July 11, 1967 D. TERZUOLI 3,330,715

APPARATUS FOR APPLYING ADHESIVE PATTERNS TO FLAT CARDBOARD ELEMENTS

Filed Dec. 11, 1964 4 Sheets-Sheet 1

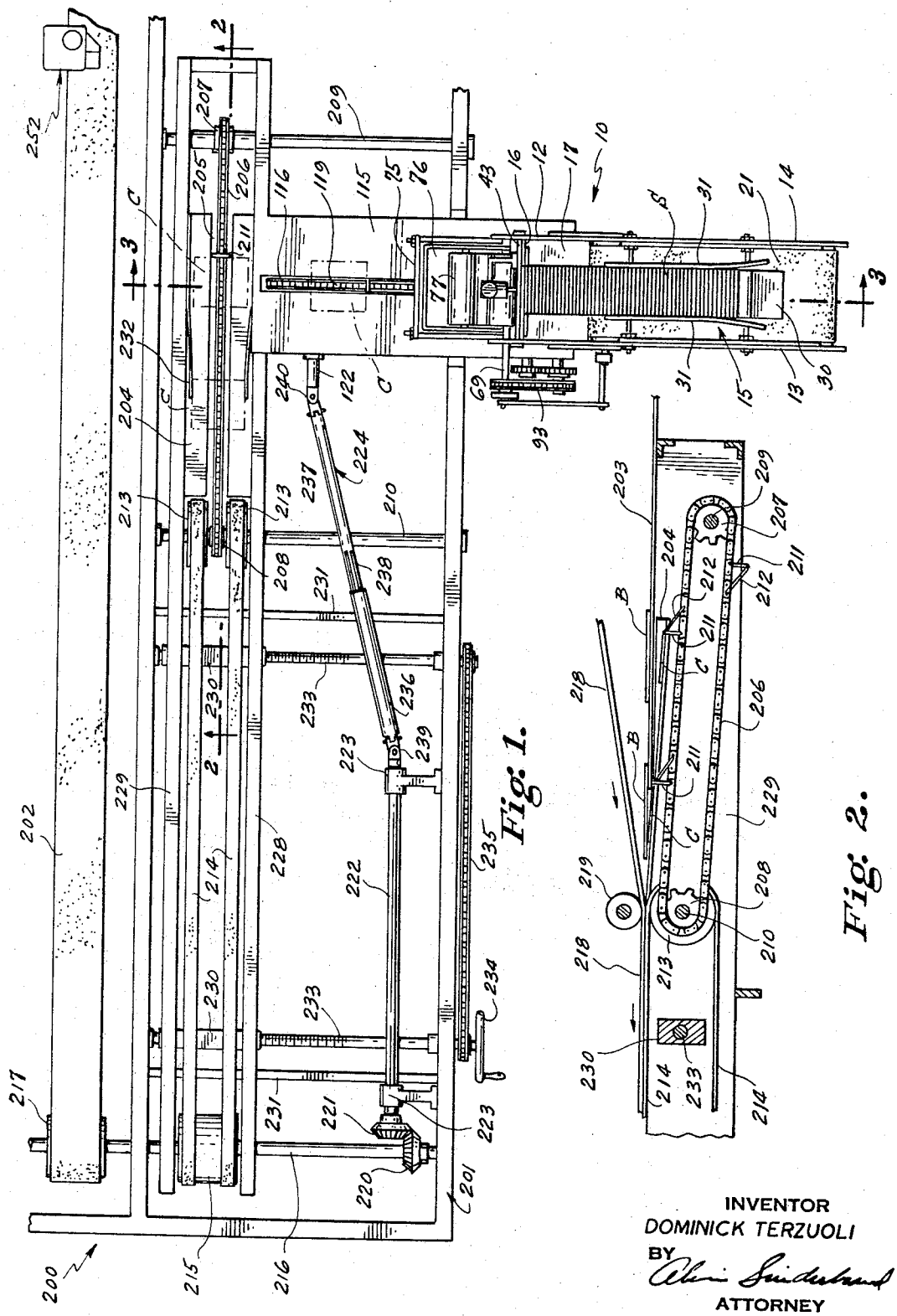


Fig. 1.

Fig. 2.

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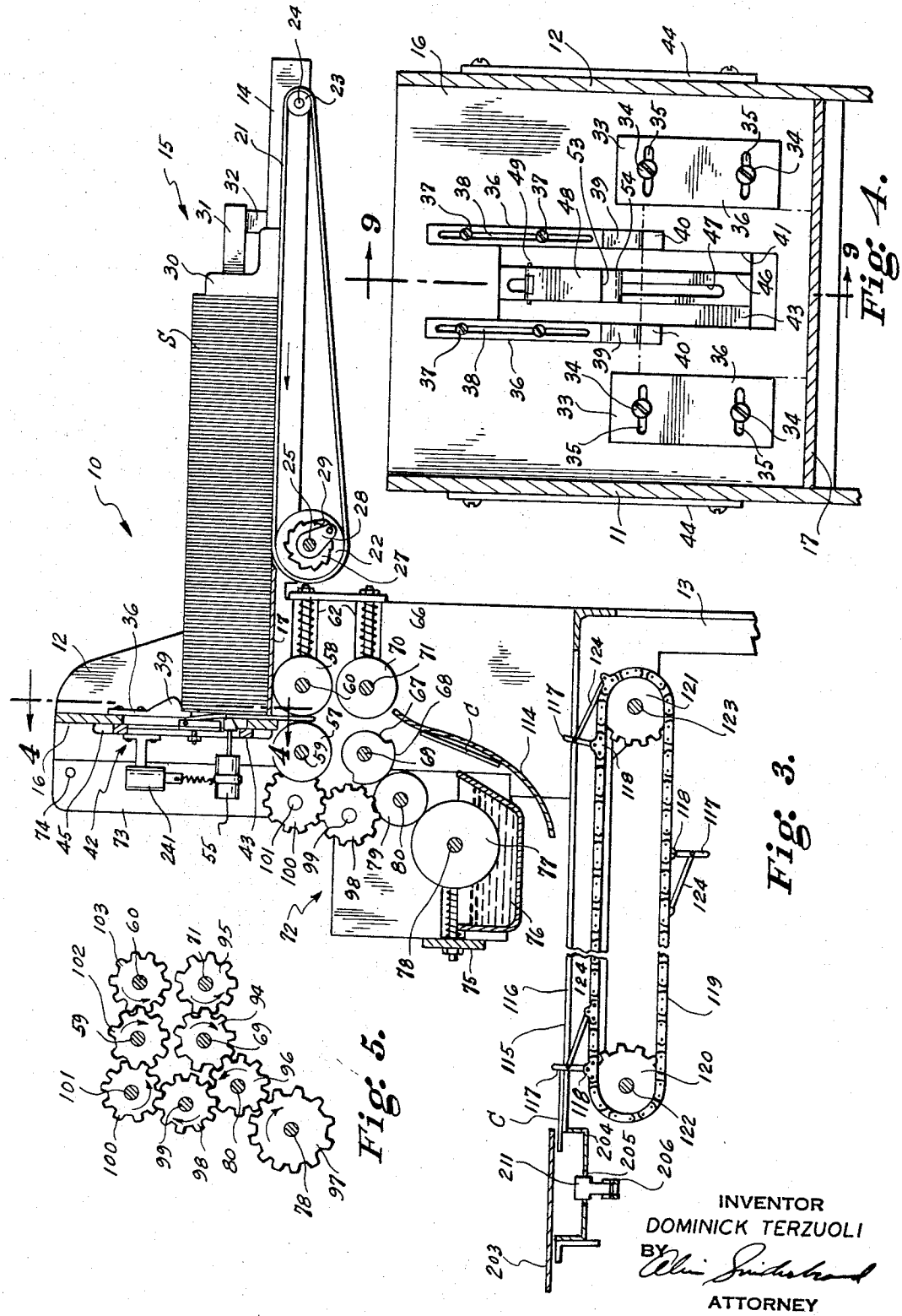


Fig. 4.

Fig. 3.

Fig. 5.

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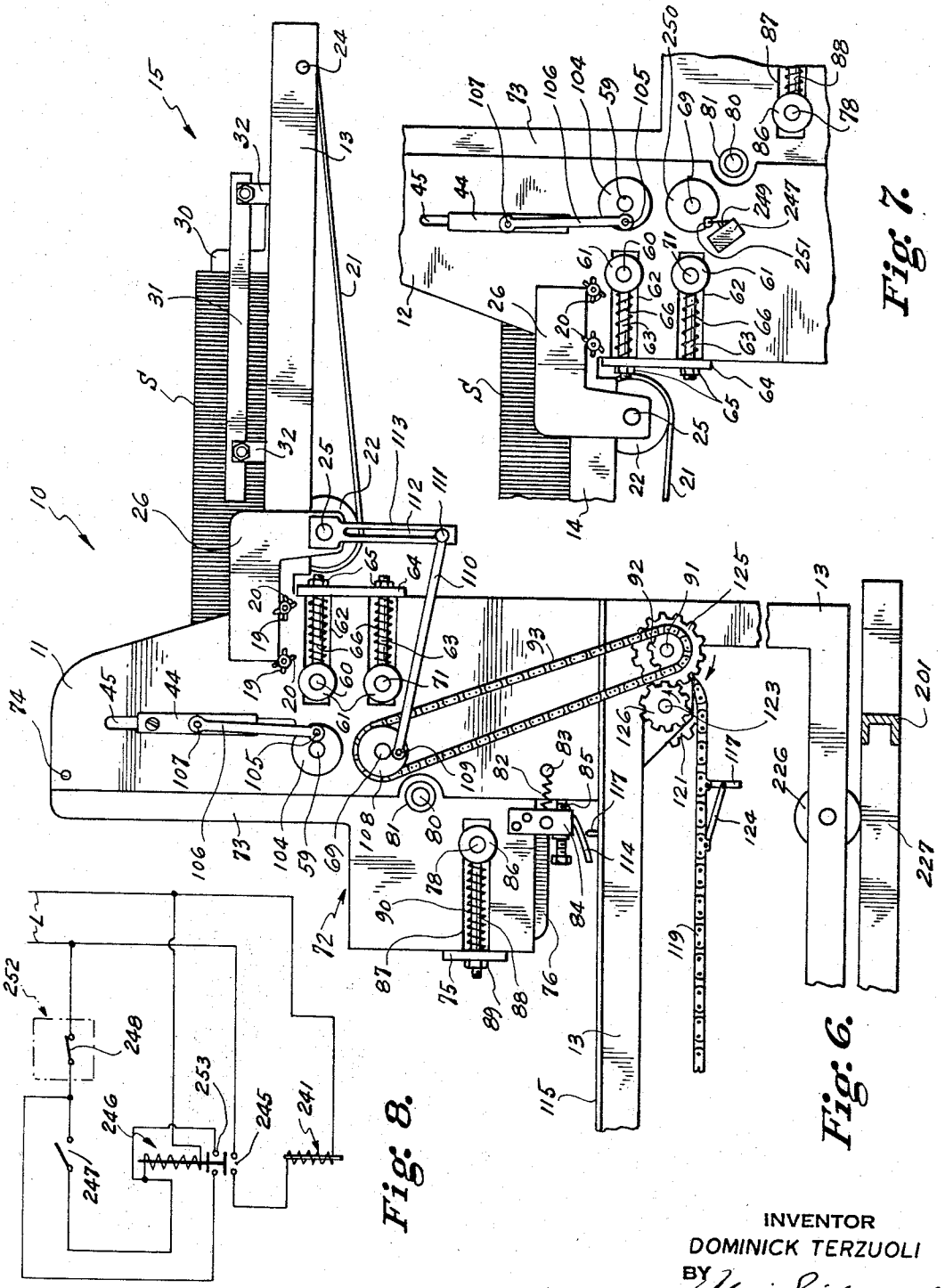


Fig. 7.

Fig. 6.

Fig. 8.

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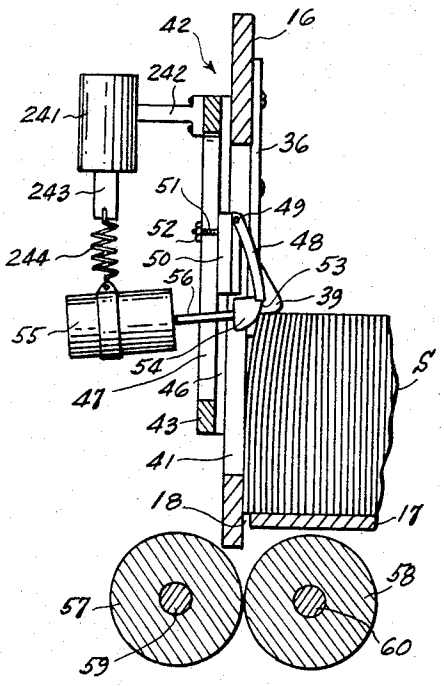


Fig. 9.

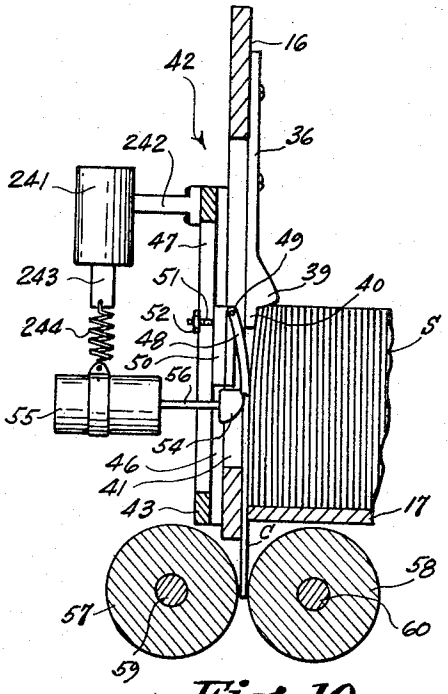


Fig. 10.

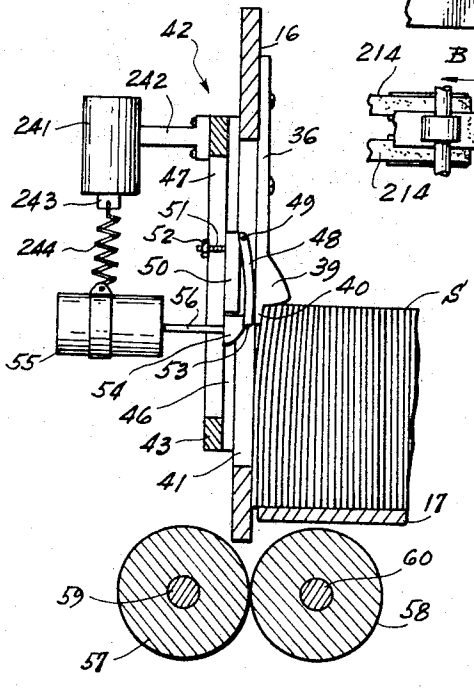


Fig. 11.

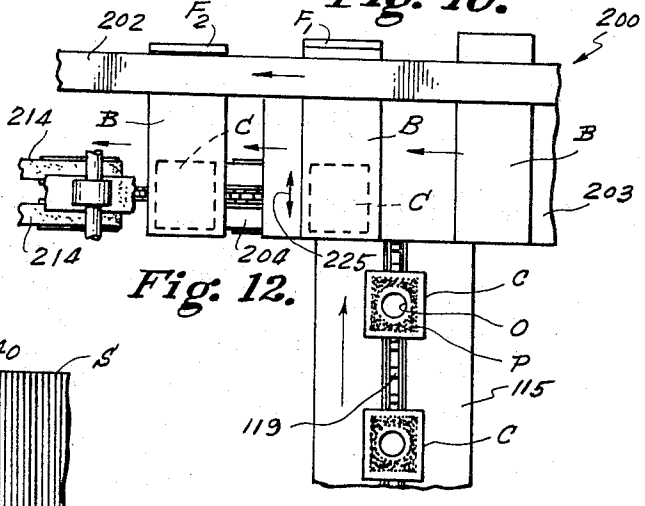


Fig. 12.

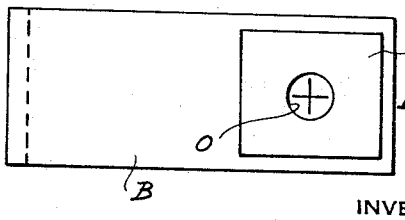


Fig. 13.

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3,330,715

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25 Claims. (Cl. 156—364)

ABSTRACT OF THE DISCLOSURE

Flat carboard elements rest on edge in a horizontally arranged stack within a magazine having a face plate at one end toward which the stack is uniformly urged, preferably by an intermittently displaced conveyor belt, a stripping member is reciprocated parallel to the face plate to drive the cardboard elements arriving successively at the adjacent end of the magazine downwardly through an exit slit and into engagement by feed rollers which further advance each engaged element away from the stripping member and between a die cylinder and a back-up roller operative to apply a pattern of adhesive to each cardboard element. The cardboard elements to which adhesive is applied may be transported by an auxiliary conveyor having a terminal portion extending under a path along which paper bags are transported in registry with underlying cardboard elements, whereupon each bag and the registered cardboard element are pressed together for attachment by the pattern of adhesive previously applied to the cardboard element.

This invention relates generally to the application of patterns of adhesive to flat cardboard elements for securing the latter to paper or cardboard articles.

Paper bags commonly used in vacuum cleaners as disposable receptacles for the collected dust are frequently provided with a cardboard stiffening element adhesively secured to the paper bag to extend around and provide the necessary strength and rigidity at the opening of the bag placed in communication with the suction hose. Other paper bags, for example, shopping bags, are also provided with cardboard elements adhesively secured to the bags, for example, to form carrying handles. Flat cardboard blanks may also have cardboard elements adhesively secured to each blank so that, when the latter is folded or erected to form a carton or box, the cardboard elements secured to the blank form spacers, buffers or cushioning members within the box or carton for protecting the contents of the latter.

It is an object of this invention to provide an improved apparatus capable of applying adhesive patterns to flat cardboard elements at a high operating speed and with a minimum of human supervision.

Another object is to provide an apparatus of the described character capable of operating reliably and consistently even when the cardboard elements to which the adhesive patterns are to be applied are warped or otherwise distorted out of flat planes.

Still another object is to provide an apparatus of the described character which is capable of applying patterns of adhesive that are of uniform thickness and sharply defined.

A further object is to provide an apparatus of the described character for applying patterns of adhesive to the flat cardboard elements and which may be made part of a machine by which the cardboard elements are secured to paper or cardboard articles while the latter are continuously transported through the machine.

In accordance with an aspect of this invention, an apparatus for applying adhesive patterns to flat cardboard

elements comprises a magazine for a stack of the cardboard elements including a face plate at one end of the magazine toward which the stack is urged and means cooperating with the face plate to define an exit slit therebetween through which the cardboard element nearest the face plate can be removed from the stack; stripping means reciprocable parallel to the face plate toward and away from the exit slit and being normally urged into the adjacent end of the magazine for engagement with the cardboard element nearest the face plate to drive the engaged cardboard element through the exit slit during movement of the stripping means toward the slit; rotatable feed rollers positioned adjacent the exit slit at opposite sides of the latter to engage the cardboard element driven through the slit and further advance the element away from the magazine; a rotatable die cylinder carrying a die and a cooperating back-up roller located for rolling contact, from opposite sides, with each cardboard element advanced therebetween by the feed rollers, the die having an operative area in the shape of the pattern of adhesive to be applied to each cardboard element; means for applying adhesive to the operative area of the die during each revolution of the die cylinder for transfer of the adhesive from the operative area of the die to a cardboard element in rolling contact therewith; and means synchronously driving the stripping means, feed rollers, die cylinder and back-up roller to obtain predetermined positioning of each pattern of adhesive with respect to the cardboard element to which it is applied.

When the adhesive applying apparatus is included in a machine for attaching the cardboard elements to paper bags or other articles successively transported along a predetermined path by means of a main conveyor, an auxiliary conveyor receives each cardboard element to which an adhesive pattern has been applied and transports the same with the pattern facing upwardly along a path having a terminal portion extending under the transport path of the bags and converging with respect to such path of the bags, and the auxiliary conveyor and the several components of the adhesive applying apparatus are driven in synchronism with the main conveyor so that each cardboard element moving along the terminal portion of its path on the auxiliary conveyor underlies, and is brought into registered engagement with a bag being transported by the main conveyor, whereupon each bag and the underlying registered cardboard element are pressed together as the bag is transported by the main conveyor beyond the terminal portion of the path of transport of the cardboard elements on the auxiliary conveyor.

In accordance with another feature of this invention, means are provided for sensing the presence and absence of bags on the main conveyor and for rendering the stripping means inoperative to remove cardboard elements from the stack in the magazine when the sensing means indicates the absence of a bag from the main conveyor, thereby ensuring that cardboard elements with adhesive patterns applied thereto are only fed through the machine when bags are available for attachment of the cardboard elements thereto.

The above, and other objects, features and advantages of the invention, will be apparent in the following detailed description of an illustrative embodiment thereof which is to be read in connection with the accompanying drawings forming a part hereof, and wherein:

FIG. 1 is a top plan view of an apparatus for applying adhesive patterns to flat cardboard elements in accordance with an embodiment of this invention, and which is shown in association with a machine for attaching such cardboard elements to paper bags or the like;

FIG. 2 is a fragmentary sectional view taken along the line 2—2 on FIG. 1;

FIG. 3 is a sectional view taken along the line 3—3 on FIG. 1, but on an enlarged scale;

FIG. 4 is an enlarged detail sectional view taken along the line 4—4 on FIG. 3;

FIG. 5 is a detail view of a gear train by which several elements of the adhesive applying apparatus are synchronously rotated;

FIG. 6 is a side elevational view of the adhesive applying apparatus;

FIG. 7 is a fragmentary side elevational view showing a portion of the side of the adhesive applying apparatus opposite to that appearing on FIG. 6;

FIG. 8 is a wiring diagram of an electrical circuit associated with the adhesive applying apparatus for controlling the operation of the latter;

FIG. 9 is a sectional view taken along the line 9—9 on FIG. 4, and showing the illustrated parts of the apparatus in their positions at the beginning of an operative cycle of the apparatus;

FIG. 10 is a view similar to that of FIG. 9, but showing the positions of the illustrated parts during the feeding of a cardboard element from a stack;

FIG. 11 is another view similar to that of FIG. 9, but showing the positions of the illustrated parts when the apparatus is rendered inoperative to feed a cardboard element from the stack;

FIG. 12 is a schematic, fragmentary plan view showing the manner in which cardboard elements having adhesive patterns applied thereto in accordance with this invention are brought into registry with and secured to paper bags during continuous transport of the latter; and

FIG. 13 is a plan view of a paper bag with a cardboard stiffener or reinforcement which may be secured thereto by the apparatus embodying this invention.

Referring to the drawings in detail, and initially to FIGS. 1, 3 and 6 thereof, it will be seen that an apparatus **10** for applying adhesive patterns to flat cardboard elements in accordance with an embodiment of this invention includes upstanding, side frame members or plates **11** and **12** secured in vertical, spaced apart planes on a base or sub-frame **13**. The side frame plates **11** and **12** have elongated, horizontally directed arms **13** and **14**, respectively, extending from their upper portions to form the support for a magazine **15** which is intended to carry a horizontal stack S of substantially flat cardboard elements to which adhesive patterns are to be applied.

The magazine **15** includes a face plate **16** (FIGS. 1 and 3) extending vertically between side frame plates **11** and **12** adjacent the upper ends of the latter, and a horizontally extending base plate **17** also extending between side frame plates **12** and **13** adjacent the bottom of face plate **16** and being spaced from the latter to define an exit slit **18** therebetween (FIG. 9). The base plate **17** is preferably horizontally adjustable relative to face plate **16** so that the width of exit slit **18** can be varied in accordance with the thickness of the cardboard elements which are to be fed from the stack S. The adjustable mounting for the base plate **17** may merely consist of screws extending from the opposite side edges of base plate **17** through horizontally elongated openings or slots **19** in side frame plates **11** and **12** and receiving wing nuts **20** by which plate **17** can be secured in its adjusted position (FIG. 6).

The magazine **15** further includes a conveyor belt **21** disposed between arms **13** and **14** and running around a drive roller **22** disposed adjacent base plate **17** and an idler roller **23** which is freely rotatable on a shaft **24** carried by the free end portions of arms **13** and **14** (FIGS. 3 and 6). The drive roller **22** and idler roller **23** are vertically located so that the upper run of belt **21** is substantially at the same level as the horizontal base plate **17**. The drive roller **22** is rotatable on a shaft **25** journalled in brackets **26** which extend from side frame

plates **11** and **12**. A one-way coupling is provided between shaft **25** and driving roller **22** so that the latter is turned incrementally or in a step-by-step manner in response to periodic oscillation of shaft **25**. As shown on FIG. 3, the one-way coupling between shaft **25** and roller **22** may, for example, consist of a ratchet wheel **27** secured to roller **22**, and a pawl lever **28** secured to shaft **25** and carrying a pawl **29** urged into engagement with the teeth of ratchet wheel **27**. The teeth of the ratchet wheel are arranged so that pawl **29** drives ratchet wheel **27** and driving roller **22** in the counter-clockwise direction, as viewed on FIG. 3, during each angular displacement of lever **28** with shaft **25** in the counter-clockwise direction. It will be apparent that the step-by-step rotation of roller **22** drives belt **21** so that the upper run of the latter is moved in the direction toward face plate **16** at one end of the magazine **15**.

A body **30** of substantial weight rests on the upper run of belt **21** and bears against the end of stack S remote from space plate **16**. By reason of the frictional engagement of belt **21** with body **30** and with the bottom edges of the cardboard elements in stack S, the stack is urged toward face plate **16** in response to the incremental or step-by-step movement of the conveyor belt. As hereinafter described in detail, the shaft **25** of driving roller **22** is oscillated in synchronism with the stripping or removal of the successive cardboard elements from the stack S downwardly through the exit slit **18** of the magazine. Preferably, the oscillation of shaft **25** is sufficient to cause displacement of the upper run of belt **21** through a distance substantially greater than the thickness of each cardboard element during the removal of each element from the stack. Thus, the cardboard element at the end of the stack S nearest face plate **16** is always pressed securely against the latter.

The cardboard elements in stack S on the conveyor belt **21** are laterally guided by guide strips **31** which are mounted for lateral adjustment with respect to brackets **32** extending upwardly from arms **13** and **14**.

A pair of lateral locating members **33** are secured to plate **16** by screws **34** extending through laterally elongated slots **35**. Thus, members **33** can be laterally adjusted to vary the distance between their rounded inner edges **36** which engage the side edges of the cardboard element closest to plate **16** and accurately locate such cardboard element in the lateral direction.

Vertical guides **36** are mounted for vertical adjustment on face plate **16** by means of screws **37** extending through vertically elongated slots **38** in guides **36**. The lower portion of each vertical guide **36** has a nose **39** projecting therefrom and formed with an arcuate lower edge surface engageable by the upper edges of the cardboard elements nearing plate **16** so as to hold such cardboard elements down on base plate **17** and thereby determine the vertical positions of the cardboard elements (FIGS. 9, 10 and 11). Each of the vertical guides **36** further has a ledge **40** extending therefrom below the nose **39** and engageable with the upper edge portion of the cardboard element nearest plate **16** so as to bow that cardboard element, as particularly shown on FIG. 11, and thereby establish a predetermined distance between the central part of the upper edge of the cardboard element nearest plate **16** and the confronting face of the latter, even when the cardboard element is warped or distorted.

Plate **16** has a centrally located, vertically elongated slot or opening **41** betwen vertical guides **36** to permit a stripping device **42** to reach from in back of plate **16** through slot **41** for engagement with the cardboard element closest to the face plate.

Stripping device **42** includes a plate **43** disposed in back of face plate **16** (FIGS. 9, 10 and 11) and mounted for vertical reciprocation by means of bearing members **44** which are secured to the opposite side edges of plate **43** and are slidable in vertically elongated slots **45** formed in side frame plates **11** and **12** (FIGS. 4 and 6). The

surface of plate 43 facing toward plate 16 has a centrally located, vertical groove 46 formed therein, and a relatively narrow vertical slot 47 extends through plate 43 and opens into the center of grove 46.

The stripping device 42 further includes a stripping element 48 pivotally mounted at its upper end, as at 49 (FIGS. 9, 10 and 11), on a substantially rectangular mounting block 50 which is vertically adjustable in groove 46. A screw 51 extends rearwardly from block 50 through slot 47 and receives a nut 52 which can be tightened against the back of plate 43 for securing the mounting block 50 in vertically adjusted position on plate 43. The stripping element 48 has a downwardly facing shoulder or ledge 53 extending thereacross and a rounded nose 54 extending downwardly below shoulder 53.

The width of shoulder 53 is less than the thickness of each cardboard element in stack S, and the mounting block 50 and stripping element 48 are dimensioned so that the stripping element can swing about its pivot 49 between an operative position in which it project through slot 41 of plate 16, as shown on FIGS. 9 and 10, and an inoperative position in which stripping element 48 is completely retracted into slot 41, as shown on FIG. 11. A weight 55 is mounted on a rod 56 extending rearwardly from the lower end portion of stripping element 48 so that the force of gravity acting on weight 55 produces a turning movement about pivot 49 which normally urges the stripping element toward its operative position.

The plate 43 is reciprocated, as hereinafter described in detail, and the mounting block 50 of stripping element 48 is adjusted relative to plate 43 so that, at the top of the upward stroke of plate 43, the shoulder 53 of stripping element 48 is disposed above the upper edge of the cardboard element nearest plate 16. By reason of the force of gravity acting on weight 55 and urging stripping element 48 to its operative position, nose 54 at the bottom of the stripping element is pressed against the upper edge portion of the cardboard element closest to plate 16, as shown on FIG. 9. During the downward stroke of plate 43, downwardly facing shoulder 53 of stripping element 48 engages the upper edge of the cardboard element C closest to plate 16 and drives that cardboard element downwardly through exit slit 18, as shown on FIG. 10.

Mounted below exit slit 18 are back and front feed rollers 57 and 58 which are located so that each cardboard element driven downwardly through exit slit 18 has its lower edge portion projected into the nip between the feed rollers. The roller 57 has its shaft 59 journalled in fixed bearings (not shown) carried by side frame plates 11 and 12, while the shaft 60 of the front feed roller 58 is journalled in bearings 61 which are slidable in slots 62 extending horizontally in the side frame plates (FIGS. 6 and 7). A threaded rod 63 extends from each slidable bearing 61 along slot 62 and has its end portion passed loosely through a cross member 64 which is welded or otherwise secured to the front edges of side frame plates 11 and 12. The ends of threaded rods 63 receive nuts 65 engageable with cross member 64 to adjustably limit the movement of the axis of shaft 60 in the direction toward the axis of shaft 59. Compression springs 66 extend around rods 63 and bear, at their opposite ends, against cross member 64 and bearings 61 to urge the latter in the direction toward the axis of shaft 59. Thus, feed roller 58 is pressed towards feed roller 57 with the contact therebetween being adjustably regulated by nuts 65. When a cardboard element is driven downwardly from the magazine and enters between feed rollers 57 and 58, roller 58 is urged away from roller 57 against the force of springs 66 thereby ensuring secure and smooth contact of the feed rollers with the successive cardboard elements even when the latter are of substantial thickness.

As shown on FIG. 3, a die cylinder 67 is mounted below feed roller 57 and carries a die 68 having a raised or operative area in the shape of the pattern of adhesive to be applied to the successive cardboard elements. The die cylinder 67 is secured on a shaft 69 located vertically below shaft 59 and being similarly journalled in fixed bearings (not shown) carried by side frame plates 11 and 12. A back-up roller 70 is mounted on a shaft 71 which is located substantially below the shaft 60 of feed roller 58 and similarly journalled in bearings 61 which are slidable in slots 62 and urged in the direction toward shaft 69 of the die cylinder by means of spring 66 disposed around rods 63 which extend from the bearings through the cross member 64 and receive adjustment nuts 65. Shaft 71 of back-up roller 70 is located adjustably to provide the desired contact pressure of the operative area of die 68 on each cardboard element as the latter is fed downwardly by feed rollers 57 and 58 so as to pass between die cylinders 67 and back-up roller 70.

In order to apply adhesive to the raised or operative area of the die 68 during each revolution of die cylinder 67, apparatus 10 further comprises a unit 72 (FIG. 3) having a sub-frame made up of side members 73 pivotally suspended, at their upper ends, from side frame plates 11 and 12, as at 74 (FIGS. 3 and 6) and having their lower portions joined together by a cross member 75. An ink reservoir 76 is suitably mounted between the lower end portions of side members 73, and an ink pick-up roller 77 is rotatable on a shaft 78 so as to dip into and pick up adhesive from a supply thereof in reservoir 76. The pick-up roller 77 is in rolling contact with a transfer roller 79 which is rotatable on a shaft 80 and positioned to also effect rolling contact with the raised or operative area of the die 68. The shaft 80 is journalled in fixed bearings 81 (FIG. 6) carried by side members 73, and a spring 82 is connected between an anchor pin 83 on side frame plate 11 and a bracket 84 depending from the adjacent side member 73 to urge the latter in the direction moving transfer roller 79 toward die cylinder 67. A stop screw 85 is threaded through bracket 84 and engageable against side frame plate 11 to limit the movement of the side members 73 by spring 82 and thereby determine the extent of the contact of the transfer roller with the operative area of the die.

The shaft 78 of pick-up roller 77 is journalled in bearings 86 (FIGS. 6 and 7) which are slidable along horizonal slots 87 formed in side members 73. A threaded rod 88 extends from each bearing 86 and passes loosely through the cross member 75, with a nut 89 being screwed on each rod 88 to bear against cross member 75 and thereby limit the movement of the bearing 86, and hence of the axis of shaft 78 in the direction toward the transfer roller 79. A spring 90 is disposed around each rod 88 between cross member 75 and the related bearing 86 to urge the latter in the direction for pressing pick-up roller 77 against transfer roller 79. It will be apparent that, by adjusting the nuts 89 on rods 88, the thickness of the layer of adhesive transferred from roller 77 to roller 79 and hence to the operative area of die 68 can be conveniently controlled.

In order to effect the synchronous operation of the above described components of adhesive applying apparatus 10, the latter has a drive shaft 91 journalled in the base 13 and being suitably driven, as hereinafter described in detail. Drive shaft 91 carries a sprocket 92 driving a chain 93 which runs around a sprocket (not shown) secured on the shaft 69 of die cylinder 67. A spur gear 94 (FIG. 5) is fixed on shaft 69 of the die cylinder and meshes with a spur gear 95 fixed on the shaft 71 of back-up roller 70 and also with a spur gear 96 fixed on the shaft 80 of transfer roller 79. The pick-up roller 77 is driven from the transfer roller 79 by means of a spur gear 97 secured on the shaft 78 of the pick-up roller and meshing with the gear 96. The gear 96 further meshes with an idler gear 98 freely rotatable on a stub shaft 99 carried by the adjacent side member 73. The idler gear 98 meshes, in turn, with another idler gear 100 freely rotatable on a stub shaft 101 and meshing with a gear

102 fixed on the shaft 59 of feed roller 57. Feed roller 58 is driven from feed roller 57 by way of a gear 103 fixed on the shaft 60 of feed roller 58 and meshing with the gear 102. The several gears of the drive train shown on FIG. 5 are dimensioned so that the die 68 of cylinder 67 and the rollers 57, 58, 70, 77 and 79 are all driven at the same peripheral speed.

Vertical reciprocation of the plate 43 of stripping device 42 is obtained by crank wheels 104 (FIGS. 6 and 7) secured on the opposite ends of shaft 59 of feed roller 57 and carrying crank pins 105 connected through rods 106 with pivot pins 107 extending from the bearing members 44 which are slidable in slots 45 and secured to the adjacent ends of the reciprocated plate 43. The radial distance from each crank pin 105 to the axis of shaft 59 is preferably smaller than the radius of the feed rollers 57 and 58, as will be apparent from a comparison of FIGS. 3 and 6, so that the maximum linear speed of movement of the reciprocated plate 43, and hence of the stripping element 48 will be less than the peripheral speed of the feed rollers. Thus, when the stripping element 48 engages the upper edge of the cardboard element C nearest to face plate 16 and drives such cardboard element downwardly through exit slit 18 into the nip between feed rollers 57 and 58, the initiation of engagement of the feed rollers with the cardboard element is effective to downwardly accelerate the cardboard element away from the shoulder 53 of stripping element 48. The movement of the cardboard element away from the shoulder 53 is effective to avoid the buckling or damage to the cardboard element that might otherwise result from the exertion of a force on the upper edge of the carboard element by stripping element 48 at a time when the travel of the cardboard element is already under the control of feed rollers 57 and 58.

As shown on FIG. 6, the shaft 69 of die cylinder 67 also has a crank wheel 108 fixed thereon and carrying a crank pin 109 forming a pivotal attachment for one end of a connecting rod 110. The other end of rod 110 is pivotally connected, as at 111, in a longitudinal slot 112 of an arm 113 which is secured to the shaft 25 of drive roller 22 of the conveyor belt 21. Thus, during rotation of the die cylinder, arm 113, and hence shaft 25, is oscillated to effect the described incremental or step-by-step movement of conveyor belt 21. The attachment 111 of connecting rod 110 to arm 113 is adjustable along slot 112 of the arm to vary the angular extent of the oscillation of arm 113, and thereby to adjust the extent of the movement of conveyor belt 21 during each revolution of the die cylinder. When the feed rollers 57 and 58 and the die 68 on the die cylinder have the same effective radii and are rotated at the same speed, as shown, the drive of the stripping device 42 causes reciprocation of the plate 43 of the latter through a single complete cycle, and thereby removes a single cardboard element from the stack S, during each complete revolution of the die cylinder. Further, as previously described, the oscillation of arm 113 and shaft 25 is adjusted so that the advance of conveyor belt 21 during each complete revolution of the die cylinder exceeds the thickness of the cardboard element thus removed from the stack.

It will be apparent that the pattern of adhesive applied by the die 68 to each cardboard element as the latter passes downwardly between die cylinder 67 and back-up roller 70 is only determined by the configuration of the operative area of the die. For example, as shown schematically on FIG. 13, each cardboard element C may constitute a stiffener intended to be secured around the inlet opening of a paper bag B of the type employed as a disposable collector for dust in tank-type vacuum cleaners. The cardboard element C to be employed as such a stiffener has a central opening O and the pattern of adhesive to be applied to the cardboard element, as indicated at P on FIG. 12, should be spaced uniformly inward from the outer margin of the cardboard element and from the margin of its opening O to avoid smearing of the adhesive from under the cardboard element when the latter is pressed against and secured to the bag B, as hereinafter described in detail.

With the above described arrangement for individually feeding the cardboard elements from the stack S and for applying a pattern of adhesive to each cardboard element, the pattern of adhesive is accurately located or registered relative to each cardboard element and further contains a uniformly controlled thickness of adhesive to avoid any undesirable smearing thereof. Further, the described arrangement is capable of operating at high speeds to reliably apply patterns of adhesive to the cardboard elements, even when the latter are initially warped or otherwise distorted from flat planes.

Extending downwardly from below die cylinder 67 and back-up roller 70 is a guide chute 114 which receives the successive cardboard elements C to which adhesive has been applied (FIG. 3). The guide chute 114 curves rearwardly, that is, in the direction extending under die cylinder 67 and reservoir 76 so that each guided cardboard element is conveyed by the guide chute from an initial substantially vertical position to a horizontal position in which the adhesive pattern on the cardboard element faces upwardly.

The lower end of guide chute 114 extends over a horizontal conveyor table 115 at the top of base 13. Table 115 has a longitudinal slot 116 (FIGS. 1 and 3) through which pushers 117 can project upwardly for engaging behind the successive cardboard elements and propelling the latter along the conveyor table 115. The pusher elements 117 are pivotally mounted, as at 118, on suitably spaced apart links of a chain 119 which runs around sprockets 120 and 121 secured on shafts 122 and 123, respectively. The shafts 122 and 123 are suitably journalled in base 13 so as to rotate about spaced apart axes under table 115 near the opposite ends of slot 116. Each pusher 177 is pivotally connected to a rod 124 which is, in turn, pivotally connected to a link of chain 119 trailing that link to which the pusher 117 in question is connected at 118. The chain 119 is driven, as hereinafter described in detail, so that its upper run moves toward the left, as viewed on FIG. 3. Thus, each pusher 117, as it moves along the upper run of chain 119 and projects through slot 116, engages in back of a cardboard element having a pattern of adhesive on its upper surface to propel the cardboard element along conveyor table 115 out from under the adhesive applying apparatus 10. The operation of the adhesive applying apparatus 10 is synchronized with the movement of chain 119 so that a cardboard element is deposited on table 115 in advance of each pusher 117. Such synchronized operation is obtained, for example, by driving the drive shaft 91 of the adhesive applying apparatus from the shaft 123 through meshing gears 125 and 126 secured on shaft 91 and 123 (FIG. 6).

The cardboard elements C successively conveyed along table 115 by pushers 117 may be fed directly from the adhesive applying apparatus to a synchronously operated machine by which the cardboard elements are secured to paper bags or other articles. For example, as shown on FIG. 1, the adhesive apparatus 10 may be combined with a bag folding machine 200 of the kind disclosed in detail in my copending application for United States Letters Patent identified as Ser. No. 391,966, filed Aug. 25, 1964. Such a bag folding machine generally has a horizontally elongated frame 201 with main conveyor belts 202 supported within the frame and having operative horizontal runs extending through the frame and being continuously driven to move in the direction from one end to the other of the frame. The successive bags are introduced in uniformly spaced apart relationship between the operative runs of the main conveyor belts 202 at one end of the frame for transport by the belts 202 to the other end of the frame. During such transport of the bags B by the

main conveyor belts **202**, each bag extends laterally with respect to its direction of movement and has one end of the bag projecting laterally beyond the main conveyor belts at one side of the latter and being acted upon successively by suitable devices to form one or more adhesively secured folds, as at F_1 and F_2 on FIG. 12. Since the devices for folding each bag form no part of the present invention, the same are neither described nor illustrated herein. As the folding or other operations are performed on one end portion of each bag, the opposite end portion of the bag also projects laterally beyond the main conveyor belts **202** and may be slidably supported on a table **203**.

As shown particularly on FIGS. 1 and 12, the adhesive applying apparatus **10** may be arranged relative to the machine **200** so that the successive cardboard elements C conveyed over table **115** by the pushers on chain **119** move along a path at right angles to the path of movement of the successive bags B by the main conveyor belts **202**. As shown particularly on FIG. 3, the level of conveyor table **115** is below that of the support table **203** so that the sucessive cardboard elements C propelled off the end of table **115** by pushers **117** pass under support table **203**. A sloping ramp **204** extends under table **203** generally parallel to the path of main conveyor belts **202**, that is, at right angles to table **115** and has its relatively low end portion disposed below the level of table **115** to receive the successive cardboard elements propelled off the latter. The ramp **204** has a longitudinal slot **205** extending therealong, and a conveyor chain **206** runs in a plane passing through slot **205** around sprockets **207** and **208** (FIGS. 1 and 2) mounted on shafts **209** and **210**, respectively. Shafts **209** and **210** are suitably journalled in the main machine frame **201** so that the upper run of chain **206** extends below slot **205** and is inclined upwardly at the same angle as ramp **204** in the direction toward the sprocket **208**. The chain **206** carries spaced apart pushers **211** which, during movement along the upper run of the chain, project upwardly through slot **205** of ramp **204** and are intended to each engage behind a cardboard element C dropped onto the ramp **204** from table **115** to propel the cardboard element upwardly along the ramp toward the level of the successive bags transported by the main conveyor belts **202** over the support table **203**. As in the case of the pushers **117** on the chain **119**, each of the pushers **211** is pivotally mounted on a link of chain **206** and connected by a rod **212** to a trailing link of the chain. As shown on FIG. 12, the support table **203** terminates before the upper end portion of ramp **204** so that, as each cardboard element reaches the upper end portion of the inclined ramp, the upper surface of the cardboard element bearing the adhesive pattern P is exposed for contact with the underside of a bag B moved off table **203** by the main conveyor belts **202**.

As shown on FIGS. 1 and 2, pulleys **213** are mounted on shaft **210** at the opposite sides of sprocket **208**, and a pair of conveyor belts **214** run around pulleys **213** and extend horizontally from the latter to a drive pulley **215** which is mounted on a drive shaft **216**. The shaft **216** also carries a drive pulley **217** for the lower main conveyor belt **202**. Thus, the belts **214** are driven by pulley **215** from shaft **216** and have their horizontal upper runs disposed at the same level as the operative runs of the main conveyor belts **202** and moved in the same direction at the same speed. The upper end portion of ramp **204** extends substantially tangentially with respect to the belts **214** at the upper portions of the pulleys **213** so that each pusher **211** on chain **206** propels a cardboard element C from ramp **204** onto the upper runs of belts **214**. Rotation of shaft **210** and of the sprocket **208** thereon is effected through pulleys **213** from belts **214** so that the movement of chain **206** by sprocket **208** is synchronized with the movement of the successive bags B by the main conveyor belts **202**. Such synchronized movement causes registration of each cardboard element C in the direction of its movement by a pusher **211** on chain **206** with a bag B conveyed by main conveyor belts **202**.

As each cardboard element moves onto the upper runs of conveyor belts **214**, the overlying bag B is pressed downwardly against the adhesive pattern on the cardboard element. Such pressing together of each bag and cardboard element may be effected by means of a pressure belt **218** (FIG. 2) which has an operative run following a downwardly inclined path under a pressure roller **219** freely rotatable above pulleys **213** and then runs above the upper runs of belts **214**. The downward pressure of belt **218** on each bag against the related cardboard element supported by belts **214** ensures secure adhesion therebetween prior to the release of the bag and attached cardboard element at the delivery end of the belts **214** running around the pulley **215**.

In order to synchronize the operation of conveyor chain **119** and adhesive applying apparatus **10** with the operation of conveyor chain **206**, conveyor belts **214** and the main conveyor belt **202**, the drive for the conveyor chain **119** includes bevel gears **220** and **221** (FIG. 1) secured on drive shaft **216** of the main conveyor belts and on a shaft **222** which extends longitudinally with respect to the main frame **201** and is journalled in bearing blocks **223** carried by the main frame. A connection or transmission **224**, hereinafter described in detail, is provided between the shaft **222** and the shaft **122** carrying the sprocket **120** for chain **119**. Thus, the movement of chain **119** and of the pushers **117** thereon is synchronized with the movement of the successive bags by the main conveyor belts **202**. Since the adhesive applying apparatus **10** is driven from the shaft **123** carrying the sprocket **121** of chain **119**, the delivery of cardboard elements with adhesive patterns thereon for movement by the pushers **117** of chain **119** is also synchronized with the travel of the bags.

The pivotal mounting of pushers **117** and **211** on links of chains **119** and **206**, and the connections of the pushers to trailing links of the respective chains by rods **124** and **212** causes the pushers to lean back as they travel with the chains around the sprockets **120** and **208** after moving along the operative upper runs of the chains. This prevents speeding up of the cardboard elements by the pushers at the instant when each cardboard element is deposited from table **115** onto ramp **204**, and at the instant when each cardboard element is brought into contact with the respective bags at the infeed end of the operative runs of belts **214**.

In order to permit adjustment of the position of each cardboard element toward and away from the adjacent end of the bag to which it is to be secured, that is, adjustment of each cardboard element C relative to the bag B in the direction of the arrows **225** on FIG. 12, the adhesive applying apparatus **10**, and the various described conveyors by which the successive carboard elements are transported from the adhesive applying apparatus into contact with the underside of bags transported by the main conveyor belts **202** are made adjustable, as a unit, transversely with respect to the direction of movement of the successive bags by the main conveyor belts.

As shown particularly on FIG. 6, the base **13** of adhesive applying apparatus **10** is mounted for lateral movement with respect to the main frame **201**, for example, by means of flanged wheels **226** running on a laterally directed track **227** which is an integral part of the main frame. The base **13** of the adhesive applying apparatus is further joined, at its inner end to a horizontal girder **228** extending longitudinally within the main machine frame **201**. The girder **228** is joined to a parallel, spaced apart girder **229** by means of cross members **230**. The girders **228** and **229** are laterally slidable relative to the main machine frame **201** on rails **231** which form integral parts of the main machine frame. The shafts **209**, **210** and **216** all extend loosely through girders **228** and **229**. The sprockets **207** and **208** which carry chain **206** and the

pulleys 213 and 215 which carry conveyor belts 214 are disposed between girders 228 and 229, as clearly shown on FIG. 1. Further, the sprockets 207 and 208 and the pulleys 213 and 215, while being rotatably coupled to the respective shafts, as by keys or splines, are free to be axially shifted along the shafts in response to the lateral movement of the girders 228 and 229 between which the identified sprockets and pulleys are located. The ramp 204 and associated side guides 232 for the successive cardboard elements being propelled therealong are secured between the girders 228 and 229 and thus are also laterally adjustable with the girders.

It will be apparent that lateral adjustment of the girders 228 and 229 will effect lateral adjustment of the path of travel of the successive cardboard elements C at the instant when the latter are brought into contact with the related bags transported by the main conveyor belts 202.

In order to effect lateral adjustment of girders 228 and 229, jack screws 233 (FIGS. 1 and 2) extending laterally with respect to the girders 228 and 229 are rotatably journalled in suitable bearings carried by the main frame 201. The screws 233 extend threadably through suitably tapped bores in the cross members 230 which join the girders 228 and 229. Thus, rotation of the jack screws 233 will be effective to laterally move girders 228 and 229 and also the base 13 of the adhesive applying apparatus which is joined to girder 228. Rotation of the jack screws 233 may be effected manually by a hand wheel 234 secured on one of the jack shafts 233 which is connected by a chain and sprocket transmission 235 to the other jack shaft for effecting simultaneous rotation of the latter.

Since the base 13 of adhesive applying apparatus 10 moves with girders 228 and 229 relative to the main frame 201, and hence relative to the drive shaft 222, the transmission 224 connecting drive shaft 222 with the shaft 122 journalled in base 13 includes telescopic shaft sections 236 and 237 which are axially movable relative to each other and rotatably coupled, as by splines 238, and universal joints 239 and 240 joining the shaft sections 236 and 237 to the drive shaft 222 and the shaft 122, respectively. Thus, girders 228 and 229 and the base 13 carrying the adhesive applying apparatus can be adjusted relative to machine frame 201 for varying the positions of the cardboard elements relative to the bags without interrupting the operation of the adhesive applying apparatus or of the associated bag folding or other machine through which the bags are transported.

In accordance with this invention, means are preferably provided for interrupting the feeding of cardboard elements from the stack S by the stripping device 42 when the feeding of bags to the main conveyor belts 202 of the bag folding machine 200 is interrupted or improperly timed. Such means for rendering the stripping device 42 inoperative to remove cardboard elements from the stack S may include a solenoid 241 (FIGS. 3, 9, 10 and 11) supported by a bracket 242 extending rearwardly from the vertically reciprocated plate 43. The solenoid 241 has an armature 243 connected by a tension spring 244 with the weight 55 which normally urges the stripping element 48 to its operative or projecting position. When the solenoid 241 is deenergized, its armature 243 is extended to permit weight 55 to urge the stripping element to its operative position, as on FIGS. 9 and 10. However, when solenoid 241 is energized, its armature 243 is retracted to exert an upward pull on spring 244 and, through the latter, on weight 55, so that stripping element 44 is thereby retracted to its inoperative position within slot 41 of face plate 16, as shown on FIG. 11. It will be apparent that, with stripping element 48 in its inoperative position, the ledge 53 of the stripping element cannot engage the top edge of the cardboard element nearest the face plate 16 so that vertical reciprocation of the plate 43 and of the stripping element 48 can continue without causing the removal of cardboard elements from the stack S.

An electrical control system is provided to effect energization of solenoid 241 and thereby render stripping device 42 inoperative to feed or remove a cardboard element from the stack S in response to interruption or improper timing of the feeding of bags to the main conveyor belts 202 of machine 200. As shown on FIG. 8, the electrical control system for the solenoid 241 may include the usual current supply lines L to which the coil of the solenoid is connected in series with normally open contacts 245 of a relay 246. The coil of relay 246 is also connected to lines L in series with both a normally open switch 247 and normally closed switch contacts 248. As shown on FIG. 7, the normally open switch 247 may be a micro-switch mounted on the side frame plate 12 of the adhesive applying apparatus 10 and having an actuating member 249 which engages the periphery of a cam 250 secured on the adjacent end of the shaft 69 of die cylinder 67. The periphery of cam 250 has a notch 251 and, when actuating member 249 engages in the notch 251, as shown, the contacts of switch 247 are momentarily closed. When actuating member 249 engages the remainder of the periphery of cam 250, the switch contacts of switch 247 are opened. The cam 250 is angularly disposed on shaft 69 so that actuating member 249 engages in notch 251 and thereby closes the contacts of switch 247 when plate 43 has almost attained its uppermost position during the upward stroke thereof.

The normally closed switch contacts 248 form part of a photoelectric scanning device 252 which may be a commercially available photoelectric relay, for example, that produced by Specialty Control Department, General Electric Company, Waynesboro, Va., under the designation 3S7505GP105C1. The scanning unit 252 is suitably mounted adjacent the path of travel of the successive bags being fed to the main conveyor belts 202 for transport by the latter through the bag folding machine 200, and is operative to open its contacts 248 whenever a bag B passes the location of the scanning unit. The location of the scanning unit 252 is selected so that, at the instant when a cardboard element is being removed from stack S by stripping device 42, the bag to which that cardboard element is to be secured should be normally positioned to effect opening of switch contacts 248 of the scanning unit. Thus, so long as the successive bags are properly fed to the main conveyor belts 202 for transport through the bag folding machine 200, the normally closed contacts 248 will be opened in response to the presence of a bag at the location of the scanning unit 252 whenever the normally open switch 247 is closed by engagement of its actuating member 249 in the notch 251 of cam 250. Since the normally closed switch contacts 248 are opened at the instant when the normally open switch 247 is closed, relay 246 will remain deenergized and its open contacts 245 will interrupt the electrical circuit for energizing solenoid 241.

However, in the event that there is an interruption or delay in the feeding of bags to the main conveyor belts of machine 200, so that switch contacts 248 of the scanning units 252 remain closed at the instant when switch 247 is closed by engagement of its actuating member 249 in notch 251 of cam 250, then relay 246 is energized to close its contacts 245 and thereby energize solenoid 241. As previously described, such energization of solenoid 241 renders the stripping device 42 inoperative to remove or feed a cardboard element from the stack S.

As shown in FIG. 8, the relay 246 further has hold contacts 253 connected in parallel with the switch 247 and which are closed in response to energization of the relay 246. Thus, when relay 246 is energized in response to an interruption or delay in the feeding of bags to the machine 200, the coil of relay 246 will continue to be energized through switch contacts 248 and hold contacts 253, thereby continuing to effect the energization of sole-

noid 241, until switch contacts 248 of the scanning unit 252 are again opened in response to the scanning or detection of a bag being fed to the main conveyor belts.

Although the adhesive applying apparatus 10 has been shown and described herein in association with a bag folding machine, it will be understood that such adhesive applying apparatus may be employed in connection with other machines performing operations on bags or other paper or cardboard articles to which relatively flat cardboard elements are to be adhesively attached.

In the foregoing, a particular embodiment of the invention has been described in detail with reference to the accompanying drawings, but it is to be understood that the invention is not limited to that precise embodiment, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the invention, except as defined in the appended claims.

What is claimed is:

1. An apparatus for applying adhesive patterns to flat cardboard elements, comprising

a magazine for a horizontally arranged stack of flat cardboard elements standing on edge including a face plate at one end of the magazine, means moved toward said one end of the magazine and frictionally engageable with edges of the cardboard elements to urge the stack toward said face plate and means cooperating with said face plate to define an exit slit therebetween through which the cardboard element nearest the face plate can be removed downwardly from the stack,

stripping means reciprocable parallel to said plate toward and away from said exit slit and being normally urged into said one end of the magazine for engagement with the cardboard element nearest said plate to drive the engaged element downwardly through said exit slit during movement of said stripping means toward said slit,

rotatable feed rollers positioned below said slit at opposite sides of the latter to engage the cardboard element driven through said slit and further advance the engaged cardboard element away from said magazine at a speed greater than the maximum speed of movement of said stripping means,

a rotatable die cylinder carrying a die and a cooperating back-up roller disposed below said feed rollers for rolling contact, from opposite sides, with each cardboard element advanced therebetween by said feed rollers, said die having an operative area in the shape of the pattern of adhesive to be applied to each cardboard element,

means for applying adhesive only to said operative area of the die during each revolution of the die cylinder for transfer of the adhesive from said area to a cardboard element in rolling contact therewith, and

means synchronously driving said stripping means, feed rollers, die cylinder and back-up roller to obtain predetermined positioning of each pattern of adhesive with respect to the cardboard element to which it is applied.

2. An apparatus as in claim 1;

wherein said means to urge the stack toward the face plate includes a conveyor belt having a substantially horizontal run slidably engaging the lower edges of the cardboard elements of the stack, and means advancing said run of the belt toward said face plate through a distance, for each reciprocation of said stripping means, which is greater than the thickness of each cardboard element, thereby to effect the urging of the stack toward the face plate.

3. An apparatus as in claim 2;

further comprising a member of substantial mass resting freely on said run of the conveyor belt to engage the end of the stack remote from said face plate and compact the stack therebetween.

4. An apparatus as in claim 2;

wherein said means cooperating with the face plate to define the exit slit includes a base plate extending at right angles to said face plate between the latter and said run of the conveyor belt, and means mounting said base plate for movement toward and away from said face plate, thereby to adjust the width of said exit slit.

5. An apparatus as in claim 1;

further comprising spacing means on said face plate at a substantial distance from said exit slit and engageable with the cardboard element of the stack nearest the face plate to space the edge of such element which is remote from the exit slit away from the face plate and thereby ensure engagement of said stripping means even with warped cardboard elements.

6. An apparatus as in claim 1;

further comprising selectively operable means for moving said stripping means out of said one end of the magazine, thereby to interrupt removal of cardboard elements from the stack during continued reciprocation of the stripping means.

7. In an apparatus for processing flat cardboard elements, the combination of

a susbtantially horizontal magazine for a horizontally arranged stack of cardboard elements standing on edge including a vertical face plate located at one end of the magazine and having a vertical slot, a base plate extending horizontally adjacent said one end of the magazine and being spaced from said face plate to define an exit slit therebetween, and means frictionally engaging edges of the cardboard elements and being displaced horizontally to urge the elements of the stack over said base plate toward said face plate,

a stripping plate mounted for vertical reciprocation in back of said face plate,

a stripping element pivotally mounted on said stripping plate and swingable away from the latter through said slot of the face plate, said stripping element having a downwardly facing shoulder intermediate its ends,

means urging said stripping element to swing away from said stripping plate and through said slot into engagement with the cardboard element of the stack nearest said face plate, and

means reciprocating said stripping plate so that said shoulder rises above the top edge of the nearest cardboard element and drives the latter downwardly through said exit slit during the downward stroke of said stripping plate.

8. In an apparatus for processing flat cardboard elements, the combination as in claim 7; further comprising feed rollers disposed below said exit slit at the opposite sides of the latter and engageable with each cardboard element driven downwardly through said slit, and means rotating said feed rollers at a peripheral speed greater than the maximum linear speed of reciprocation of said stripping plate so that, upon engagement of a cardboard element by said feed rollers, the cardboard element is moved out of engagement with said shoulder of the stripping element.

9. In an apparatus for processing flat cardboard elements, the combination as in claim 7; wherein said means urging swinging of the stripping element away from the stripping plate is constituted by a body of substantial weight extending from said stripping element and gravitationally producing a force causing said swinging.

10. In an apparatus for processing flat cardboard elements, the combination as in claim 9; further comprising a solenoid mounted on said stripping plate and having an armature connected to said body to remove gravitationally produced force from said stripping element and thereby avoid engagement of said shoulder with the cardboard element nearest the face plate.

11. In an apparatus for processing flat cardboard elements, the combination as in claim 7; wherein said means urging a stack toward said face plate includes a conveyor belt having a horizontal run extending to said base plate and on which rest the lower edges of cardboard elements in the stack, and means advancing said run of the belt toward said face plate through a distance, for each reciprocation of the stripping plate, which is greater than the thickness of each cardboard element.

12. In an apparatus for processing flat cardboard elements, the combination as in claim 11; further comprising a member of substantial mass freely resting on said run of the belt to engage the end of the stack remote from said face plate and compact the stack therebetween.

13. In an apparatus for processing flat cardboard elements, the combination as in claim 7; further comprising guide members adjustable vertically on said face plate at opposite sides of said slot, each guide member having a lower end portion acting as a spacer between said face plate and the upper edge of the nearest cardboard element for ensuring engagement of said shoulder of the stripping element even with warped cardboard elements.

14. An apparatus for applying adhesive patterns to flat cardboard elements, comprising

a magazine including a pair of vertical, spaced apart side frame members, a vertical face plate extending between said side frame members and having a vertical slot, a base plate extending horizontally between said side frame members and being adjustable relative to the latter to define an exit slit of variable width opening downwardly from said magazine between said face and base plates, and a belt conveyor having a horizontal upper run extending at the level of said base plate and moving toward the latter so that a horizontally arranged stack of cardboard elements resting, at the lower edges of the latter, on said run, is urged over said base plate toward said face plate;

a device for removing the cardboard elements one-by-one from the stack including a stripping plate mounted between said side frame members for vertical reciprocation in back of said face plate, a stripping element vertically reciprocable with said stripping plate and movable toward and away from the latter through said slot of the face plate, said stripping element having a downwardly facing shoulder, means urging said stripping element away from said stripping plate and into engagement with the cardboard element nearest the face plate, and means reciprocating said stripping plate so that, at the top of the upward stroke of the latter, said shoulder of the stripping element engages above the upper edge of the nearest cardboard element to drive the latter downwardly through said exit slit upon the subsequent downward stroke of said stripping plate;

rotated feed rollers journalled in said side frame members below said exit slit to engage each cardboard element driven through the slit and further advance the cardboard element downwardly away from the stack;

a rotated die cylinder carrying a die and a cooperating back-up roller journalled in said side frame members below said feed rollers for rolling contact, from opposite sides, with each cardboard element advanced therebetween by said feed rollers, said die having an operative area in the shape of the pattern of adhesive to be applied to each cardboard element; and

means for applying adhesive to said operative area of the die during each revolution of the die cylinder for transfer from said area of the die to a cardboard element in rolling contact therewith.

15. An apparatus as in claim 14; further comprising selectively operable means for moving said stripping element toward said stripping plate and out of engagement with the cardboard element nearest said face plate, thereby to interrupt removal of cardboard elements from the stack.

16. An apparatus as in claim 14;

wherein said means for applying adhesive to the die includes an auxiliary frame suspended from said side frame members for movement toward and away from said die cylinder, a rotated adhesive transfer roller journalled in said auxiliary frame for rolling contact with said operative area of the die with a contact pressure therebetween determined by the position of said auxiliary frame relative to said side frame members, a reservoir for adhesive mounted in said auxiliary frame, and a rotated adhesive pick-up roller journalled in said auxiliary frame in rolling contact with said transfer roller and extending into said reservoir to pick-up adhesive from the latter for transfer, by said transfer roller, to said operative area of the die.

17. An apparatus as in claim 14; further comprising a guide chute extending from below said die cylinder and back-up roller and having a lower portion curving away from the vertical under said die cylinder, and a horizontal conveyor extending under the lower end of said chute and onto which the cardboard elements are successively delivered with the applied adhesive patterns facing upwardly.

18. In combination with a machine having a main frame supporting main conveyor means by which paper bags are successively transported along a predetermined path; apparatus for securing a flat cardboard element to each of the transported bags comprising

a magazine supporting a horizontally arranged stack of flat cardboard elements standing on edge and having means frictionally engaging edges of the cardboard elements to urge the latter toward one end of the magazine,

stripping means operative to remove the cardboard elements downwardly one at a time from the stack at said one end of the magazine,

adhesive applying means located below said magazine to receive each cardboard element from said stripping means and applying a pattern of adhesive to one side of the element,

auxiliary conveyor means receiving each cardboard element from said adhesive applying means and transporting the successive elements, with the adhesive pattern on each element facing upwardly, along a path having a terminal portion extending under said path along which the bags are transported and converging upwardly with respect to said path of the bags,

means driving said stripping means, adhesive applying means and auxiliary conveyor means in synchronism with said main conveyor means so that each cardboard element moving along said terminal portion of its path underlies, and is brought into registered engagement with a paper bag being transported by said main conveyor means, and

means pressing together each bag and the underlying registered cardboard element as the bag is transported by said main conveyor means beyond said terminal portion of the path of transport of the cardboard elements by said auxiliary conveyor means.

19. The combination as in claim 18; further comprising means sensing the presence and absence of said bags on said main conveyor means, and means rendering said stripping means inoperative to remove cardboard elements from the stack when said sensing means senses the absence of a bag from said main conveyor means.

20. The combination as in claim 18; wherein said auxiliary conveyor means includes a conveyor chain having a run moving longitudinally below said terminal portion of the path of the cardboard elements and passing around a sprocket at the end of said terminal portion,

said chain being driven at the same linear speed as that at which the bags are transported by said main conveyor means, spaced apart pushers extending pivotally from said chain to engage behind cardboard elements for propelling the latter along said terminal portion of the path to said pressing means, and a pivoted link extending from each pusher rearwardly to said chain to rake each pusher rearwardly when traveling around said sprocket and thereby avoid overspeeding of the cardboard element relative to the bag with which it is engaged.

21. The combination as in claim **18**; further comprising an auxiliary frame mounted for movement relative to said main frame transversely with respect to said path along which the bags are transported, said magazine, stripping means, adhesive applying means, auxiliary conveyor means and pressing means being all carried by said auxiliary frame for movement with the latter relative to said main frame, thereby to adjust the position of each cardboard element relative to the bag to which it is secured, and control means for effecting movement of said auxiliary frame relative to said main frame; and

wherein said means driving the auxiliary conveyor means, stripping means and adhesive applying means includes relatively displaceable transmission elements to permit movement of said auxiliary frame relative to said main frame during operation of said machine and said apparatus.

22. The combination as in claim **18**; wherein said magazine includes a vertical face plate having a vertical slot therein and being disposed at said one end of the magazine, a horizontal base plate adjustably spaced from said face plate to define an exit slit therebetween, and a conveyor belt having an upper run moved toward said one end of the magazine at the level of said base plate so that cardboard elements resting, at their lower edges, on said belt are urged toward said face plate; and

wherein said stripping means includes a stripping plate reciprocated vertically in back of said face plate, a stripping element mounted on said stripping plate for vertical reciprocation with the latter and being movable toward and away from said stripping plate through said slot, said stripping element having a downwardly facing shoulder intermediate its ends to rise above the upper edge of the cardboard element nearest said face plate at the upper limit of reciprocation of said stripping plate, and means for urging said stripping element away from said stripping plate to engage said shoulder with the nearest cardboard element and drive the latter downwardly through said exit slit during the downward stroke of said stripping plate.

23. The combination as in claim **22**; further comprising feed rollers disposed below said exit slit at the opposite sides of the latter and engageable with each cardboard element driven downwardly through said slit, and means rotating said feed rollers at a peripheral speed greater than the maximum linear speed of reciprocation of said stripping plate so that, upon engagement of a cardboard element by said feed rollers, the cardboard element is moved out of engagement with said shoulder of the stripping element.

24. The combination as in claim **22**; wherein said stripping element is pivoted on said stripping plate, and said means urging the stripping element away from the stripping plate includes a body of substantial weight suspended from said stripping element and offset relative to the pivoting axis of the latter.

25. The combination as in claim **24**; further comprising a solenoid mounted on said stripping plate and having an armature connected to said body to swing said stripping element toward said stripping plate and thereby halt removal of cardboard elements from the magazine upon energization of the solenoid, an energizing circuit for said solenoid, and control means for said circuit including sensing means sensing the presence and absence of bags on said main conveyor means and being operative to cause energization of said solenoid when the absence of a bag is sensed thereby.

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