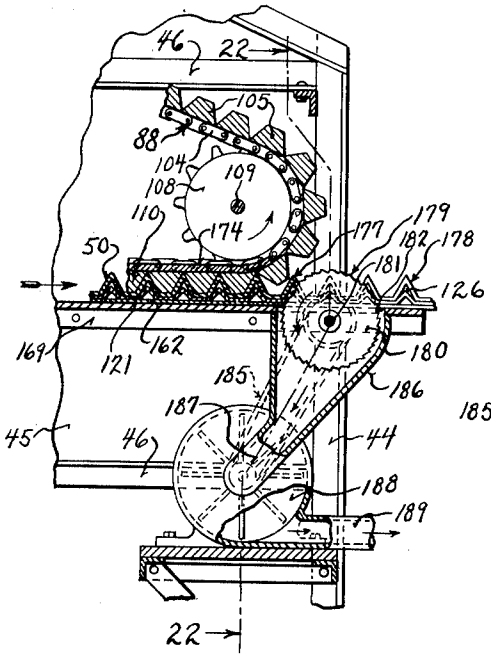


Fig. 22.

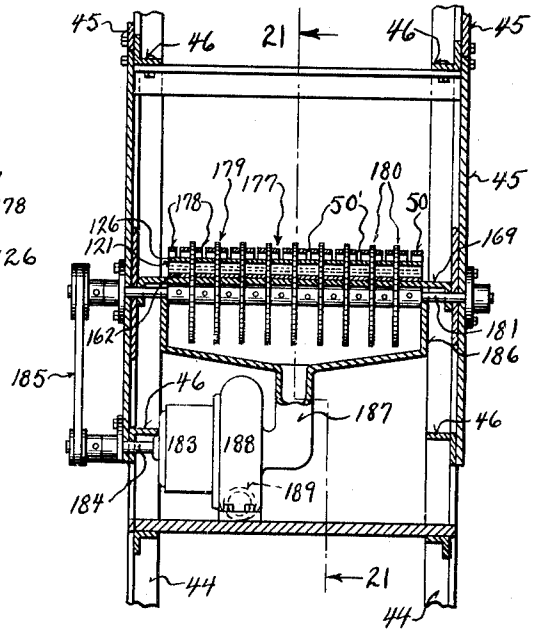


Fig. 23.

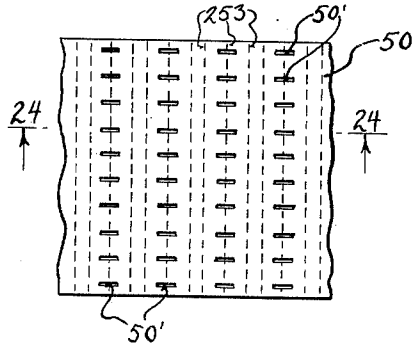


Fig. 26.

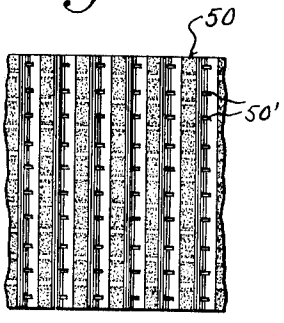


Fig. 24.

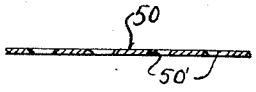
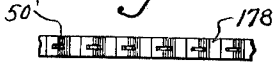


Fig. 25.

Fig. 27.



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April 18, 1950 M. VAN ANTWERPEN 2,504,473

MACHINE FOR FABRICATING A CUSHIONING PACKAGING STRIP

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Fig. 28.

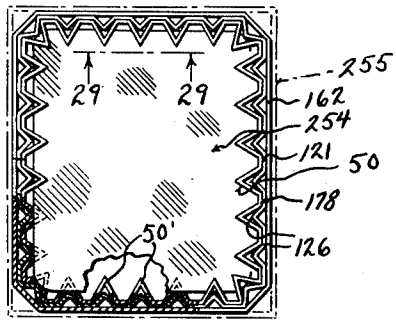


Fig. 29.

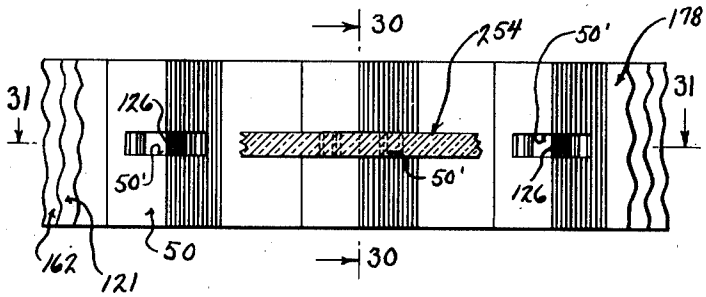


Fig. 30.

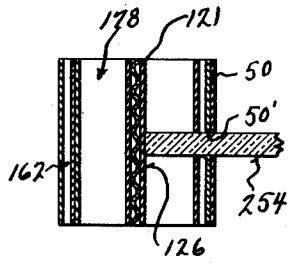
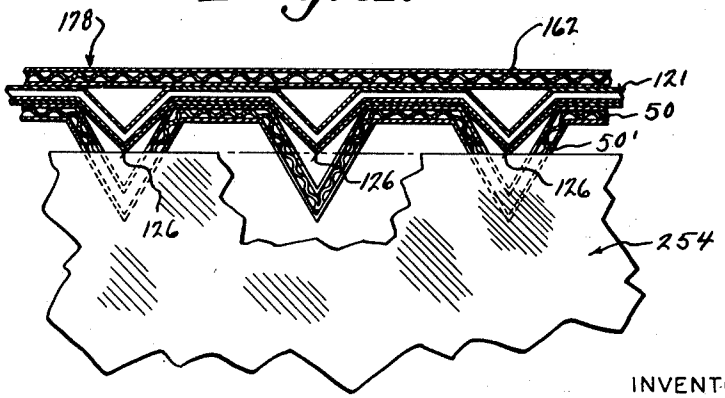


Fig. 31.



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April 18, 1950 M. VAN ANTWERPEN 2,504,473

MACHINE FOR FABRICATING A CUSHIONING PACKAGING STRIP

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Fig. 32.

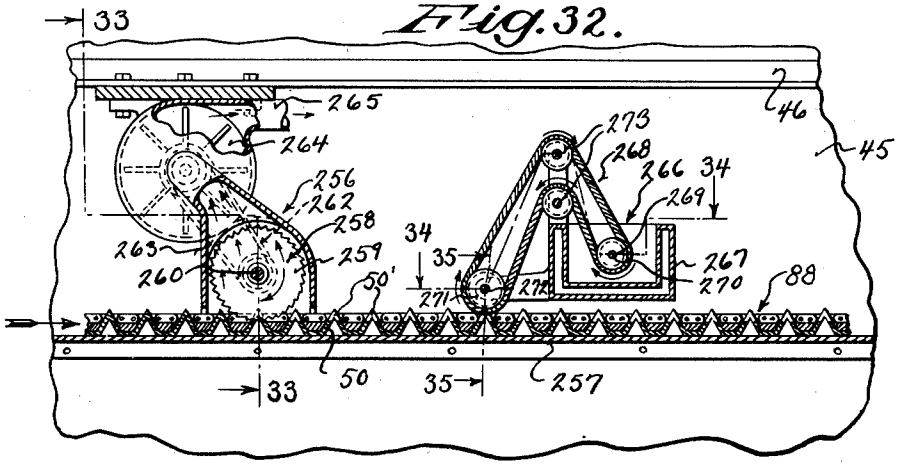


Fig. 33.

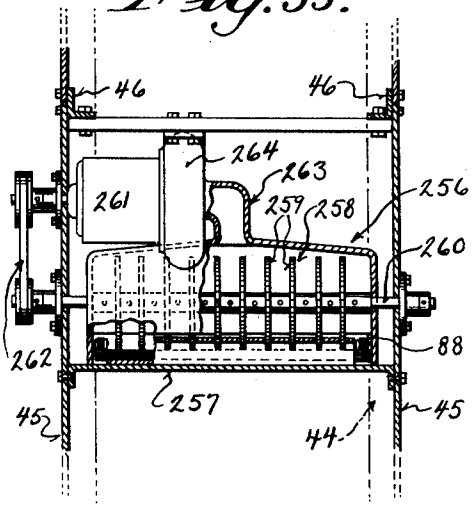


Fig. 34.

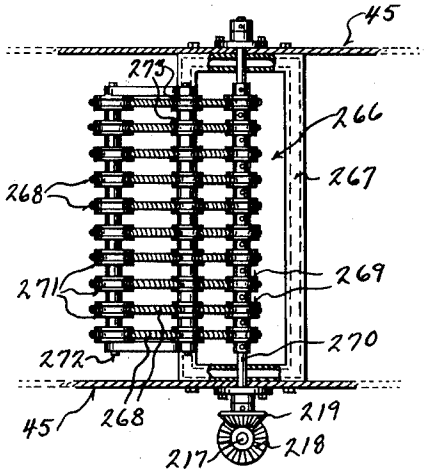
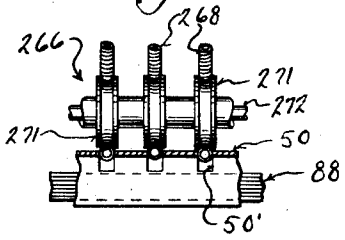


Fig. 35.



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MACHINE FOR FABRICATING A CUSHIONING PACKAGING STRIP

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Fig. 36.

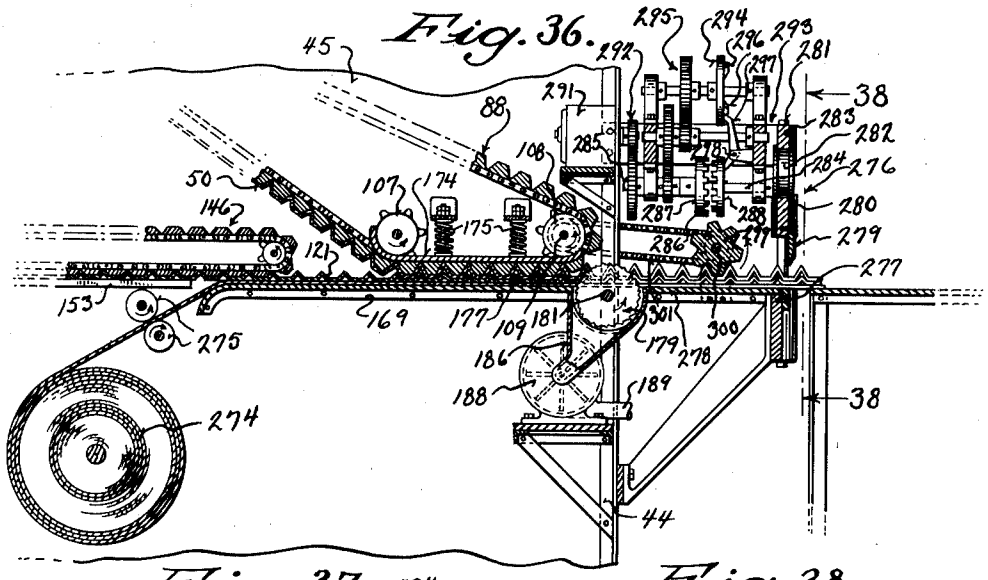


Fig. 37.

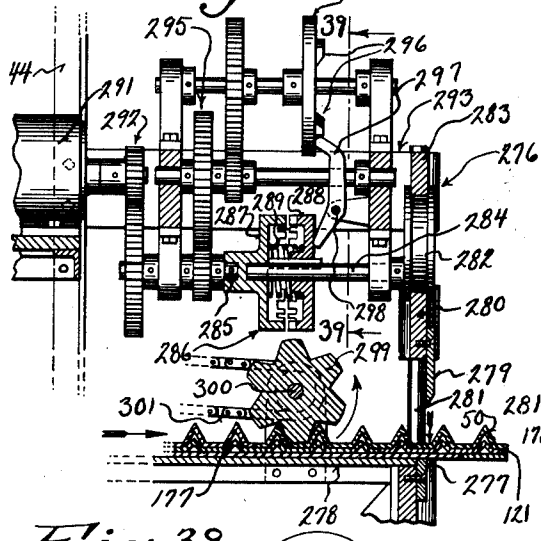


Fig. 38.

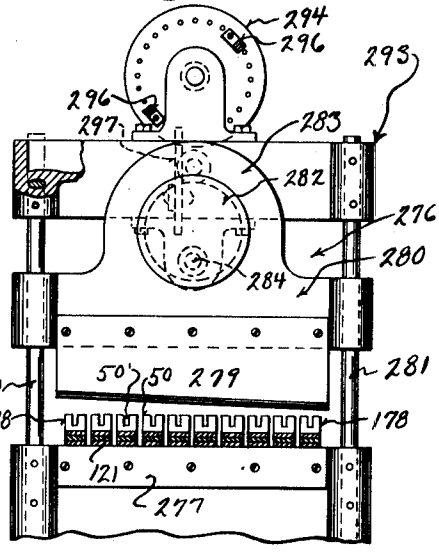
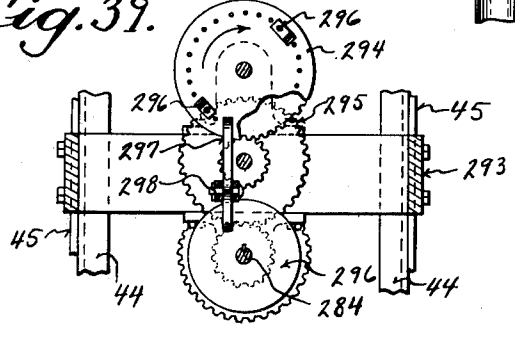


Fig. 39.



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Patented Apr. 18, 1950 2,504,473

UNITED STATES PATENT OFFICE

2,504,473

MACHINE FOR FABRICATING A CUSHIONING PACKAGING STRIP

Martin Van Antwerpen, Wauwatosa, Wis.

Application March 24, 1947, Serial No. 736,870

16 Claims. (Cl. 154—32)

1

This invention appertains to paper and like converting machines and more particularly to a novel machine and process for fabricating a cushioning and shock absorbing packaging strip for frangible articles, such as the glass replacement parts of automobiles.

It has been proposed to provide a packaging strip for the edges of glass panels and the like consisting of an outer straight length of material to which is secured an inner strip and an intermediate strip, the inner and intermediate strips having substantially V-shaped inwardly projecting spaced portions, the V's of the innermost strip having notches in the apexes thereof for receiving the edge of the glass when the strip is wound around the periphery of the glass.

One of the primary objects of the invention is to provide a novel machine and process for expeditiously and effectively fabricating durable cushioning strips of the above character, whereby said strips can be placed upon the market at a reasonable cost and easily handled by unskilled labor.

Another salient object of my invention is the provision of a machine for feeding sheets from rollers or magazines in proper timed relation relative to one another and for crimping certain of said sheets and thereafter joining said sheets in a certain specific arrangement to form a cushioning and shock absorbing packaging device.

A further object of the invention is to provide means for severing the formed packaging device into a series of elongated packing strips capable of being placed around the edge of a glass panel or the like.

Another further object of my invention is to provide a machine embodying means for feeding a sheet of material from a magazine or roll and for forming a series of accurately spaced bight portions therein of a substantially V or like shape and simultaneous therewith receiving a second sheet and forming a series of accurately spaced bight portions therein, the same shape, but of a less height, than the bight portions of the first sheet and then uniting said sheets between said bight portions in such a manner that the bight portions of the sheets are received in one another, and then finally securing the first and second formed sheets to an outer straight holding sheet.

A further important object of my invention is the provision of means for holding the bight portions in the first and second sheets in their formed condition until said sheets are secured together and to the base sheet, so that danger

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of the bight portions spreading and losing their shape will be eliminated.

A still further object of my invention is the provision of means for slotting the first sheet during the travel of said first sheet, whereby notches will be formed in the apexes of the V's so that a seat will be formed in the strip, when fabricated for receiving the glass panel or like device to be protected.

A still further important object of my invention is the provision of means for uniting the sheets together at spaced points by an adhesive with means for quickly drying said adhesive whereby the fabricated sheet can be instantly handled as the same leaves the machine.

Still another object of my invention is the provision of means whereby an adhesive can be applied to the walls of the notches during the fabrication of the cushioning device so that the fabricating device can be effectively secured to the glass or other device being protected.

A still further object of my invention is the provision of means for accurately driving all of the various parts of the machine from a single line shaft, whereby the various parts can all be driven in proper timed relation relative to one another.

With these and other objects in view the invention consists in the novel construction, arrangement and formation of parts, as will be hereinafter more specifically described, claimed and illustrated in the accompanying drawings, in which drawings:

Figure 1 is a side elevational view of one form of my novel machine.

Figure 2 is a longitudinal, sectional view through the complete machine.

Figure 3 is an enlarged fragmentary horizontal sectional view through the machine, taken substantially on the line 3—3 of Figure 1, looking in the direction of the arrows.

Figure 4 is a fragmentary horizontal sectional view taken substantially on the line 4—4 of Figure 1, looking in the direction of the arrows, illustrating the drive motor for the line shaft.

Figure 5 is a transverse sectional view through the machine taken substantially on the line 5—5 of Figure 1, looking in the direction of the arrows, and illustrating more particularly the means for feeding the first and second sheets from their magazines to the forming mechanism.

Figure 6 is a view similar to Figure 5, but taken one the line 6—6 of Figure 1, looking in the direction of the arrows and illustrating the magazine for the base sheets.

Figure 7 is a detail transverse sectional view taken on the line 7—7 of Figure 1 looking in the direction of the arrows illustrating the means for feeding the base sheets from its magazine.

Figure 8 is a transverse sectional view taken on the line 8—8 of Figure 1, looking in the direction of the arrows and illustrating the means employed for initially scoring or weakening the first and second sheets to facilitate the bending of these sheets.

Figure 9 is a transverse sectional view taken on the line 9—9 of Figure 1, looking in the direction of the arrows, illustrating the means for slotting the innermost sheet and for forming the bight portions in the second sheet.

Figure 10 is a fragmentary longitudinal detail sectional view taken substantially on the line 10—10 of Figure 9 illustrating the means employed for forming the bight portions in the second sheet.

Figure 11 is a detail perspective view illustrating one of the forming blocks or dies for making the bight portions in the sheets.

Figure 12 is a detail perspective view illustrating the companion block or die for forming the bight portions in the sheets.

Figure 13 is a fragmentary transverse sectional view taken on the line 13—13 of Figure 2, looking in the direction of the arrows, illustrating the means for forming the bight portions in the first sheet.

Figure 14 is a view similar to Figure 13, but taken on the line 14—14 of Figure 2 and illustrating the means for adjustably supporting one end of the uppermost forming belt for the first sheet.

Figure 15 is a detail transverse sectional view taken on the line 15—15 of Figure 2, looking in the direction of the arrows, and illustrating the means for applying the adhesive to the second sheet after the forming of the bight portions therein.

Figure 16 is a detail transverse sectional view taken on the line 16—16 of Figure 2 looking in the direction of the arrows, illustrating the means employed for facilitating the quick setting of the adhesive.

Figure 17 is a detailed transverse sectional view taken on the line 17—17 of Figure 2, looking in the direction of the arrows, and illustrating the means for firmly holding the first, second and base sheets together during the setting of the adhesive.

Figure 18 is a detail fragmentary longitudinal sectional view illustrating the means employed for applying an adhesive to the walls of the notches in the formed first sheet.

Figure 19 is a fragmentary horizontal sectional view taken on the line 19—19 of Figure 18, the view also illustrating the means employed for applying an adhesive to the walls of the notches.

Figure 20 is a fragmentary detail transverse sectional view taken on the line 20—20 of Figure 18, looking in the direction of the arrows.

Figure 21 is a fragmentary longitudinal sectional view illustrating the discharge end of the machine, the section being taken substantially on the line 21—21 of Figure 22, the view showing more particularly the means for severing formed sheets longitudinally into independent strips.

Figure 22 is a transverse sectional view taken on the line 22—22 of Figure 21, the view illustrating the means for severing the sheets into strips.

Figure 23 is a fragmentary top plan view illustrating the first sheet after the initial weakening thereof and the forming of the slots therein, the view showing one step in the process of forming the cushioning sheets.

Figure 24 is a longitudinal sectional view taken through the first sheet on the line 24—24 of Figure 23, looking in the direction of the arrows.

Figure 25 is a detail longitudinal sectional view through the first sheet showing another step in my process, the view illustrating more particularly the first sheet with the bight portions formed therein and the notches in said bight portions coated with an adhesive.

Figure 26 is a fragmentary bottom plan view of the first sheet after the forming of the bight portions and notches therein, the view illustrating more specifically the adhesive on the sheet.

Figure 27 is a fragmentary plan view of a fabricated strip ready for use.

Figure 28 is a front elevational view showing a formed strip applied to a glass panel for cushioning and protecting the same, the carton for receiving the panel and cushioning strip being shown in dotted lines.

Figure 29 is an enlarged fragmentary detail sectional view, the section being taken on the line 29—29 of Figure 28, looking in the direction of the arrows.

Figure 30 is a detail transverse sectional view through the strip, the section being taken on the line 30—30 of Figure 29, the view illustrating the position of the glass panel in one of the notches in the innermost layer.

Figure 31 is a detail fragmentary longitudinal sectional view taken on the line 31—31 of Figure 29, looking in the direction of the arrows and illustrating the position of the glass panel in certain notches.

Figure 32 is a detail fragmentary longitudinal sectional view through a slightly modified form of my invention, the view illustrating a means for forming the notches in the first strip after the formation of the bight portions and means for applying an adhesive to the walls of the notches by belts.

Figure 33 is a detail transverse sectional view taken on the line 33—33 of Figure 32 looking in the direction of the arrows.

Figure 34 is a detail horizontal sectional view taken on the line 34—34 of Figure 32.

Figure 35 is a fragmentary transverse sectional view taken on the line 35—35 of Figure 32, the view showing in detail the riding of the adhesive applying belts in the formed notches of the first sheet.

Figure 36 is a fragmentary longitudinal sectional view through the discharge end of the machine and illustrating a slightly modified form of my machine, the view also showing a preferred type of mechanism for severing the strips transversely to provide desired lengths of strips.

Figure 37 is an enlarged detail longitudinal sectional view of the means for severing the strips transversely.

Figure 38 is a transverse sectional view taken on the line 38—38 of Figure 36.

Figure 39 is a detail transverse sectional view through the cutting mechanism, the section being taken substantially on the line 39—39 of Figure 37.

Referring to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the views, the letter M generally indicates my novel machine and the same includes a suitable supporting base and

frame 40. This base and frame can be fabricated in any desired way, but as illustrated, the same includes a pair of spaced longitudinally extending base beams 41 and 42. These base beams preferably extend the full length of the machine and are connected at their ends at certain intermediate points by transversely extending base beams 43. Rigidly welded or otherwise fastened to the longitudinal beams 41 and 42, are upright standards 44 and these standards in turn have bolted or otherwise fastened thereto cover side plates 45. The plates 45 form means for bracing the entire frame and for enclosing certain of the operating parts of the machine. The frame can be braced in any other preferred way and as illustrated, the upper ends of the standards 44 have secured thereto spaced parallel top beams 46. The side plates 45 are also secured to these top beams. It is to be understood that certain of the plates can be made removable so that access can be easily had to the interior of the machine when necessary.

As brought out in the objects, the machine functions to receive a series of inner or first sheets, a series of intermediate or second sheets and a series of base or third sheets. Magazines 47 and 48 are provided for the first and second sheets and these magazines are preferably arranged in vertical alinement and are connected with certain standards or uprights of the frame and form in effect a part of the frame. A third magazine 49 is provided for the base sheets and this magazine is arranged forwardly of the magazines 47 and 48 for a purpose which will be later set forth. While I have shown magazines for sheet material, the material can be fed off of rollers without departing from the spirit or scope of this invention.

The magazines 47 and 48 are preferably loaded from the top and consequently these magazines are open at their tops and the sheets are fed one at a time from the bottoms of the magazines in proper relation to one another.

Each sheet is treated in a certain manner and the manner of feeding and treating the first sheet will now be described.

The magazine 47 is located at the rear end of the machine and the first sheets 50 are placed therein one on top of the other and the lowermost sheet rests upon anti-friction rollers 51 carried by the bottom wall 52 of the magazine. A discharge slot 53 is formed in the magazine at its lower front edge. In order to feed the sheets one at a time from this magazine, a rotatable feed roller 54 is provided. This roller is provided with radially extending peripheral pins 55 and the roller extends a slight distance in the magazine through a slot formed in the bottom wall 52 thereof. The roller is provided with a shaft 56 and this shaft is mounted in suitable bearings and extends beyond the opposite sides of the magazine, whereby the shaft can be driven as will also be later set forth.

Upon rotation of the feed roller 54, the lowermost sheet 50 will be fed out of the magazine and toward a scoring mechanism 57. This mechanism consists of a top scoring roller 58 and a bottom anvil roller 59. As the sheet rides between the rollers 58 and 59, these rollers tend to continuously feed the sheet forward and the roller 58 is provided with equidistantly spaced scoring ribs 60. Hence, as the sheet passes beween the rollers, the sheet will be scored transversely at spaced points and these points are accurately determined during the construction of the machine.

As the sheet leaves the scoring rollers, the same can be slotted or the slots can be formed in the sheet after another step, as will be described in the modified form of this invention. In Figures 2, 3 and 9, one means of slotting the sheet is shown. This means includes a top roller 61 and a bottom roller 62. The top roller 61 is provided with a series of equidistantly spaced longitudinally extending rows of punching or cutting knives 63. The knives in each row are also equidistantly spaced. The bottom roller 62 is provided with a series of spaced longitudinally extending rows of mating die recesses 64. The rollers 61 and 62 are driven in unison and the dies 63 are adapted to penetrate through the sheet and into the die recesses 64. This effectively forms a series of equidistantly spaced rows of slots transversely across the sheet. The rollers 61 and 62 are mounted upon and are secured to shafts 65 and 66 respectively and these shafts are rotatably mounted in suitable bearings carried by the side plates of the machine and these shafts extend beyond the plates and are power driven, by means which will also be later set forth.

As the sheet leaves the rollers 61 and 62, the same travels to a mechanism 67 for forming a series of equidistantly spaced transversely extending bight portions of a predetermined height. As illustrated, the bight portions are of a substantially V-shaped in cross section, but it is to be understood that the bight portions can be of other configuration, in cross section should such be desired.

The forming mechanism 67 can consist of mating die rollers, or as shown, from an upper endless forming belt 68 and a lower endless forming belt 69. The sheet after leaving the slotting rollers is guided between the belts by a guide throat 70 which can be rigidly secured in place to the frame of the machine. The upper belt is of a considerable greater length than the lower belt for a purpose, which will also hereinafter more fully appear. The upper belt 68 travels over a series of idle sprocket wheels 71 and over a hold-down set of sprocket wheels 72. The set of hold-down sprocket wheels 72 are keyed or otherwise fastened to a transversely extending shaft 73 and the shaft and the sprocket wheels 72 constitute the drive for the upper belt. All of the shafts for the idle sprocket wheels and the hold-down sprocket wheels are carried by side plates 74. These plates are adjustably supported and carried by hanger screws 75. The hanger screws 75 are in turn threaded in brackets 76 carried by the frame plates of the machine. Hence, the upper forming belt can be adjusted relative to the lower forming belt. The upper forming belt preferably includes spaced sprocket chains 77 and the chains have rigidly secured thereto transversely extending equidistantly spaced forming blocks 78. The forming blocks 78, as shown, are of a frusto-pyramidal shape in cross section and define transversely extending V-shaped valleys. The lower belt 69 also includes a pair of spaced sprocket chains 79 and these chains have secured thereto transversely extending equidistantly spaced mating forming blocks 80. These blocks, as shown, are of a V-shape in cross section and fit between the forming blocks 78 of the upper belt and into the valleys defined by said blocks 78. The upper stretch of the lower belt is held in proper contact with the upper belt

by means of drive sprocket wheels 81. These sprocket wheels are keyed or otherwise fastened to a drive cross shaft 82. The shaft 82 extends beyond the sides of the machine to permit the driving thereof, as also will be later set forth. The sprocket chains 79 are also trained over a series of idle sprocket wheels 83. Attention is directed to the arrangement of the idle sprocket wheels for the upper and lower belts relative to the sprocket wheels 72 and 81, and it will be noted that the arrangement is such that a wide flaring entrance throat is provided to facilitate the travel of the sheet between the belts.

If desired, guide tables 84 and 85 can be provided respectively for the adjacent runs or stretches of the upper and lower belts and each of the belts can be provided with any preferred type of belt tighteners 86.

Obviously, the sheet 50 passes between the belts, the sheet will be caught between the blocks 78 and 80 and the desired equidistantly spaced V-shaped ribs or projections will be formed in the sheet. It is to be also noted that the slotting rolls 61 and 62 are so arranged relative to the forming belts that when the V-shaped projections are formed in the sheets, that the slots will register with the apexes of the projections or ribs so that the apexes will be provided with equidistantly spaced notches 50'.

It is desirable that the V-shaped projections or ribs in the sheet be maintained during the travel of the sheet and until the sheet is united with the second and third sheets.

Hence, as the sheet leaves the lower forming belt 69 the same is engaged by a lower transfer belt 87 which carried the sheet to a conveyor belt 88. The function of the conveyor belt 88 is to carry the formed first sheet down to and in engagement with the second and third sheets.

The transfer belt 87 can be constructed similar to the lower forming belt 69 and consequently the same includes spaced parallel sprocket chains 89 connected together by transversely extending supporting blocks 90 and these blocks are adapted to enter into the V-shaped projections or ribs formed in the sheet. It is to be also noted that the blocks 90 enter between the blocks 78 of the belt at the discharge end thereof. The chains 89 travel over sprocket wheels 91 and these sprocket wheels are keyed or otherwise fastened to shafts 92 and 93. The shaft 93 constitutes the drive for the transfer belt and at least one thereof extends beyond one side of the machine. This belt is also preferably provided with guide tables and a belt tightener.

The discharge end of the transfer belt 87 extends under and in contact with the conveyor belt 88 so as to insure the correct carrying of the formed sheet to the conveyor belt 88.

Again referring to the transfer belt 87, it is to be noted that the blocks 90 are truncated and this leaves a space between the outer ends of the blocks and the inner faces of the V-shaped projections or ribs. This is provided, so that the walls of the notches 50' in the apexes of the projections can be coated with an adhesive.

In Figures 2 and 18 to 20 inclusive, I have illustrated one type of means 94 for applying an adhesive to the walls of the notches 50'.

As illustrated in these figures, the mechanism for applying the coating of adhesive to the walls of the notches 50' includes a series of equidistantly spaced adhesive applying discs 95. These discs are all rigidly secured to a transversely extending shaft 96. Adhesive is applied to the discs by grooved transfer discs 97. These discs are all rigidly secured to a transversely extending shaft 98. The transfer discs 97 receive adhesive from a series of pickup discs 99. The discs 99 are all keyed or otherwise secured to a transversely extending shaft 100 and the discs 99 rotate in a pot 101 containing the desired adhesive. The pot 101 can be maintained at a desired temperature in any suitable way. Obviously, upon rotation of the discs 99 the adhesive will be picked up and applied to the groove periphery of the transfer discs 97 and these discs in turn will apply the adhesive to the discs 95. In view of the fact that the discs 97 are grooved, the adhesive will tend to flow around the sides of the applying discs 95. These discs 95 are so positioned that as the sheet 50 passes the same, the discs will ride into the notches 50' and coat the walls thereof. All of the shafts 96, 98 and 100 protrude beyond the sides of the machine and the shafts are all operatively connected together by a sprocket chain 102 which is trained over sprocket wheels 103 secured to these shafts. The shaft 100 constitutes the drive shaft for the adhesive applying unit 94. The means for driving the shaft will appear as the description proceeds.

As heretofore set forth, the conveyor belt 88 functions to carry the formed sheet 50 down into engagement with the other sheets and this conveyor belt 88 includes spaced parallel sprocket chains 104. The sprocket chains are united by transversely extending flights or holding blocks 105. These blocks are of the same shape as the forming blocks 78 and are adapted to extend into the valleys of the formed sheet between the V-shaped projections or ribs. The belt travels over suitable sprocket wheels 106, 107 and 108. The shaft 109 constitutes the drive shaft, as will be later brought out. It will be noted that the transfer belt 87 extends under the sprocket wheels 106 so as to insure the proper transferring of the formed sheet to the conveyor belt. The sprocket wheels 107 and 108 are arranged below and in advance of the sprocket wheels 106 and the sprocket wheels 107 and 108 are in the same horizontal plane so as to define a straight parallel lower stretch 110 in the conveyor belt. The purpose of this will also be later set forth. This conveyor belt can also be provided with a belt tightener and suitable guide tracks can be provided therefor. Preferably stationary inclined supports 111 and 112 are arranged under the lower inclined stretch of the conveyor belt and this tends to hold the formed projections in proper shape. The support or guide 112 is preferably in the nature of a series of spaced longitudinally extending slats.

Between the inclined guides 111 and 112, I provide an adhesive applying mechanism 113. This mechanism is employed for applying a coating of adhesive to the inner face of the sheet 50 between the V-shaped projections or ribs. This adhesive applying mechanism can be of any desired character, but as illustrated, includes a glue applying roller 114. This roller is located between the guides 111 and 114 and is so disposed as to engage the sheet as the sheet travels from one guide to the other. The adhesive is applied to the periphery of the roll 114 by an applying roller 115, which rotates in a pot 116 containing the adhesive. Means can be utilized for maintaining the temperature of the pot at a predetermined degree. The rollers 114 and 115 are secured to shafts 117 and 118 respectively and these shafts

are operatively connected together by meshing gears 119, so that the rolls will be operated together. The shaft 117 is power driven as will be later set forth.

As the sheet leaves the adhesive applying rollers 114 it is desirable that some means be provided for insuring a quick initial setting of the adhesive so that this adhesive will firmly adhere to the second sheet, as will be later described and bind these two sheets together. Various means can be provided for accomplishing this, such as an electronic heating mechanism, or, as shown, a battery of infra-red lamps 120. These lamps can be conveniently located under the slatted guide 112. Means is also provided for insuring the proper contacting of the first sheet 50 with the second sheet and this will be later more clearly brought out.

The second sheets are indicated by the reference character 121 and as heretofore stated these second or intermediate sheets can be stacked in the magazine 48. The second sheets 121 are fed one at a time and in proper timed relation into the machine relative to the first sheet by a power driven toothed roller 122. This roller is similar to or the same as the roller 54 employed for the magazine 47. Briefly, it can be seen that the toothed roller 122 operates through a slot in the bottom wall of the magazine 48. The stack of sheets 121 can be supported on anti-friction rollers carried by the bottom wall of the magazine. The toothed roller 122 is fastened to a drive shaft 123 and this shaft is driven by means which will be later set forth.

As the lowermost second or intermediate sheet is fed forwardly into the machine by the roller 122, the same rides between a pair of companion scoring rolls 124 and 125. The uppermost roll can be provided with spaced peripheral scoring ribs and the lowermost roll constitutes an anvil against which the uppermost roll bears. Consequently, as the sheet passes between the rolls, the sheet will be scored and weakened transversely. The scoring or weakened portions occur at the points where the sheet is treated to form the V-shaped projections 126. The V-shaped projections 126 are formed in the second or intermediate sheets substantially in the same manner as the projections are formed in the first sheet, but it is to be understood that the projections 126 are of a less height and width than the projections in the first sheet so that the projections 126 can fit within the projections in the first sheet.

The means for forming the projections 126 in the second sheet is generally indicated by the reference character 127 and this mechanism 127 includes an upper endless belt 128 and a lower endless forming belt 129. The uppermost belt 128 is of a greater length than the lowermost belt and projects a considerable distance forwardly of the lowermost belt. Both belts include spaced parallel sprocket chains 130 and the chains of the uppermost belts are connected by transversely extending forming blocks 131. These blocks define V-shaped valleys between the same. The chains of the lowermost belt are connected by equidistantly spaced V-shaped forming blocks 132 which fit in the valleys above mentioned during the travel of the belts. The chains of the uppermost belt travel over a series of idle sprocket wheels 133 and the chains of the lowermost belt travel over similar sprocket wheels 134. All of these sprocket wheels are keyed to suitable shafts and the shafts are mounted in anti-friction bearings carried by the side plates of the frame. In order to insure the proper engagement of the upper and lower belts with one another, drive sprocket wheels 135 and 136 are provided respectively for the upper and lower belts. The sprocket wheels are keyed or otherwise fastened respectively to drive shafts 137 and 138 and these shafts are mounted in bearings and extend beyond at least one side of the machine. The arrangement of the drive sprocket wheels 135 and 136 relative to the idle sprocket wheels is such that a wide flaring entrance mouth for the sheet leading between the belts is provided. The scoring rolls 124 and 125 are preferably located as close to this throat as is practical. The belts 128 and 129 can have guide tracks provided therefor and suitable belt tightenrs can also be utilized.

As the sheet travels between the belts, the blocks 131 and 132 function to form the equidistantly spaced V-shaped projections 126 in the sheet. These projections are maintained in their original form prior to the uniting thereof with the first sheet 50 and the third or base sheet. To bring this about, I provide a transfer belt 139 and this belt corresponds to the belt 89. The belt 139 also consists of a pair of spaced parallel sprocket chains 140 united at spaced points by transversely extending holding blocks or flights 141. These blocks 141 correspond in shape to the blocks 132. The chains 140 are trained about sprocket wheels 142 and 143 and the belt is maintained taut by a belt tightener. The sprocket wheels 142 and 143 are keyed or otherwise secured to shafts 144 and 145 respectively. The shafts are mounted in suitable bearings carried by the frame of the machine and the shaft 145 constitutes the drive shaft. The transfer belt extends under the belt 128 and receives the sheet therefrom. A conveyor belt 146 receives the sheet from the transfer belt and conducts the formed sheet to the first sheet and to the conveyor belt 88. The conveyor belt 146 can include a pair of spaced sprocket chains 147 united by transversely extending holding blocks 148. These blocks correspond in shape to the blocks 131. The sprocket chains travel over sprocket wheels 149 and 150 and these sprocket wheels are in turn keyed or otherwise fastened respectively to shafts 151 and 152. The shafts are mounted in suitable bearings carried by the frame and the shaft 152 constitutes the drive shaft for the belt. Suitable guide tables and belt tighteners can be provided for this conveyor belt. The conveyor belt extends over and in engagement with the transfer belt 139. In order to further maintain the shape of the formed second sheet, a supporting platform 153 can be arranged below the lower run of the conveyor belt 146. Hence the sheet will be carried by the belt over this platform. The platform is preferably made from a series of equidistantly spaced slats.

For a purpose, which will soon appear, the portions of the second sheets between the V-shaped projections 126 are coated with an adhesive and I provide an adhesive coating mechanism 154 therefor. This mechanism includes a rotatable adhesive applying roller 155. This roller engages the sheet as the same travels from the transfer roller to the platform 153. The adhesive is applied to the perifery of the roll 155 by a pickup roller 156. This roller operates within a pot 157 containing the adhesive. The temperature of the adhesive can be taken care of in different manners. The rollers 155 and 156 are fastened respectively

to shafts 158 and 159 and these shafts are also mounted in suitable bearings carried by the frame. The shafts are operatively connected together by means of intermeshing gears 160 secured to said shafts and the shaft 158 constitutes the drive shaft for the adhesive applying mechanism.

It is also desirable to have the adhesive quickly set and any desired means can be provided for this purpose. As illustrated, I have provided a battery of infra-red lamps 161. These lamps are arranged under the slatted platform 153 so that the heat emanating therefrom will effect the adhesive on the sheet traveling over the platform.

As the formed sheet leaves the conveyor belt 146, the same is fed into engagement with the first sheet and the V-shaped projections of the second sheet fits within the V-shaped projections of the first sheet.

The third or base sheets are indicated by the reference character 162 and these sheets are stacked within the magazine 49. For convenience, the magazine is arranged at an angle and the sheets are fed one at a time from the top of the magazine into engagement with the second or intermediate sheet. In view of the fact that the sheets are fed from the top of the magazine, it is necessary to provide some means for normally urging the stack upwards at all times. This means can include a false bottom or follower 163. The false bottom or follower 163 can be normally urged toward the top of the magazine by springs or, as shown, by suitable weights 164. These weights are connected to the lower ends of pulley cables 165. The follower 163 has secured thereto lift cables 165'. These cables 165 and 165' are secured to and wound about pulleys 166. The pulleys are keyed to a shaft 166' which is rotatably carried by the frame.

The uppermost sheet is fed from the top of the magazine by a toothed roller 167 and this roller is fastened to a drive shaft 168. The tooth roller rotates in a counterclockwise direction and feeds the uppermost sheet out of the magazine towards the second sheet and on to a supporting table 169. This table is securely fastened to the frame of the machine. The table extends under the forward end of the conveyor belt 146 and under the conveyor belt 88. To insure the proper feeding of this third or base sheet between the conveyor belt 146 and the table, I can provide feed and guide rollers 170 and 171 and secured respectively to shafts 172 and 173 and these shafts are mounted in suitable bearings carried by the frame of the machine. The shafts are power driven, as will later appear.

From the description so far, it can be seen that a first sheet is weakened, slotted, and then folded along the weakened lines to provide transversely extending notched V-shaped projections and that the inner face of the sheet between the projections are coated with an adhesive. Simultaneous with the operation, a second sheet is weakened transversely and then folded along the weakened lines to provide V-shaped projections with the inner face of sheet between the projections coated with an adhesive. And finally and simultaneous with the fabrication of the first and second sheets, that a third sheet is delivered to the first and second sheets. All of these sheets are fed in proper timed relation to one another and after the machine is once in operation all of the sheets are fed continuously one after the other from the respective magazines and that the cushioning sheets are continuously fabricated.

Referring more particularly to Figure 2 of the drawings, it can be seen that as the first folded sheet is fed downwardly by the conveyor belt to the straight lower stretch thereof, that the second folded sheet is fed into engagement with the first sheet and this belt. Just prior to the feeding of the folded second sheet to the first sheet, the third straight sheet is fed into engagement with the second sheet and the conveyor belt 146 functions to press the second sheet tight down against the first sheet and against the table 169. As the adhesive on the second sheet is relatively tacky, due to the infra-red lamps 161, this adhesive will readily adhere to and unite the second sheet with the third sheet. Thus the united second and third sheets are fed as a unit to the first sheet. It also can be seen that the adhesive on the first sheet will be in a tacky stage when the first sheet reaches the second sheet, in view of the battery of infra-red lamps 120.

As the three sheets ride over the straight stretch 110 of the conveyor belt 104, these sheets are brought into firm contact with one another. For the purpose, I can provide a pressure plate 174. This plate bears down on the straight stretch 110 and urges this stretch toward the table 169. Expansion springs 175 can be utilized to force down the pressure plate.

Attention is called to the fact that means is provided for preventing lateral shifting of the sheets on the various belts during the travel of the sheets through the machine. This means can include spaced parallel side plates 176 and these plates can be secured to the frame of the machine in any desired way. These plates 176 are so disposed as to engage the longitudinal edges of the sheets.

As the sheets in their united form, and now indicated by the reference character 177, the same can be divided longitudinally so as to provide a series of cushioning strips 178 of the desired width. This can be accomplished by a gang-saw 179 and this saw is arranged adjacent to the outlet of the machine. The gang-saw 179 includes a plurality of disc saw blades 180 spaced the desired distance apart on a mandrel 181. The mandrel is mounted in suitable bearings carried by the frame of the machine and the gang of saws extend up through slots 182 formed in the table 169. The gang-saw preferably rotates in a counterclockwise direction and consequently the rotation thereof tends to hold the formed cushioning strip downward against the table. By referring to Figure 1, it can be seen that the gang-saw is located close enough to the feed belt 86 so that the said belt will forceably feed the formed cushion sheet to the saws. The saws do not have to be operated in any direct timed relation relative to other working parts of the machine and consequently I can provide an independent motor 183 for operating the mandrel 181. This motor can be located in any preferred point on the machine and its armature shaft 184 can be operatively connected, such as through a belt and pulley arrangement 185 with the mandrel.

In order to quickly remove the cuttings of the gang-saw from the machine, the lower part of the gang-saw can be housed within a hood 186. The hood is provided with an outlet 187 and this outlet communicates with the inlet of a suction fan 188. Any suitable type of container or the like can be connected with the outlet 189 of the suction fan. This fan can be directly driven by the motor 183.

As heretofore intimated, all of the various operating parts of my machine are actuated in proper timed relation relative to one another. As is clearly shown in Figure 1, I provide a main line drive shaft 190 for this purpose. The shaft itself is operatively connected to a main drive motor 191. The motor can be mounted upon the frame of the machine in any desired way. Its armature shaft 192 drives a vertical shaft 193 and this shaft is, in turn, connected to the main shaft 190 by meshing beveled gears 194. The shafts 190 and 193 are mounted in supporting bearings 195 carried by the frame of the machine. The main shaft extends substantially the full length of the machine and the end thereof adjacent to the magazines 47 and 48 is provided with a beveled drive gear 196. This gear meshes with and drives beveled gears 197 and 198 which are secured respectively to oppositely extended countershafts 199 and 200. The outer ends of these shafts are operatively connected to the shafts 56 and 123 by intermeshing sets of beveled gears 201 and 202. Hence, the feed rollers 54 and 122 of the upper and lower magazine are driven from the line shaft. The scoring mechanism for the first and second sheets are also driven from the line shaft and hence, the frame of the machine carries oppositely extending rotatable countershafts 203 and 204. These countershafts are operatively connected to the line shaft 190 by intermeshing gears 205. The outer ends of these countershafts 203 and 204 are operatively connected respectively to the scoring rollers 58 and 59 and to the scoring rollers 124 and 125 respectively by sets of intermeshing gears 206 and 207.

Extending parallel to the countershaft 203 is another countershaft 208. This shaft is also rotatably mounted in suitable bearings carried by the frame and is driven from the line shaft by intermeshing beveled gears 209 and 210. These gears are secured respectively to the line shaft 190 and the countershaft 208. The countershaft 208 has secured thereto facing beveled gears 211 and these gears mesh with beveled gears 212 keyed to the shafts 65 and 66 of the slotting mechanism 61.

In order to drive the forming belts 68 and 69, a countershaft 213 is rotatably carried by the frame of the machine. This countershaft is operatively connected to the line shaft by intermeshing gears 214. The countershaft is provided with facing beveled gears 215 and these gears mesh respectively with beveled gears 216 fastened to the drive shafts 73 and 82 for the upper and lower belts 68 and 69.

The drive shaft 100 for the glue applying mechanism 97 is operatively connected to the line shaft 190 by a countershaft 217. As illustrated, this shaft at its upper end has keyed thereto a beveled gear 218 which meshes with a beveled gear 219 secured to the drive shaft 100 for the glue applying mechanism. The lower end of the shaft 215 has secured thereto a beveled gear 220 which meshes with a beveled gear 221 secured to the shaft 190.

The drive shaft 93 of the transfer belt 87 is operatively connected by intermeshing beveled gears 222 to a countershaft 223 and this shaft is driven from the line shaft 190 by intermeshing gears 224.

The drive shaft 117 for the glue applying mechanism 113 is operatively connected to a countershaft 225 by intermeshing gears 226 and the lower end of this shaft has secured thereto

a beveled gear 227 which meshes with a beveled gear 228 secured to the line shaft.

The conveyor belt 88 has its drive shaft 109 operatively connected by intermeshing gears 229 to a countershaft 230 and this shaft, in turn, is operatively connected to the line shaft 190 by intermeshing gears 231.

The drive shafts 137 and 138 for the forming belts 128 and 129 are driven from a countershaft 232 and, as illustrated, the shaft 232 is connected to the shaft 137 by intermeshing gears 233. The shaft 138 is connected to the countershaft by intermeshing gears 234. The upper end of the shaft 232 has keyed thereto a beveled gear 235 which meshes with the beveled gear 209 secured to said line shaft.

The drive shaft 145 for the transfer belt 139 is connected by intermeshing gears 236 with a countershaft 237 and this countershaft is, in turn, operatively connected to the line shaft 190 by intermeshing gears 238.

The drive shaft 156 for the adhesive applying mechanism 154 is operatively connected to a countershaft 239 by intermeshing gears 240. The upper end of the countershaft has secured thereto a beveled gear 241 which meshes with the beveled gear 221 keyed to the line shaft 190.

The shafts 172 and 173 of the guide rollers 170 and 171 are driven from a countershaft 242. This countershaft 242 is provided with a double faced beveled gear 243 which meshes with beveled gears 244 and 245 keyed respectively to the shafts 172 and 173. The upper end of this shaft 242 has secured thereto a beveled gear 245 which meshes with the beveled gear 228 secured to the line shaft 190.

The shaft 168 for the feed roller 167 of the magazine 49 is also driven from the countershaft 242 and hence the countershaft 242 is operatively connected, by means of beveled gears 247 with a driven shaft 248. This shaft 248 is, in turn, operatively connected to the shaft 168 by intermeshing gears 249.

The conveyor belt 146 has its drive shaft 152 operatively connected by beveled gears 250 to a countershaft 251 and this countershaft is, in turn, operatively connected by intermeshing gears 252 with the line shaft 190.

It is to be understood that all of the shafts for the drive are mounted in any desired types of bearings and that these bearings can be placed at the desired points on the frame of the machine. It is to be further understood that the gears connecting the various shafts are of a desired size so that the various parts will be driven in proper timed relation.

At the initial start of the machine all of the sheets from the magazine 47, 48 and 49 will be fed simultaneously and after the first set of sheets are fed through the machine the other following sheets will be properly correlated relative to each other.

It is to be understood that the upper forming belt 128 can be suspended and adjusted similar to the forming belt 68 for the first sheet.

In order to prevent undue wear on the gang-saw 179, spaced parallel lines free from glue are left on the sheets in alinement with the saw discs. This is accomplished by providing spaced annular grooves in the adhesive applying rolls 114 and 155 (see Figure 15).

Attention is now directed to Figures 23 to 31 inclusive. The material from which the cushion sheets and strips are formed is preferably corrugated board as shown in Figures 28 to 31, but it

is to be understood that the cushioning sheets and strips can be formed from any material that may be found suitable for the purpose intended.

In Figure 23, I have shown the inner or first sheet 50 provided with the rows of spaced slots 50' and weakened by transverse lines 253 at the points where the sheet is to be folded to form the V-shaped projections or ribs. In Figures 25 and 26 I have shown the next step in which the V-shaped ribs or projections are already formed. It is to be also noted that these figures show the adhesive applied to the walls of the slots 50' and to the inner face of the sheets between the V-shaped ribs or projections. Figure 27 shows a small part of a formed cushion strip.

In Figure 28 this formed strip 178 is shown applied to the edge of a plate of glass 254. The strip is placed around the edge of the glass so that the edge of the glass will fit in the slots 50' of the innermost member and the glass rests upon the V's of the second or intermediate member 121. The base or third member 162 forms a support and a third shock absorbing member for the entire strip. When the strip is placed around the glass 254 the ends thereof can be secured together in any desired way.

It is intended that the entire protecting strip and glass 254 be placed in a shipping carton 255 indicated by dotted lines in Figure 28.

While I have specified and shown means for uniting the sheets by an adhesive, it is to be clearly understood that the sheets can be united in other ways, such as by the use of staples and the like.

It may be desirable to form the notches 50' in the sheets 50 after the V-shaped notches or ribs are formed in the first sheet. In Figures 32 and 33 I have illustrated a means for doing this and this means is generally indicated by the reference character 256. The mechanism is carried by the frame of the machine and is disposed above the supporting table 257 which is provided for the lower run of the conveyor belt 88. This mechanism 256 includes a gang-saw 258 and the gang saw includes a plurality of equidistantly spaced saw discs 259 which are secured on a mandrel 260. The mandrel is rotatably carried by the frame of the machine and is so arranged that the saw discs will engage the apexes of the V-shaped ribs or projections as the sheet is carried past the gang-saw by the conveyor belt. This gang-saw does not have to be operated in timed relation relative to the other operating parts of the machine and consequently I can provide an independent electric drive motor 261 therefor. The drive motor is carried by the frame and its armature shaft can be operatively connected to the mandrel 260 by a pulley belt and pulley wheels mechanism 262.

In order to carry the dust made by the gang-saws away from the machine, the gang-saw can be housed within a hood 263. The hood is provided with an outlet which communicates with the inlet of a suction fan 264. The suction fan can be driven directly from the electric motor. The dust can be taken from the outlet 265 of the fan in any desired way.

Various means to be provided for making the slots or notches in the V's of the first sheet and in lieu of die rollers and saws, a punching mechanism can be used.

The means for applying the glue to the walls of the slots or notches 50' can also be varied and in Figures 32, 34 and 35 I have illustrated another means for accomplishing this. The means shown in the mentioned figures is generally indicated by the reference character 266 and includes a pot 267 for the adhesive. The adhesive can be kept in a flowing state in the pot through any suitable heating mechanism. Glue is fed out of the pot by a series of equidistantly spaced coiled spring belts 268. The belts are trained over drive pulleys 269 which are immersed in the adhesive in the pot. These drive pulleys are all fastened to a drive shaft 270 rotatably carried by the end walls of the pot and the frame of the machine. The coiled spring belts are also trained over a series of equidistantly spaced pulley wheels 271 and these pulley wheels are carried by a shaft 272. The shaft 272 can be carried by bearing brackets formed on or secured to the pot 267. The shaft and the pulleys 271 are arranged in close proximity to the lower run of the belt 88 and are so disposed that the belts will extend into the slots or notches 50' as the sheet 50 is carried past the glue pot by the conveyor belt 88. The intermediate portions of the glue applying belts are trained over idle pulleys 273.

The shaft 270 can be driven from the line shaft 217.

As heretofore also intimated, the sheets can be fed off of rolls and, as shown in Figure 36, I have illustrated the base or third sheet in the nature of a continuous sheet fed from a roll 274. The sheet can be pulled off of the roll by power driven guide rollers 275 and these rollers correspond to rollers 170 and 171 described in the first form of the invention. The sheet is fed by the rolls 275 to the first and second sheets in identically the same manner as the separate sheets from the magazine 49.

Where the sheet is fed from a roll it is highly desirable that the sheet be severed in desired lengths and this can be accomplished by a guillotine mechanism 276. The guillotine mechanism 276 includes a stationary knife 277 carried by a supporting table 278 and a reciprocating knife 279. The reciprocating knife is located above the formed sheet and is carried by a cross head 280. The cross head 280 is mounted for sliding movement on guide rods 281. An eccentric 282 operating in an eccentric strap 283 is employed for reciprocating the knife 279. The cross head 280 and its knife 279 operates periodically and at certain definite times and I have provided a means for accomplishing this. The shaft 284 for the eccentric 282 is operatively connected to a drive shaft 285 by a clutch 286. The clutch 286 includes a drive section 287 and a driven section 288. The sections are normally held out of clutching engagement by an expansion coil spring 289. The drive clutch section 287 is secured to and rotated by a drive shaft 285 which is driven directly from the armature shaft of an electric motor 291 through intermeshing gears 292. The clutch section 288 is feathered upon the shaft 284 for the eccentric and this shaft can be piloted in the drive clutch section 287. It can be seen that the clutch section 288 is mounted for sliding movement on the shaft 284 for movement into and out of engagement with its companion drive clutch section 287.

In view of the direct drive of the shaft 284 from the motor 291, the knife 279 will be rapidly raised and lowered so that the same will not stop the progress of the advancing strips. The shafts 284 and 285 are suitably mounted in bearings carried by a frame 293 forming a part of the severing mechanism.

As heretofore brought out, it is desirable that the knife 279 be brought into operation at a pre-

determined interval of time and this is accomplished by automatically throwing the clutch section 288 into driving engagement with the clutch section 287. This intermittent mechanism includes a drive cam disc 294 and this disc is driven through a train of speed reducing gearing 295 from the motor 291. One face of the disc 294 is provided with cam shoes 296. A trip lever 297 is rockably mounted intermediate its ends on a pivot pin 298 carried by the frame 293. One end of the lever presses against the clutch section 288 and the other end of the lever is disposed in the path of the cam shoes 296. Hence, each time a cam shoe rides against the lever 297 the clutch section 288 will be moved into driving engagement with the clutch section 297.

In order to alter the timing of the operation of the clutch to suit varying conditions, more or less of cam shoe 296 can be utilized and, hence, the cam shoes are detachably secured to the cam disc 294 for adjustment.

With the severing mechanism 276 I preferably use a supplemental hold down and feed roller 299. This roller is disposed above the table 278 between the gang of saws 179 and the knife 279. The roller is grooved longitudinally to receive the projecting ribs on the finished strips and the position of the roller is such that the roller will hold the severed strips and to feed the same forwardly. The roller is fastened to a transversely extending shaft 300 rotatably mounted on the frame 293. The shaft can be conveniently driven by a sprocket chain and sprocket wheel connection 301 from the drive shaft 109 of the conveyor belt 88.

Various changes in details can be made without departing from the spirit or the scope of my invention, but what I claim as new is:

1. A machine for fabricating a cushion shock absorbing packaging member comprising means for feeding a series of independent sheets forwardly, means for weakening certain of said sheets transversely, means for folding said certain sheets on said weakened lines to provide transversely extending projecting ribs and means for forming notches in the ribs of certain sheets during the travel of the sheets through the machine.

2. A machine for fabricating a cushion shock absorbing packaging member comprising means for feeding a series of independent sheets forwardly, means for weakening certain of said sheets transversely, means for folding said certain sheets on said weakened lines to provide transversely extending projecting ribs and means for forming notches in the ribs of certain sheets during the travel of the sheets through the machine, and means for securing all of said sheets together to form a finished product.

3. A machine for fabricating a cushion shock absorbing packaging member comprising means for feeding a series of independent sheets forwardly, means for weakening certain of said sheets transversely, means for folding said certain sheets on said weakened lines to provide transversely extending projecting ribs and means for forming notches in the ribs of certain sheets during the travel of the sheets through the machine, means for securing all of said sheets together to form a finished product and means for maintaining the formation of the ribs until the connection of the sheets together.

4. In a machine for fabricating a packaging cushioning and shock absorbing member, a device for forming a series of equidistantly spaced transversely extending ribs therein including an upper endless belt and a lower endless belt, means for feeding sheet material between said belts, said belts having adjacent runs arranged in close parallel relation, one of said belts being provided with transversely extending forming blocks and the other of said belts being provided with transversely extending companion forming blocks adapted to fit between the forming blocks of the first belt, means for simultaneously driving said belts and means for weakening said sheet along transverse lines as the same is fed between the belts.

5. In a machine for fabricating a packaging cushioning and shock absorbing member, a device for forming a series of equidistantly spaced transversely extending ribs therein including an upper endless belt and a lower endless belt, means for feeding sheet material between said belts, said belts having adjacent runs arranged in close parallel relation, one of said belts being provided with transversely extending forming blocks and the other of said belts being provided with transversely extending companion forming blocks adapted to fit between the forming blocks of the first belt, means for simultaneously driving said belts and means for forming a series of equidistantly spaced rows of slots in the sheet as the same is fed between the belts.

6. In a machine for fabricating a packaging cushioning and shock absorbing member, a device for forming a series of equidistantly spaced transversely extending ribs therein including an upper endless belt and a lower endless belt, means for feeding sheet material between said belts, said belts having adjacent runs arranged in close parallel relation, one of said belts being provided with transversely extending forming blocks and the other of said belts being provided with transversely extending companion forming blocks adapted to fit between the forming blocks of the first belt, means for simultaneously driving said belts and means for regulating the distance of one of said belts relative to the other.

7. In a machine for fabricating a shock absorbing and cushioning member, means for forming a series of equidistantly spaced transversely extending projecting ribs in a sheet including an upper and a lower endless forming belt, means for feeding sheet material between said belts, said belts having adjacent parallel runs arranged in close proximity, one of said belts having a series of forming blocks thereon and the other of said belts having a series of forming blocks thereon adapted to ride between the forming blocks of the first belt, a conveyor belt for conducting the formed sheet toward the discharge end of the machine, and a transfer belt disposed between the forming belts and the conveyor belt for carrying said sheet to the conveyor belt, said transfer belt and conveyor belt having means for maintaining the formed configuration of the sheet.

8. In a machine for fabricating a shock absorbing and cushioning member, means for forming a series of equidistantly spaced transversely extending projecting ribs in a sheet including an upper and a lower endless forming belt, means for feeding sheet material between said belts, said belts having adjacent parallel runs arranged in close proximity, one of said belts having a series of forming blocks thereon and the other of said belts having a series of forming blocks thereon adapted to ride between the forming blocks of the first belt, a conveyor belt for conducting the formed sheet toward the discharge end of the machine, and a transfer belt disposed between the forming belts and the conveyor belt for carry-

ing said sheet to the conveyor belt, said transfer belt and conveyor belt having means for maintaining the formed configuration of the sheet, said upper belt being of a greater length than the lower forming belt and extending over the transfer belt.

9. In a machine for fabricating a shock absorbing and cushioning member, means for forming a series of equidistantly spaced transversely extending projecting ribs in the sheet including an upper and a lower endless forming belt, means for feeding sheet material between said belts, said belts having adjacent parallel runs arranged in close proximity, one of said belts having a series of forming blocks thereon and the other of said belts having a series of forming blocks thereon adapted to ride between the forming blocks of the first belt, a conveyor belt for conducting the formed sheet toward the discharge end of the machine, and a transfer belt disposed between the forming belts and the conveyor belt for carrying said sheet to the conveyor belt, said transfer belt and conveyor belt having means for maintaining the formed configuration of the sheet, a second pair of forming belts, means for continuously feeding second sheets between the second pair of forming belts, said second pair of forming belts having mating companion forming blocks, and a conveyor belt for carrying the second formed sheets toward the first conveyor belt and said second sheets into engagement with the first formed sheets carried by the first conveyor belt.

10. In a machine for fabricating a shock absorbing and cushioning member, means for forming a series of equidistantly spaced transversely extending projecting ribs in the sheet including an upper and a lower endless forming belt, means for feeding sheet material between said belts, said belts having adjacent parallel runs arranged in close proximity, one of said belts having a series of forming blocks thereon and the other of said belts having a series of forming blocks thereon adapted to ride between the forming blocks of the first belt, a conveyor belt for conducting the formed sheet toward the discharge end of the machine, and a transfer belt disposed between the forming belts and the conveyor belt for carrying said sheet to the conveyor belt, said transfer belt and conveyor belt having means for maintaining the formed configuration of the sheet, a second pair of forming belts, means for continuously feeding second sheets between the second pair of forming belts, said second pair of forming belts having mating companion forming blocks, a conveyor belt for carrying the second formed sheets toward the first conveyor belt and said second sheets into engagement with the first formed sheets carried by the first conveyor belt, and a transfer belt between the second forming belts and the second conveyor belt, the said second transfer belt and conveyor belt having means for maintaining the configuration of the second sheets.

11. In a machine for fabricating a shock absorbing and cushioning member, means for forming a series of equidistantly spaced transversely extending projecting ribs in the sheet including an upper and a lower endless forming belt, means for feeding sheet material between said belts, said belts having adjacent parallel runs arranged in close proximity, one of said belts having a series of forming blocks thereon and the other of said belts having a series of forming blocks thereon adapted to ride between the forming blocks of the first belt, a conveyor belt for conducting the formed sheet toward the discharge end of the machine, and a transfer belt disposed between the forming belts and the conveyor belt for carrying said sheet to the conveyor belt, said transfer belt and conveyor belt having means for maintaining the formed configuration of the sheet, a second pair of forming belts, means for continuously feeding second sheets between the second pair of forming belts, said second pair of forming belts having mating companion forming blocks, a conveyor belt for carrying the second formed sheets toward the first conveyor belt and said second sheets into engagement with one face of the first formed sheets carried by the first conveyor belt, a transfer belt between the second forming belts and the second conveyor belt, the said second transfer belt and conveyor belt having means for maintaining the configuration of the second sheets, and means for continuously feeding third sheets into the machine and to the second conveyor belt and into engagement with one face of the second sheets as the second sheets are fed to the first conveyor belt and said first sheets.

12. In a machine for fabricating a shock absorbing and cushioning member, means for forming a series of equidistantly spaced transversely extending projecting ribs in the sheet including an upper and a lower endless forming belt, means for feeding sheet material between said belts, said belts having adjacent parallel runs arranged in close proximity, one of said belts having a series of forming blocks thereon and the other of said belts having a series of forming blocks thereon adapted to ride between the forming blocks of the first belt, a conveyor belt for conducting the formed sheet toward the discharge end of the machine, a transfer belt disposed between the forming belts and the conveyor belt for carrying said sheet to the conveyor belt, said transfer belt and conveyor belt having means for maintaining the formed configuration of the sheet, a second pair of forming belts, means for continuously feeding second sheets toward the first conveyor belt and said second sheets into engagement with one face of the first formed sheets carried by the first conveyor belt, a transfer belt between the second forming belts and the second conveyor belt, the said second transfer belt and conveyor belt having means for maintaining the configuration of the second sheets, means for continuously feeding third sheets into the machine and into engagement with the second sheets as said second sheets are fed into engagement with the first sheets, means for securing all of the said sheets together as a unit, said means for securing the sheets together including means for applying an adhesive to the inner face of the first sheet, means for applying an adhesive to the inner face of the second sheet, means for pressing said sheets into firm contact with one another, means for setting the adhesive prior to the engagement of the sheets with one another, means for synchronously driving all of the operating parts from a single line shaft, and means for severing the fabricated sheets longitudinally into strips.

13. In a machine for fabricating a shock absorbing and cushioning member as set forth in claim 11, and means for securing all of said sheets together as a unit.

14. In a machine for fabricating a shock absorbing and cushioning member as set forth in claim 11, means for securing all of said sheets

together as a unit, said means for securing the sheets together including means for applying an adhesive to the inner face of the first sheet, means for applying an adhesive to the inner face of the second sheet, and means for pressing said sheets into firm contact with one another.

15. In a machine for fabricating a shock absorbing and cushioning member as set forth in claim 11, means for securing all of said sheets together as a unit, said means for securing the sheets together including means for applying an adhesive to the inner face of the first sheet, means for applying adhesive to the inner face of the second sheet, means for pressing said sheets into firm contact with one another, and means for setting the adhesive prior to the engagement of the sheets with one another.

16. In a machine for fabricating a shock absorbing and cushioning member as set forth in claim 11, means for securing all of said sheets together as a unit, said means for securing the sheets together including means for applying adhesive to the inner face of the first sheet, means for applying adhesive to the inner face

of the second sheet, means for pressing said sheets into contact with one another, means for setting the adhesive prior to the engagement of the sheets with one another, and means for synchronously driving all of the operative parts from a single line shaft.

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