United States Patent [19]

Place et al.

[11] **3,885,373**

[45] **May 27, 1975**

[54] **APPARATUS FOR SECURING ARTICLES TO A DISPLAY BOARD**

[75] Inventors: **Osmund V. Place**, Hudson; **Philip C. Hungerford, Jr.**, Cleveland Heights; **John L. Gereby**, Wickliffe, all of Ohio

[73] Assignee: **Cardpak Incorporated**, Cleveland, Ohio

[22] Filed: **Nov. 5, 1973**

[21] Appl. No.: **412,907**

[52] **U.S. Cl.** **53/196;** 53/137

[51] **Int. Cl.** **B65b 61/00**

[58] **Field of Search** 53/137, 196, 139.3; 156/210, 212

[56] **References Cited**

UNITED STATES PATENTS

2,551,288	5/1951	Prohaska	53/198 R
3,129,545	4/1964	Sloan	53/184 S X
3,286,835	11/1966	Crane	53/184 S X
3,470,794	10/1969	Crane	53/139.3 X
3,796,019	3/1974	Swezey	53/196 X

Primary Examiner—Travis S. McGehee
Assistant Examiner—John Sipos
Attorney, Agent, or Firm—Hamilton, Renner & Kenner

[57] **ABSTRACT**

Disclosed is an apparatus and method for the packaging of salable articles. The articles to be packaged are placed within spaced holders carried by an endless belt which advances the article through the apparatus while various operations are being performed thereon. A drive mechanism advances and periodically interrupts movement of the endless belt and operates a display card transfer mechanism. Movement by the transfer mechanism is in two directions, vertically, to pick up a display card from a supply and subsequently place it in juxtaposition to the article in the holder, and horizontally whereby a display card is transferred from the supply to a position over the conveyor belt and holder. Simultaneous with the placement of the display card in juxtaposition to the article, one or more labels are applied to an article and display card positioned in another holder to form a package. At least one of the labels is preformed in order to better conform to the contours of the article and display card. When movement of the conveyor belt resumes, beginning another cycle, a completed package is emitted from the holder, another display card is transferred from the supply and one or more labels are prepared, both card and labels to be applied to different holders during the next interruption in the movement of the endless belt.

20 Claims, 19 Drawing Figures

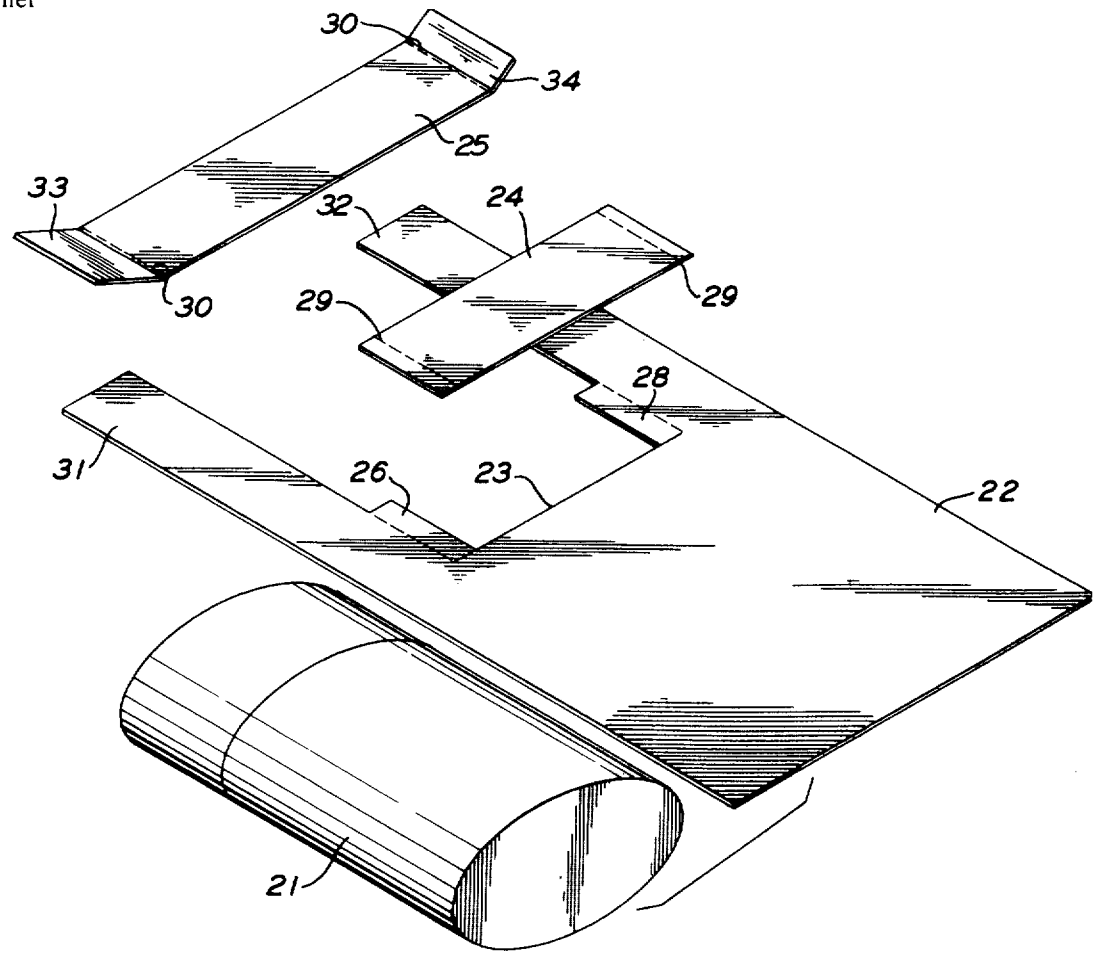


FIG. 1

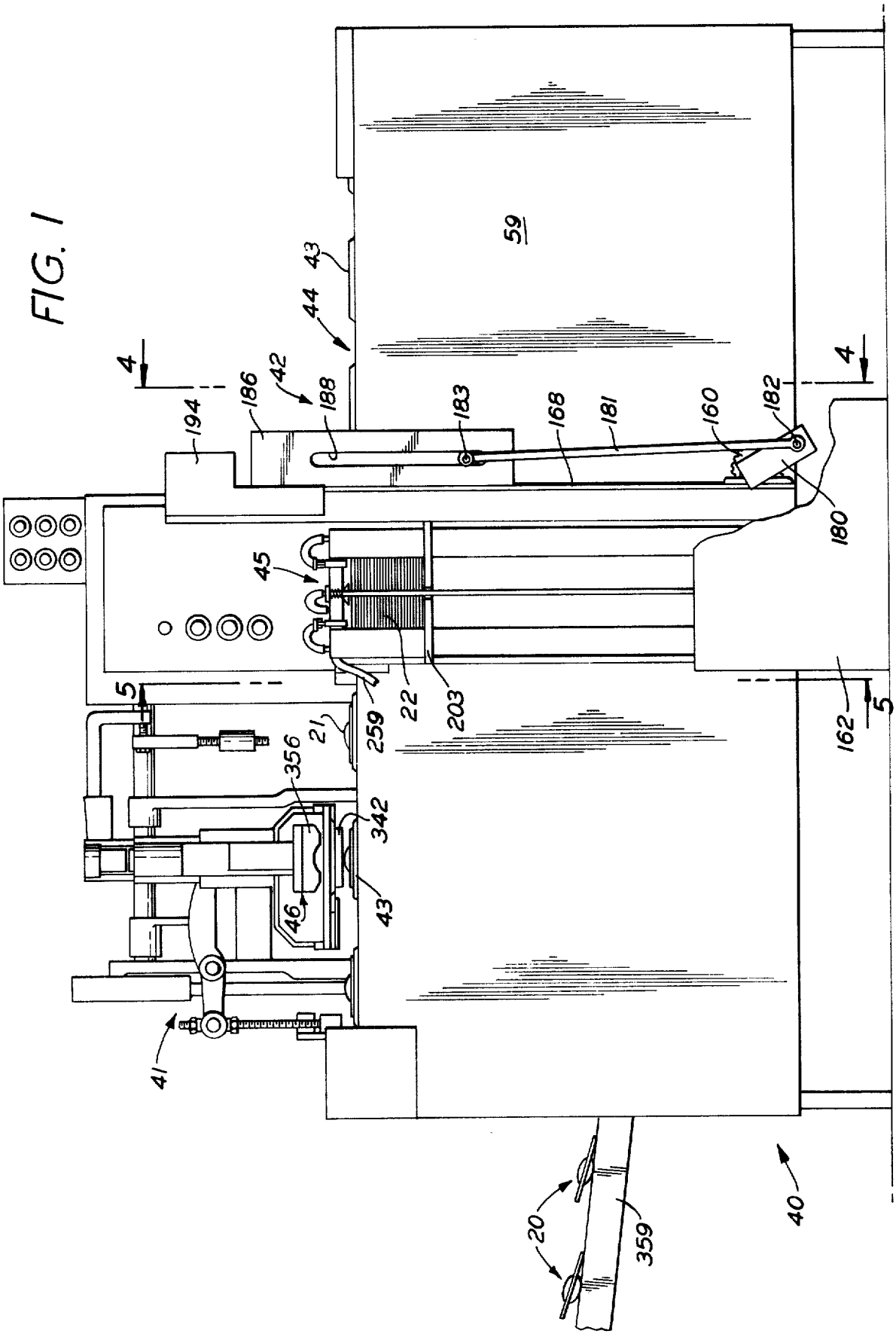

59
43
44
42
4
186
188
194
183
168
181
160
182
180
45
22
203
5
259
21
356
342
43
46
41
20
359
40
162

FIG. 2

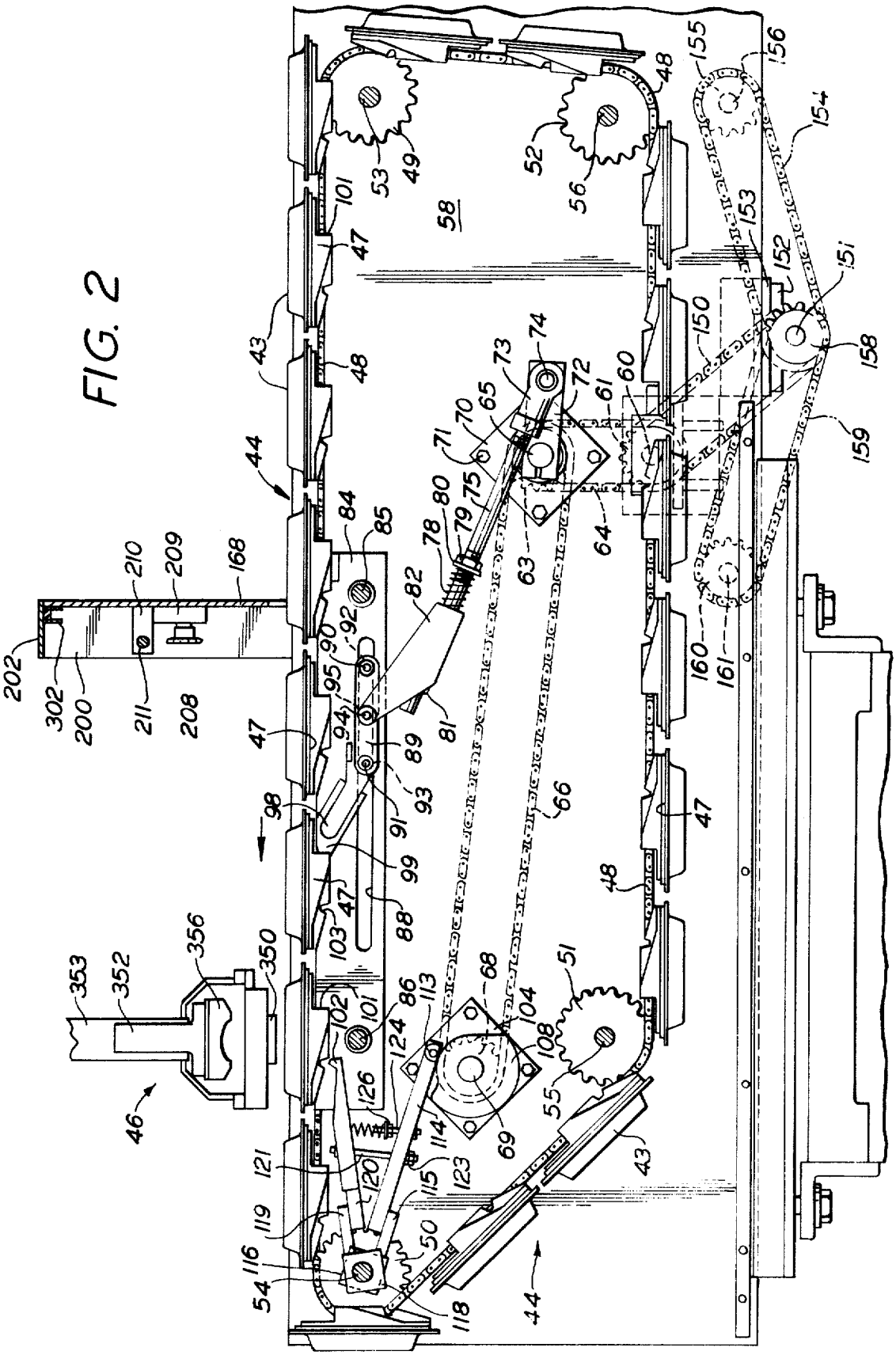
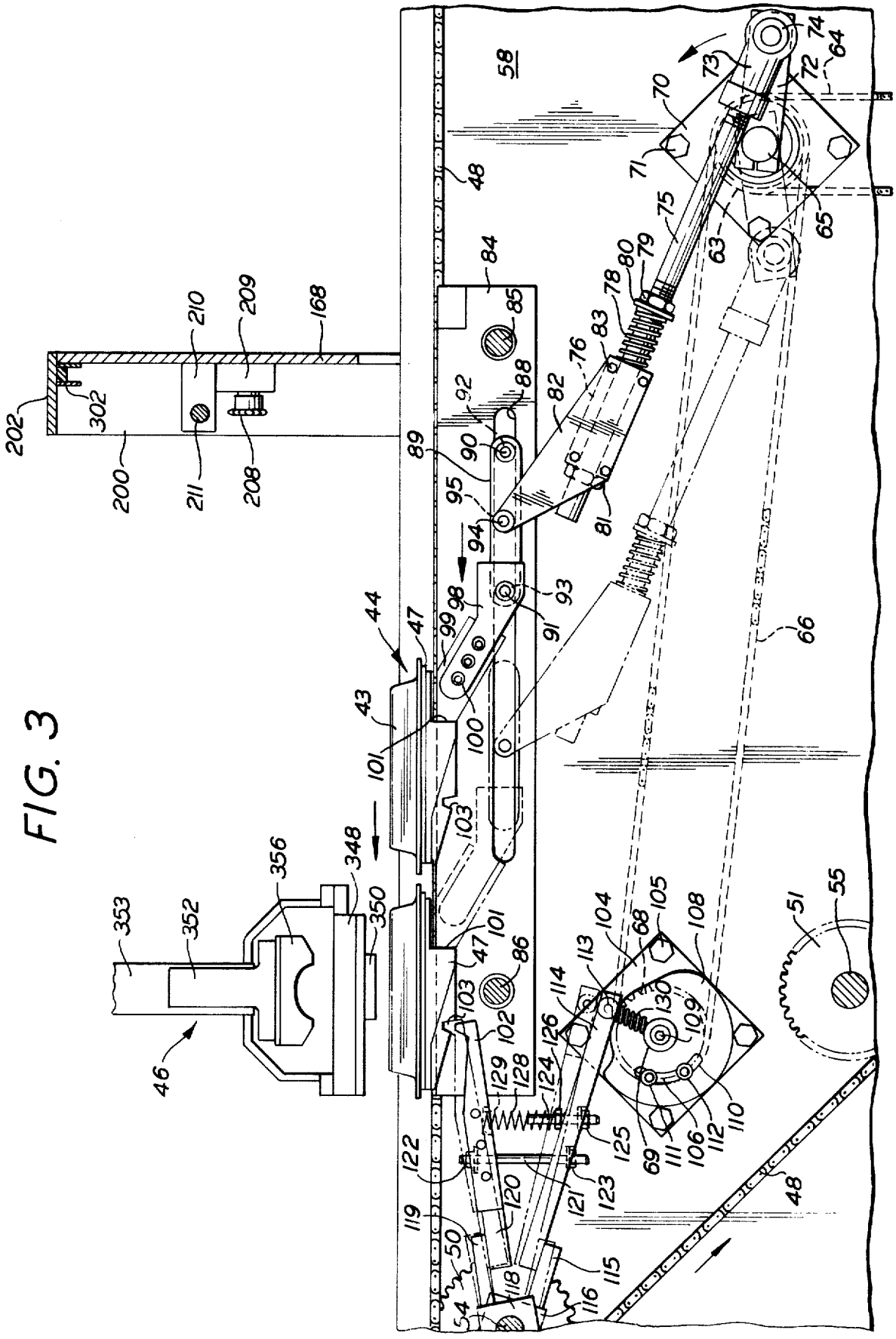

58
44
46
47
48
49
50
51
52
53
54
55
56
43
63
64
65
66
68
69
72
73
74
75
78
79
80
81
82
84
85
86
88
89
90
91
92
93
94
95
98
99
101
102
103
104
108
113
114
115
116
118
119
120
121
123
124
126
150
151
152
153
154
155
156
158
159
160
161
168
200
202
208
209
210
211
302
350
352
353
356

FIG. 3


58
48
84
85
88
92
89
90
95
94
98
93
91
99
47
44
43
101
100
103
348
356
350
353
352
46
86
102
129
128
124
126
114
113
104
105
68
108
109
130
110
112
106
111
69
125
123
121
122
119
120
50
54
118
116
115
48
51
55
66
63
65
71
70
73
72
74
64
75
79
80
78
83
76
82
81
202
302
200
211
208
210
209
168

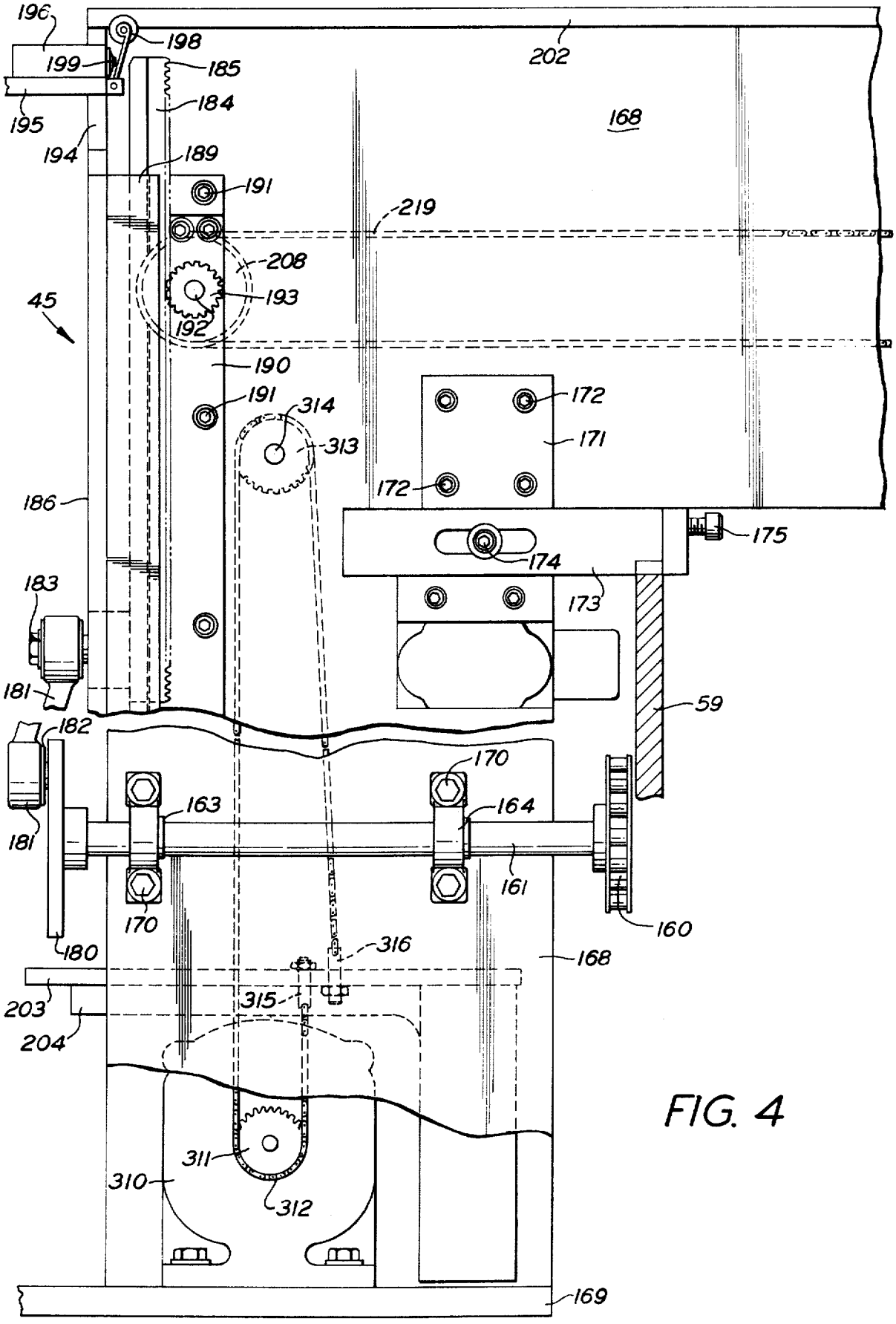

196
198
199
185
184
195
194
189
191
219
208
193
192
45
190
191
314
313
172
171
172
186
175
174
183
173
181
59
182
170
163
164
181
161
170
160
180
316
168
203
315
204
311
310
312
169

FIG. 4

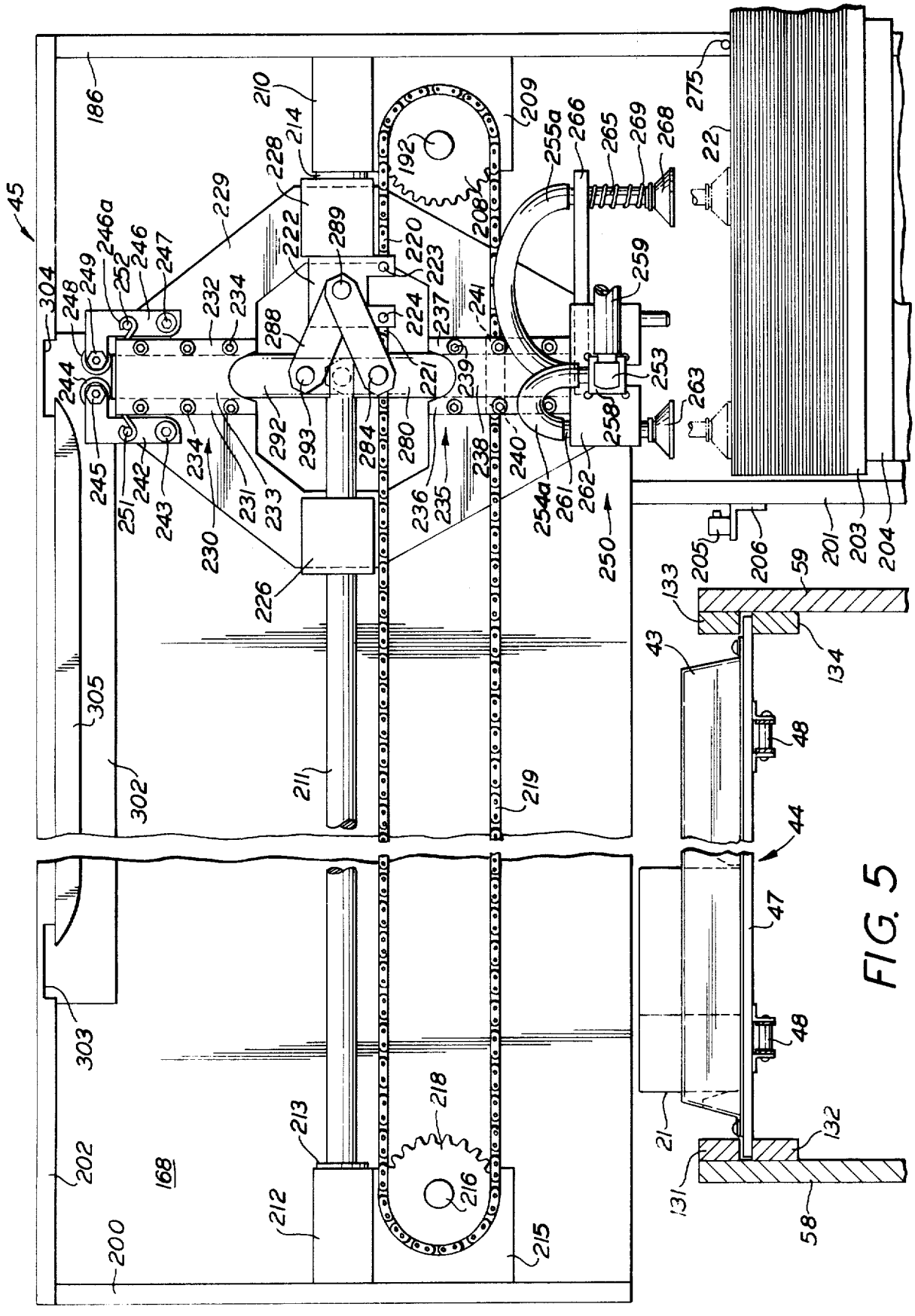

45
186
210
214
228
229
222
289
192
209
255a
266
265
269
268
275
22
246a
246
247
249
252
248
304
232
234
288
220
223
224
237
241
259
253
263
244
245
251
242
243
234
231
233
292
293
284
280
221
239
238
240
254a
261
262
258
236
235
230
226
250
205
206
59
201
203
204
133
134
43
48
305
302
211
219
44
47
48
21
132
131
58
303
202
168
213
218
216
212
215
200

FIG. 5

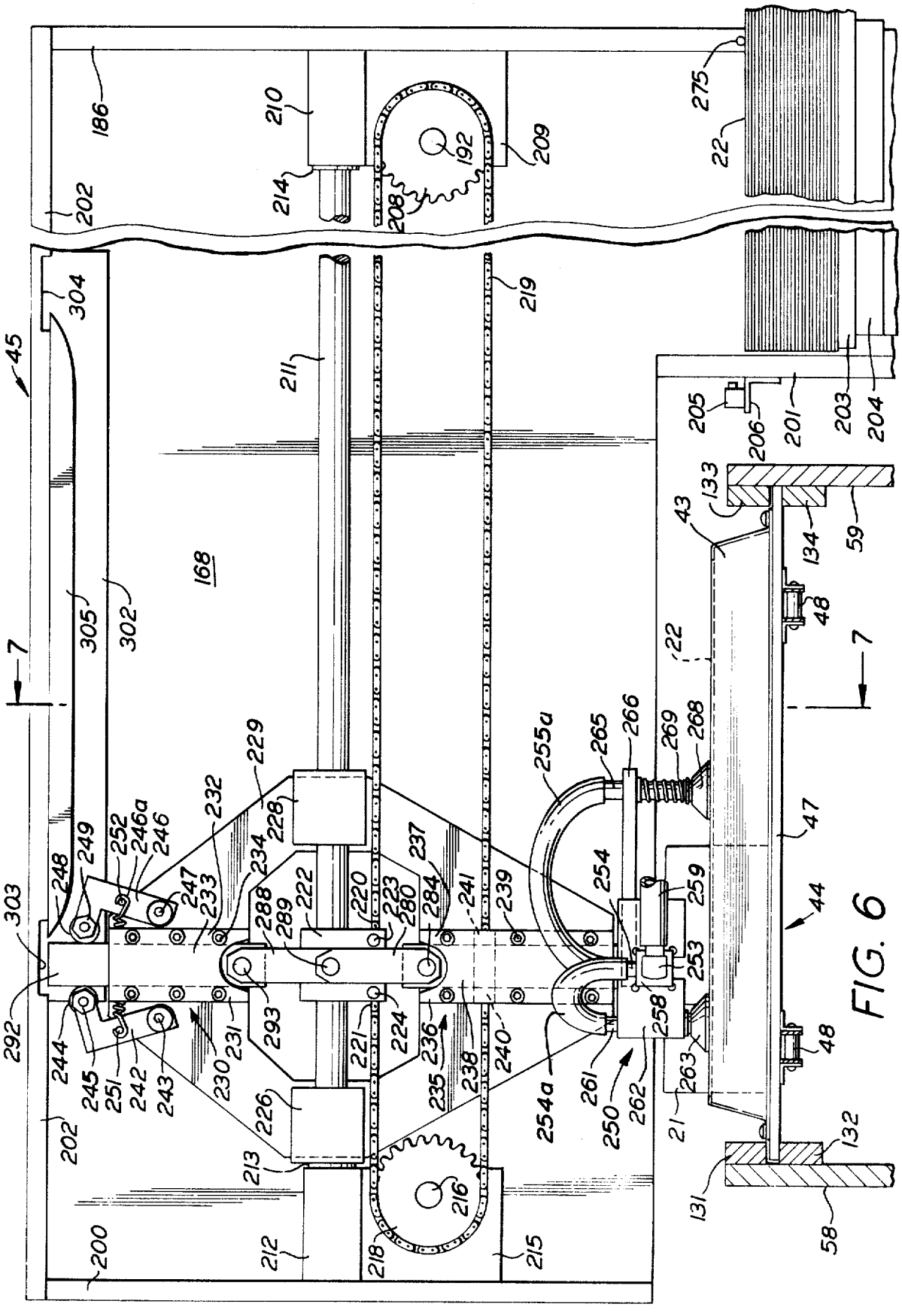

186
210
192
209
275
22
202
214
208
304
219
45
211
205
206
201
203
204
133
43
59
134
48
168
305
302
7
122
229
232
228
255a
265
266
269
268
47
249
252
246a
246
248
247
233
234
237
254
259
44
303
222
220
223
280
284
241
239
288
289
253
292
244
245
251
242
243
230
231
293
224
221
236
238
240
258
254a
261
250
262
263
21
132
131
58
226
213
216
218
215
212
200

FIG. 6

FIG. 12

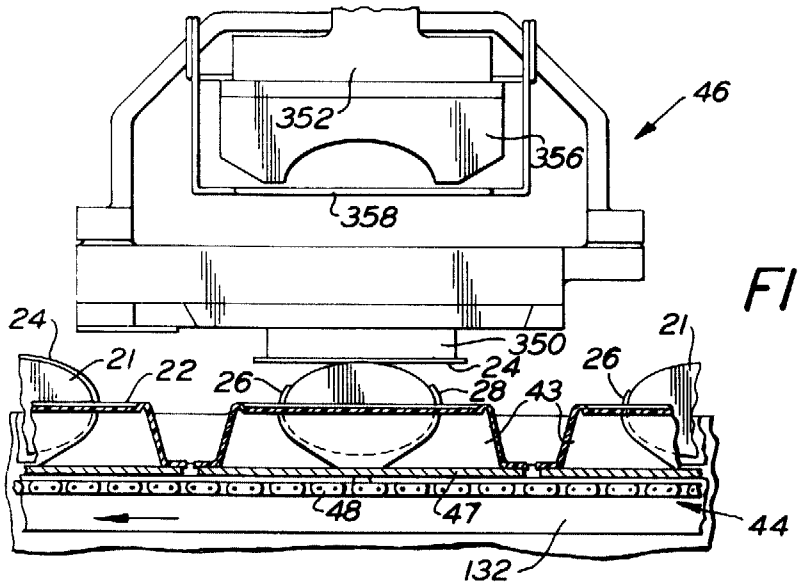


FIG. 13

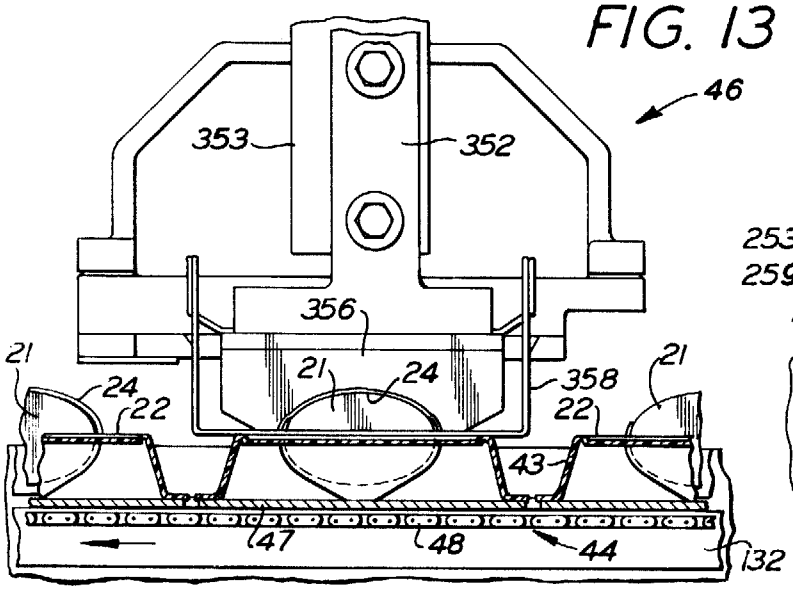
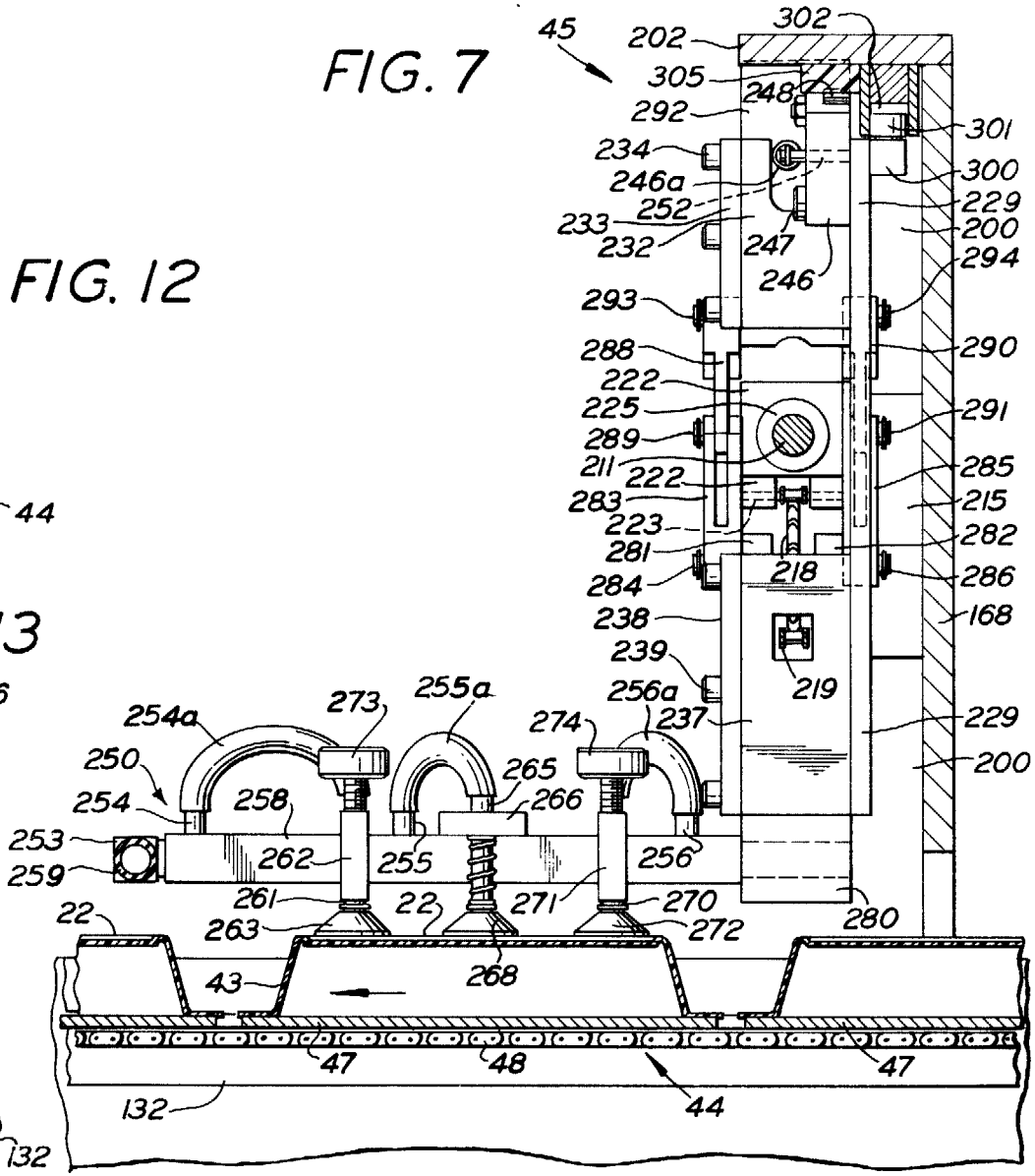


FIG. 7



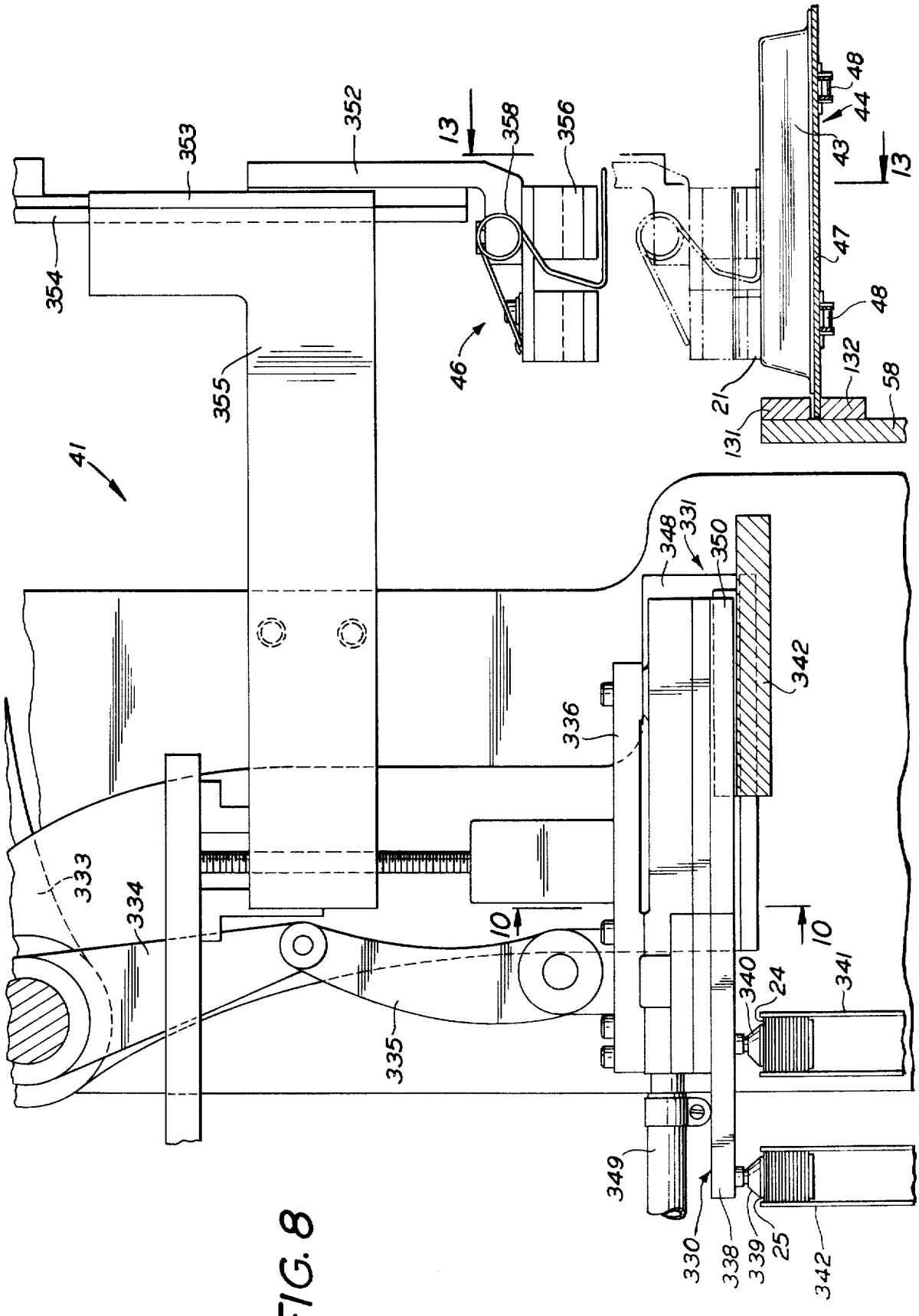

352
353
354
355
356
358
13
46
41
48
44
43
47
21
131
132
58
348
331
350
342
336
333
334
10
335
340
24
341
349
330
338
339
25

FIG. 8

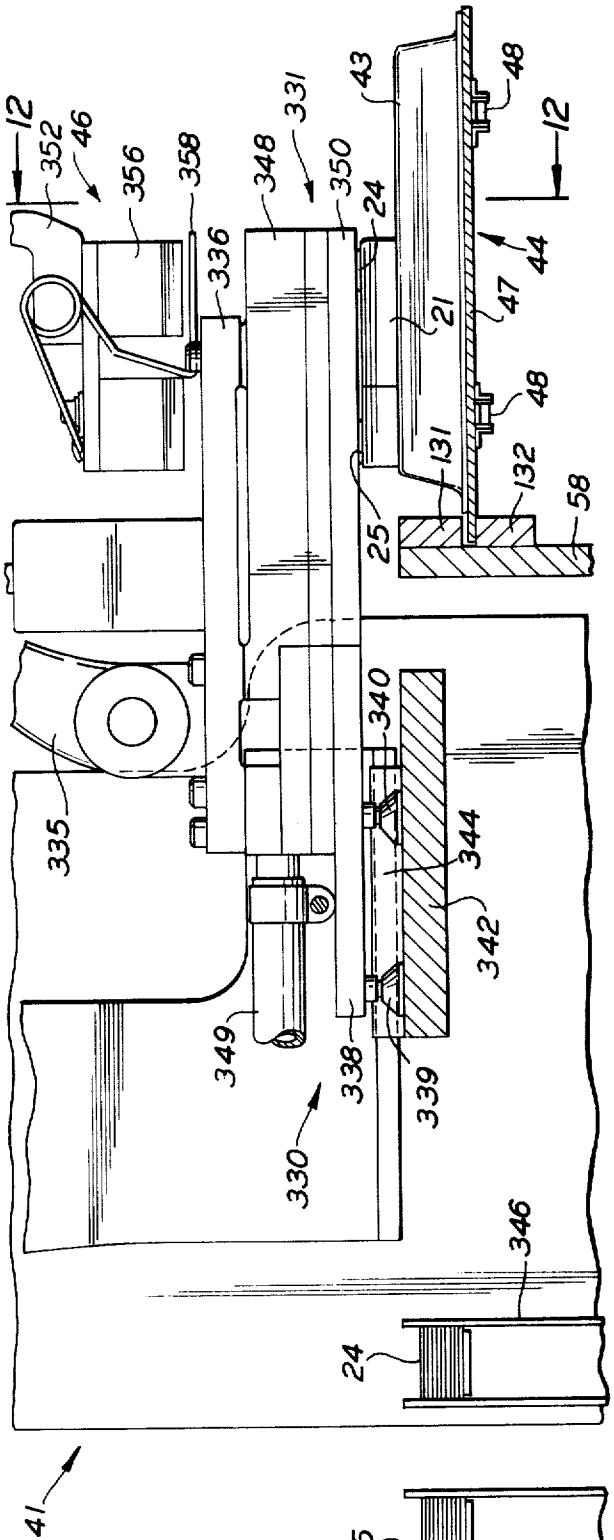


FIG. 9

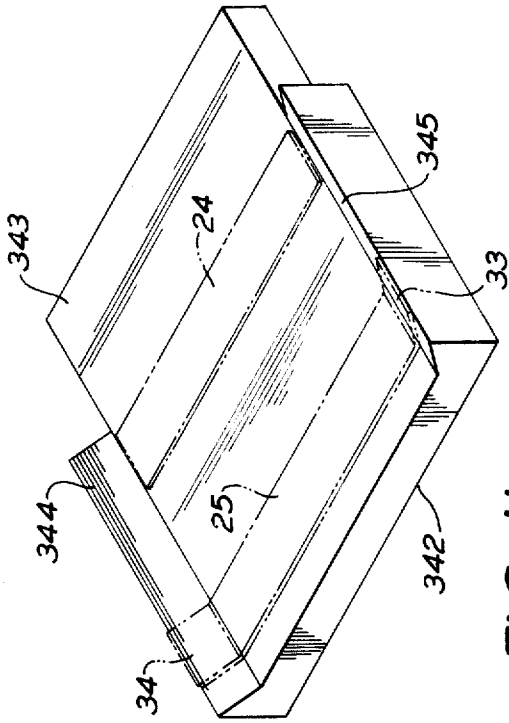


FIG. 11

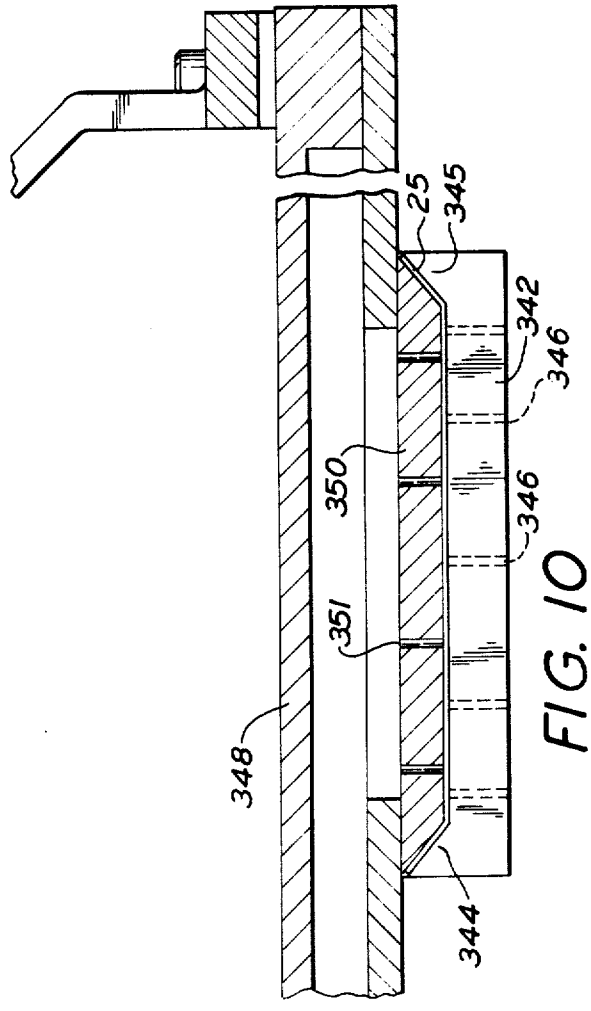


FIG. 10

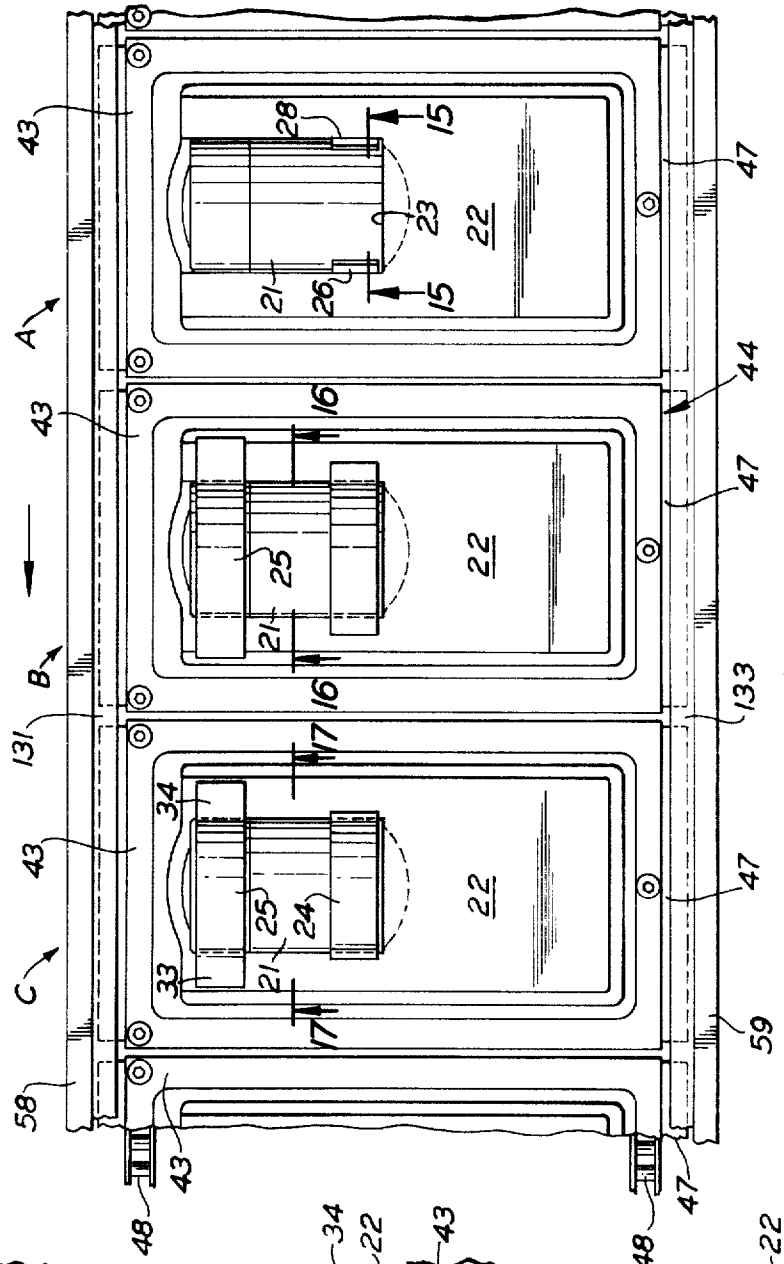


FIG. 14

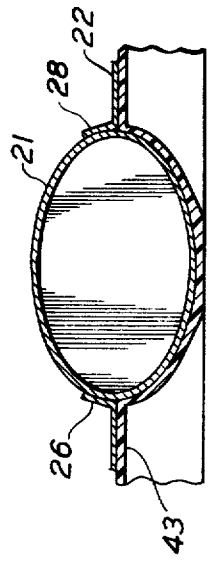


FIG. 15

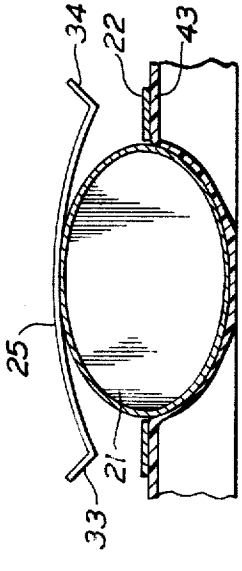


FIG. 16

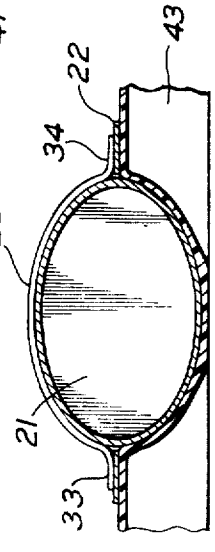


FIG. 17

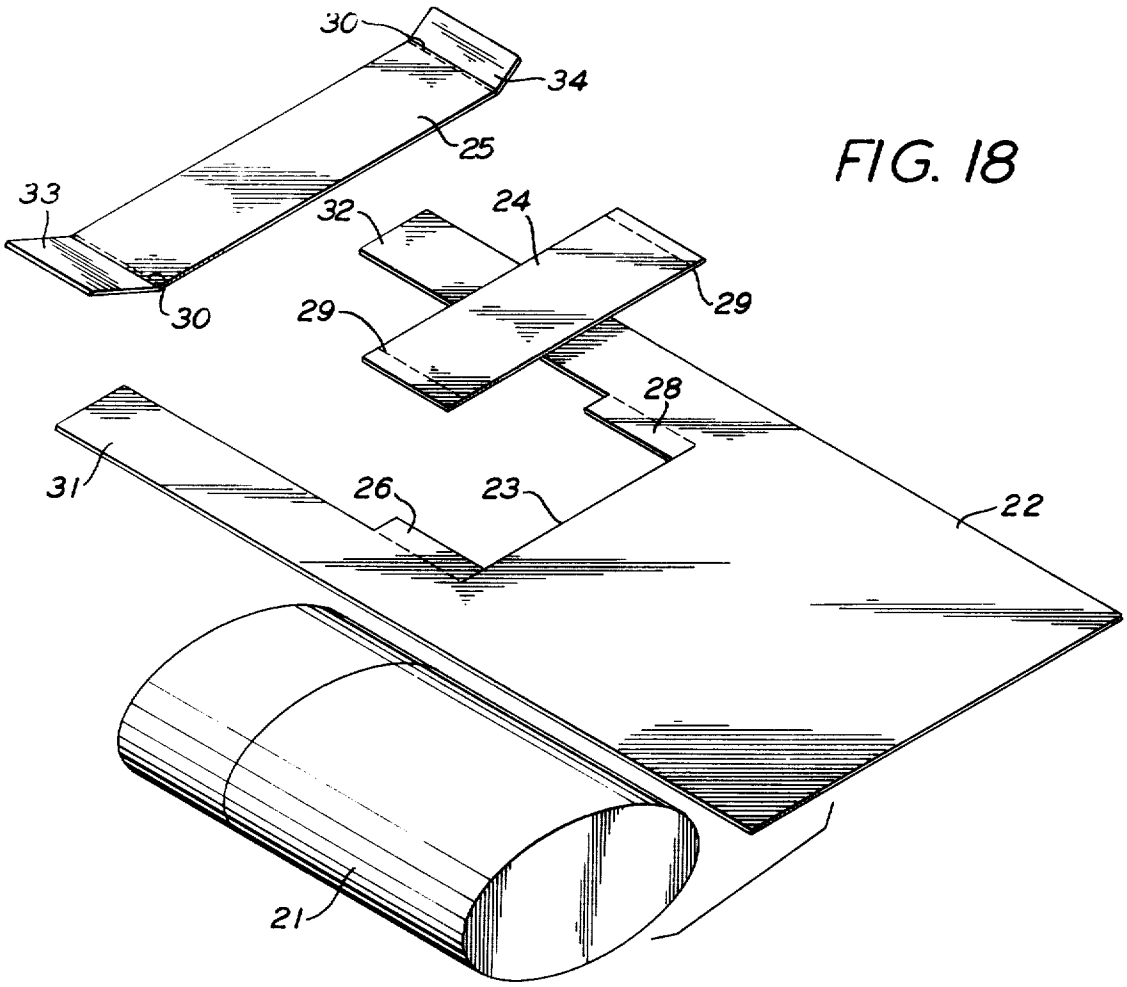

30
34
25
33
32
24
30
29
29
28
31
26
23
22
21

FIG. 18

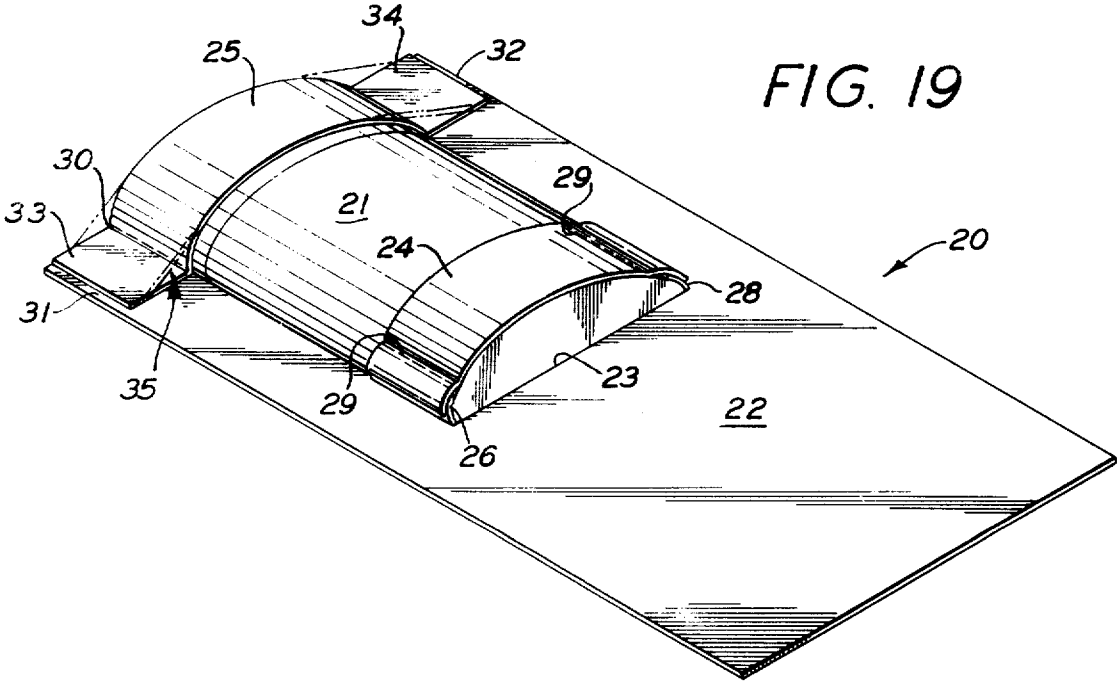

34
25
32
30
21
29
33
24
20
28
31
35
29
23
22
26

FIG. 19

APPARATUS FOR SECURING ARTICLES TO A DISPLAY BOARD

BACKGROUND OF THE INVENTION

Concepts of packaging small goods including household products and personal items have been steadily changing from the day when most of the goods were sold in closed containers particularly cardboard boxes and paper wrappers. Packages are necessary for several reasons some of the more common ones being, to protect the product during shipment and subsequent display prior to the time of purchase by the consumer, to advertise the goods and to prevent tampering with the product by unauthorized persons.

Many products are also sold without the aid of packages because they are of such a nature that the consumer generally wishes to inspect them, or simply because they do not require protection or any appreciable amount of advertising. While lack of packaging represents a savings to the manufacturer, the retailer is often plagued with the theft of such goods, which include lipstick containers, ballpoint pens, spools of thread, combs, small toys and the like. One of the remedies to the theft of small items that has evolved has been effected by mounting the small product on a larger display card of a fairly rigid cardboard which increases the difficulty of inconspicuous theft.

The display card method of packaging also places the product in full view of the consumer and again provides the manufacturer the space for advertising. Most of the packages include a display panel of cardboard or similar material upon which may be printed product information, advertisement and directions. The article is placed upon the card and then affixed thereto by selecting a suitable method such as completely enveloping the article and display panel with a layer of clear plastic which may be either rigid or a flexible film.

In the interest of minimizing packaging material and labor, one method utilizes the label, normally affixed to the article, as the means for fastening the article to the display panel. The label, which is preferably self-adhesive, may be imprinted with directions or other desired information and is affixed directly to the article and display panel as though the article were being taped to a card. Following purchase, the consumer simply removes the article from the display panel and discards the latter.

While the foregoing procedure represents a significant departure from other methods, made more costly by the type of materials used, due to the number of steps involved and the apparatus required to perform the operations, it has not been found possible to apply the labels to the article and display panel in a proper manner. The chief difficulty experienced is due to the fact that most of the articles are thicker than the panel and when the label is applied it does not follow the contours of the article and the card but has a tendency to contact the highest surface of the article and then the card leaving a span or web between the two where the label is contacting neither surface. The web not only weakens the union between the article and panel, but also decreases the adherence of the label to the article upon removal from the panel. This troublesome occurrence becomes more frequent when the attempt is made to subject the packaging process to techniques of high speed automation.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a method and apparatus for packaging an article by mounting it on a display card in full view, with adequate space for advertisements, directions and other information.

It is another object of the present invention to provide a method and apparatus for packaging an article which is held on a display card by the use of one or more labels.

It is yet another object of the present invention to provide a method and apparatus for packaging an article with a display card larger than the article thereby reducing the ease with which the article may be pilfered.

It is a further object of the present invention to provide a method and apparatus for packaging an article on a display card with one or more labels in such a manner that the labels remain permanently affixed to the article when the latter is intentionally separated from the card.

It is a still further object of the present invention to provide a method and apparatus for packaging an article utilizing a minimum amount of materials and a minimum number of operations so as to be nearly totally automated with a corresponding savings in time and labor.

These and other objects, together with the advantages thereof over existing and prior art forms, which will become apparent from the following specification are accomplished by means hereinafter described and claimed.

In general, an apparatus embodying the concept of the present invention and operable according to the method thereof, for packaging articles involves the placement of the article to be packaged upon a conveyor belt having spaced holders for the receipt thereof. A supply of display cards are stacked adjacent the conveyor belt and a transfer mechanism removes a card from the supply and deposits the card in juxtaposition to the article as it advances upon the conveyor belt.

A conventional label applying machine is adapted to prepare and apply labels to the article and display card and includes a label pick-up head to remove labels, preferably from two stacks, and to deposit them in a specially shaped tray wherein at least one of the labels is preformed in a manner hereinafter described to insure proper positioning of the label over the article and display card. A label transfer head is heated for use with heat sensitive labels and removes the labels from the preforming tray and deposits them onto the article. Movement of the conveyor belt is intermittantly interrupted to allow positioning of the labels upon the article. As the label transfer head withdraws from the article, a vertically displaced label applicator is driven down over the momentarily motionless conveyor belt to affix both labels completely to the article and display card. As the label applicator withdraws, the conveyor belt resumes movement, the packaged article is emitted therefrom and another packaging cycle is performed.

A preferred embodiment of apparatus suitable for practicing the method of the present invention to package an article is shown by way of example in the accompanying drawings and described in detail without attempting to show all of the various forms and modifica-

tions in which the invention might be embodied; the invention being measured by the appended claims and not by the details of the specification.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevation of an exemplary apparatus embodying the concept of the present invention and suitable for packaging articles by mounting them in juxtaposition to display cards with labels, all according to the method thereof;

FIG. 2 is a front elevation of a portion of the apparatus represented in FIG. 1, with the front cover removed showing the sprocket and chain drive train;

FIG. 3 is an enlarged front elevation similar to FIG. 2, depicting the mechanism for interrupting movement of the conveyor belt;

FIG. 4 is an enlarged side elevation taken substantially on line 4—4 of FIG. 1, depicting the rear side of the display card transfer means for moving a display card from a stack to the article;

FIG. 5 is a side elevation taken substantially on line 5—5 of FIG. 1 depicting the front side of the display card transfer means represented in FIG. 4 and particularly depicting the head of the transfer means in position to remove a discard card from a stack of such cards;

FIG. 6 is a side elevation similar to FIG. 5 and particularly depicting placement of a display card in juxtaposition to an article by the head of the transfer means as the article passes therebeneath on the conveyor belt;

FIG. 7 is a frontal section take substantially on line 7—7 of FIG. 6 again depicting the placement of a display card in juxtaposition to an article by the head of the transfer means;

FIG. 8 is a side elevation of a labelling machine, adapted for use with the apparatus, depicting the simultaneous operations performed by the label pick up head and the label transfer head in their rearward position, and by the label applicator;

FIG. 9 is a side elevation of the labelling machine depicted in FIG. 8 further depicting the simultaneous operations performed by the label pick up head and the label transfer head in their forward position, and the retracted position of the label applicator;

FIG. 10 is a vertical section taken substantially on line 10—10 of FIG. 8 depicting the forming of at least one label between the preforming plate and the label transfer head;

FIG. 11 is a perspective view depicting two labels on the preforming plate one of which has been preformed;

FIG. 12 is an enlarged front elevation taken substantially on line 12—12 of FIG. 9 depicting application of a label to an article by the label transfer head, said FIG. 12 appearing on the same sheet of drawings as FIG. 7;

FIG. 13 is an enlarged front elevation taken substantially on line 13—13 of FIG. 8 similar to FIG. 12, depicting application of the label to an article and a display card, the label transfer head having been withdrawn rearwardly;

FIG. 14 is a top plan of a portion of the conveyor belt depicting three articles and display cards upon spaced trays and further depicting sequential application of the labels thereto;

FIG. 15 is an enlarged vertical section taken substantially on line 15—15 of FIG. 14, depicting an article within a tray carried by the conveyor belt and having a display card placed thereover;

FIG. 16 is an enlarged vertical section taken substantially on line 16—16 of FIG. 14 similar to FIG. 15, and depicting a label as applied to the article;

FIG. 17 is an enlarged vertical section taken substantially on line 17—17 of FIG. 14, similar to FIGS. 15 and 16 and depicting final application of a label to the article and the display card;

FIG. 18 is an exploded perspective view of the type of packaging according to the preferred method, depicting an article, a display card to be placed thereover and two labels to join the article to the display card; and,

FIG. 19 is a perspective view of the finished package depicting the relative position of the article to the display card and the adjoining labels.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring more particularly to the drawings, a display package, indicated generally by the numeral 20, is depicted in FIGS. 18 and 19 and is representative of the type of package which may be prepared by the subject apparatus and according to the subject method. The display package 20, includes an article 21 of any conventional size and shape, a display card 22 of stiff paper, plastic, thin metal or other suitable material, generally larger than the article and having a cut out portion or opening 23 which approximately corresponds to the outline of the article 21, and one or more labels 24 and 25 joining the article 21 and display card 22 together.

It will be noted that the display card 22 has two tabs 26 and 28 extending into the opening 23. As the display card 22 is placed over the article 21 the tabs 26 and 28 are raised and tend to grip the article 21. Although not illustrated, other shapes and sizes of display cards may be utilized, and selection of a suitable one will generally be made with respect to the size, shape and weight of the article. Thus, if the article is relatively heavy, the tabs 26 and 28 may extend along the entire side thereof, or a tab forming a base may be provided at the bottom of the display card. Moreover, if the article has a flat side, it may be desirable to utilize a solid display card placing the article thereon and subsequently applying one or more labels to both. It is therefore within the scope of the present invention to utilize articles and display cards having sizes and shapes other than as depicted in FIGS. 18 and 19. Furthermore, although the display cards lie in juxtaposition to the articles, they may or may not actually contact one another. Nor is it imperative that the display card always be placed over or around the article, inasmuch as some layouts may require initial placement of the display card followed by deposit of the article thereon.

According to the preferred method for preparing the display package 20, as described herein, the display card 22 is placed in juxtaposition to the article 21. Both labels 24 and 25 are perforated as at 29 and 30 to aid the user in separating the article 21 from the display card 22 leaving labels 24 and 25 on the article. The label 24, which has a heat sensitive adhesive backing, preferably attaches to tab 26, to a portion of the article 21 and to tab 28. Label 25, also having a heat sensitive adhesive backing, adheres directly to the flat surface of the card, as at 31, over the article 21 and back to the card, as at 32. It has been found advantageous to preform the label 25 by creasing both ends, as at 33 and

34, to insure complete contact by all surfaces of the label 25 with the article 21 and the display card 22. Otherwise, the label 25 has a tendency to form a web by spanning the distance between the article 21 and the display card 22, generally indicated in chain lines by the letter X in FIG. 19. Such webbing not only weakens the union between the article 21 and display card 22 but also permits the label 25 to pull away from the article 21 after removal from the display card 22.

An overall view of one preferred form of apparatus embodying the concept of the present invention is depicted in FIG. 1 and identified generally by the numeral 40. The apparatus 40 includes a conventional dry labelling machine such as the New Jersey Pony Label-Dri 250 model, which has been somewhat modified and identified generally by the numeral 41, and the mechanism for positioning and feeding the articles 21 and display cards 22 thereto, identified generally by the numeral 42.

During processing of the package 20, the article 21 is placed in a tray holder 43 forming part of a conveyor belt generally 44. As the article advances, a display card transfer mechanism 45 places a display card 22 in juxtaposition to the article 21. Subsequently, a label applicator 46 from the labelling machine 41 affixes labels 24 and 25 to the article 21 and display card 22.

With reference to FIGS. 1–3 there appear a plurality of tray holders 43. Each is preferably manufactured from plastic or other suitable material and is shaped to receive and hold approximately one-half of the article 21 to be packaged. The holder 43 is itself attached to a firm metal base 47 in a suitable manner and the bases 47 are in turn attached to two parallel chains 48 only one of which is shown. The two chains 48 with attached bases 47 and holders 43 form an endless conveyor belt 44 for passing the articles 21 through the apparatus 40 to be packaged. Four paired sprockets, 49 through 52, guide the chains 48 and each pair is mounted on an axle, 53 through 56 respectively, which passes from a rear or backing plate 58 to a front cover plate 59. To further support the conveyor belt 44, guide strips 131–132 and 133–134 may be fastened to the upper edge of plates 58 and 59 respectively, as depicted in FIGS. 5 and 6, providing narrow channels therebetween to receive the bases 47 attached to the chains 48.

The power to drive the conveyor belt 44 and holders 43 is derived from a motor (not shown) having a shaft 60 to which is attached a main drive sprocket 61 all of which are located behind the backing plate 58 forming part of the frame. A sprocket 63 is driven by sprocket 61 via chain 64 and is mounted on a shaft 65. Shaft 65 is journaled within a bearing (not shown) and passes through plate 58. Another sprocket mounted behind sprocket 63 drives another chain 66 to drive yet another sprocket 68 which is also mounted on a shaft 69, journaled within a bearing and passing through plate 58.

A bearing plate 70 is attached with bolts 71 to the plate 58 and provides support for the shaft 65 passing therethrough. A crank arm 72 is fitted over the end of shaft 65 and is fastened thereto with a bolt (not shown). A pitman arm 73 is attached to the opposite end of the crank 72 with a ball and socket joint 74 and includes a threaded portion 75 for lengthwise adjustment. Referring to FIG. 3, a sleeve 76 is shown slidably mounted on the end opposite of the joint 74 which is resiliently biased away from the joint 74 by a stiff compression spring 78. The spring 78 is adjusted between a nut and washer combination, 79 and 80, and the sleeve 76, the forward advancement of which is limited by nut 81. Two parallel pusher plates 82 are attached to the sleeve 76 with bolts 83.

Beneath the conveyor belt 44, a metal guide plate 84 is located which may be welded to bars 85 and 86 which extend between the plates 58 and 59. An elongated milled slot 88 passes between bars 85 and 86 in the lower half of guide plate 84. A link 89 is mounted on either side of the slot 88 with bolts 90 and 91 passing through roller spacers 92 and 93 respectively. The pusher plates 82 are fastened to the links 89 with a bolt 94, there being another roller 95 within the slot 88. A parallel set of drive fingers 98 are rotatably attached to the links 89 with the bolt 91, and wear plates 99 of nylon or similar material are positioned between the fingers 98 on either side of the guide plate, and are fastened to the fingers 98 with small screws 100.

All of the metal bases 47 are milled to slide over guide plate 84 and are provided with recesses 101 for the wear plates 99 and drive fingers 98. Movement of the conveyor belt with spaced holders is as follows. Rotation of sprocket 61 drives chain 64 and sprocket 63 which in turn causes the shaft 65 and crank arm 72 to rotate in a counter-clockwise fashion. As the pitman 73 is driven from its rearward position to its forward position, indicated in chain lines in FIG. 3, the links 89 and attached drive fingers 98 are urged linearly forward by the pusher plates 82. The wear plates 99 in turn push against the recess 101 and thereby urge a base 47 and overlying tray holder 43 in a forward direction, or to the left. Inasmuch as all of the bases 47 are fastened to the two chains 48, the entire conveyor belt 44 rotates about sprocket pairs 49–52 in a counter-clockwise fashion.

The forward advancement of the base 47 being driven is limited by a pair of pawls 102 which intermittantly engage a slot 103 in the base 47 in a manner hereinafter described in detail. The pawls 102 engage the slot 103 before the pusher plate 82 has been totally advanced by the pitman 73 and the excess movement of the pitman 73 is taken up by the compression spring 78. In like manner, when the pitman 73 is retracted by the crank arm 72 the spring 78 moves before the pusher plates 82 are withdrawn. This action is adjustably timed to maintain the tray holders 43 in a static position for a specific interval. The edge of each base 47, immediately forward of the slot 103 is machined at an angle so that the wear plates 99 may tip downwardly as they are withdrawn, the fingers 98 rotating a few degrees about the bolt 91. A small spring (not shown) urges the fingers 98 upwardly to engage the recess 101 of the next base 47 to advance it as the the pitman 73 again begins its forward throw.

As described above, the sprocket 68 is driven by the chain 66 from a sprocket behind sprocket 63. Another bearing plate 104 is attached with bolts 105 to the plate 62 and provides support for the shaft 69 passing therethrough. A face plate 106 may be fastened to the shaft 69 to facilitate mounting of a cam 108 onto the end of the shaft 69. A bolt 109 passes through the center of cam 108 and into the shaft 69. The cam 108 has an arcuate slot 110 milled therein and bolts 111 and 112 pass therethrough threadably engaging face plate 106. The cam 108 may therefore be rotatably adjusted

about the shaft **69** and then locked with bolts **109, 111** and **112.**

A cam follower **113** is carried between two prongs of an actuator rod **113** which is welded to a bar **115** extending from a flat plate **116.** A bore is provided in the plate **116** for rotatably mounting it upon the axle **54** which in turn carries the sprocket pair **50** and passes between the rear and front plates **58** and **59.** A similar plate **118** having a bore is also rotatably mounted by the axle **54** and carries a bar **119** to which is welded an elongated flat rod **120.** The paired pawls **102,** referred to above, are preferably bolted to the flat rod **120** and fit against either side of the guide plate **84** to ultimately engage the slot **103** in the base **47.** A small diameter rod **121** having threaded ends for nuts **122** and **123** passes through the actuator rod **114** and the flat rod **120.** The nuts **122** and **123** limit divergence between the two rods **114** and **120.** Another small diameter rod **124** extends through a second bore in the actuator rod **114** and is held there by nuts **125** and **126.** A compression spring **128** fits over the rod **124** and extends into a recess **129** in the overlying rod **120.**

During advancement of the conveyor belt **44** the chain **66** is driven to rotate the cam **108.** As the radius of the cam **108** increases, the follower **113** and actuator **114** are raised toward the tray holders **43** and the spring **128** transmits this upward movement to the rod **120** carrying the paired pawls **102.** When the actuator rod **114** is at its highest position, the pawls **102** have been seated in the recess **103** on the underside of the base **47.** As previously described, the drive finger **98** has simultaneously advanced the metal base **47** and the entire conveyor belt **44** to the position for engagement by the pawls **102.** When the pawls **102** engage the base **47** movement of the entire conveyor belt **44** is interrupted and the various tray holders **43** are accurately positioned permitting the actual packaging operations to be performed as hereinafter described. Movement of the belt **44** remains temporarily interrupted, although the motor continues to run, and as the cam **108** continues to rotate and its radius decreases, the actuator rod **114** moves away from the overlying tray holder **43** simultaneously permitting the pawls **102** to withdraw and advancement of the conveyor belt **44** to resume as soon as the drive fingers **98** urge a subsequent tray holder **43** forward. A spring **130** may be employed to assure the quick withdrawal of the actuator rod **114** as shown in FIG. **3.** For reasons of brevity, the foregoing operation shall be understood to occur as described and any particular tray holder **43** will therefore either be advancing or its movement will be temporarily interrupted.

The display card transfer mechanism **45** is also driven by the same motor which moves the conveyor belt **44.** Referring to FIG. **2,** the shaft **60** from the motor drives another sprocket (not shown) behind the sprocket **61.** This sprocket is provided with a chain **150** which rotates another sprocket (not shown) and a shaft **151.** The shaft **151** is journaled within a housing **152** which extends from a frame member **153** at the base of and connecting rear and front plates **58** and **59** respectively. Another sprocket (not shown) is mounted on shaft **151** and drives a chain **154,** and a sprocket **155** mounted on a shaft **156.** The sprocket **155** may be utilized to drive the display card transfer mechanism **45** in which event the mechanism **45** is mounted further toward the right end of the apparatus **40.** In such position the mechanism **45** will deposit a display card **22** onto the tray holder **43,** prior to placement of the article **21** thereon. The shaft **151** extends beyond the front plate **58** and carries a sprocket **158** which drives a chain **159** and a sprocket **160** mounted on a shaft **161.** Sprockets **158** and **159** and the shaft **161** are outside of the front plate **58** and are generally protected by a guard **162,** a portion of which is shown in FIG. **1.**

Referring now to FIGS. **1** and **4,** the shaft **161** is journaled within two bearings **163** and **164** which are attached to the side wall **168** of the frame **169** with bolts **170.** The side wall **168** forming the main support structure for the display card transfer mechanism **45,** extends over the conveyor belt **44** and is secured to the upper face of the apparatus **40.** A plate **171** is fastened to side wall **168** with bolts **172** and a brace **173** joins the outboard or supply end of the side wall **168** to the front cover plate **59** with bolts **174** and **175.**

The shaft **161** carries a crank arm **180** at the end opposite the drive sprocket **160.** A pitman arm **181** is attached to the crank **180** with a ball and socket joint **182.** Another ball and socket joint **183,** connects the opposite end of the pitman **181** to a T-shaped rack **184** having a row of teeth **185** on the side opposite the connection with the pitman **181.** A guide plate **186** having a longitudinal slot **188** therein is attached to the side wall **168** to direct the reciprocation of the rack **184** vertically.

The guide plate **186** is also provided with two angled members **189** (only one of which may be seen in FIG. **4**) which together form a T-shaped channel to retain the rack **184** therein. A narrow spacer plate **190** is fastened to the side wall **168** with bolts **191** and houses a bearing for a shaft **192** provided with a pinion gear **193** which communicates with and is driven by the teeth **185** of the rack **184.**

Extending outwardly from side wall **168** and above the guide plate **186** is a support **194** for a shelf **195.** A micro air valve **196** is secured to the shelf **195** and is connected to a vacuum supply line (not shown). Through another line which exits from the valve **196,** the vacuum is utilized to move the display cards **22.** A switch **198** is pivotally mounted to the shelf **195** and is activated by the reciprocating rack **184.** Thus, when the top of the rack **184** is below the switch **198,** as depicted in FIG. **4,** the vacuum from the supply line passes through the valve **196** and to the other line leading to the display card transfer mechanism **45.** Whenever the rack **184** is driven into contact with the switch **198** and beyond, the switch moves against a plunger **199** which closes the valve **196** to the mechanism **45** cutting the vacuum thereto.

Referring particularly to FIGS. **5–7,** the components of the display card transfer mechanism **45** may be described. The side wall **168** which constitutes the chief support structure for the mechanism **45** is seen extending over the conveyor belt **44** wherein a tray holder **43** and article **21** are presented in position to receive a display card **22.** The entire transfer mechanism structure may be joined to the existing portion of the apparatus **40** in any conventional manner and for the sake of clarity such joining structure has largely been eliminated. In addition to the guide **186,** the side wall **168** also carries an end wall **200,** a median wall **201** and a top wall **202.**

A supply of display cards **22** is seen resting upon an adjustable tray and support frame, **203** and **204** respectively. An electric eye **205** may be mounted upon a

bracket **206** attached to the median wall **201** for maintaining a constant level of display cards **22** as they are removed from the tray **203.** The electric eye **205** regulates a supply motor the operation of which will be explained hereinbelow.

The shaft **192** to which the pinion gear **193** is attached on the opposite side of the side wall **168,** extends therethrough and is provided with a drive sprocket **208.** A bearing plate **209** is affixed to the wall **168** and maintains the sprocket **208** at a proper distance therefrom. Immediately above the bearing plate **209** is a solid metal bumper block **210.** A polished cylindrical guide rod **211** is housed at one end within the bumper block **210,** at the outboard end of the mechanism **45,** i.e., where the supply of display cards **22** lies, and extends over the conveyor belt **44** and tray holders **43** to the inboard end of the mechanism **45,** i.e., where the display cards **22** are deposited over the articles **21.** The inboard end of the guide rod **211** is housed within a similar solid metal bumper block **212.** Solid rubber washers **213** and **214** surround both ends of the rod **211** at the bumper blocks **210** and **212** and serve as cushions. Beneath the inboard bumper block **212** is another bearing plate **215** for an axle **216** carrying a sprocket **218** for a chain **219** which is driven by sprocket **208.**

As clearly depicted in FIG. **5,** the chain **219** is not continuous but has two separate end links **220** and **221** which are attached to a slider block **222** by recessed machine screws **223** and **224.** The slider block **222** fits over the guide rod **211** and is provided with a center of bearing material **225,** as shown in FIG. **7,** which actually contacts the guide rod **211.** The guide rod **211** also passes through inboard slider blocks, **226** and **228** respectively, which also have a central lining of bearing material. Unlike the slider block **222,** neither of the blocks **226** and **228** communicates with the chain **219** and both are fastened to a diamond-shaped carrier plate **229.**

At the upper corner of the carrier plate **229,** is mounted a hollow rectangular housing **230** comprising two side plates **231** and **232** and a cover plate **233** affixed thereto with screws **234.** In a similar manner, at the lower corner of the carrier plate **229,** is mounted another hollow rectangular housing **235** comprising two side plates **236** and **237** and a cover plate **238** affixed thereto with screws **239.** A bore **240** in plate **236** and a bore **241** in plate **237** permits the lower half of the chain **219** to pass therethrough freely. A movable gate **242** is pivotally mounted on the carrier plate **229** adjacent the side plate **231** with a screw **243.** The upper end of the gate **242** is provided with a roller **244** mounted thereon by a small nut and bolt **245.** Another movable gate **246** is pivotally mounted on the carrier plate **229,** with a screw **247,** adjacent the side plate **231.** The gate **246** also carries a roller **248** mounted thereto by a nut and bolt **249.** A tension spring **246***a* is hooked between lugs **251** and **252,** on gates **242** and **246,** respectively, and serves to maintain the gates **242** and **246** drawn together i.e., in a closed position.

The display card transfer head **250** which picks up, transfers and deposits display cards **22** comprises an elongated hollow body element **258.** An air line **259** which is connected to the micro valve **196** provides a vacuum supply to the body element **258** through a suitable fitting **253.** Three short pipes **254–256,** extending from the top of the body element **258** transfer the vacuum through flexible tubes **254***a*, **255***a*, **256***a*. Tube **254***a* is connected to a hollow pipe **261** passing through a vertical cross member **262** which straddles the body element **258.** The lower end of pipe **261** carries a vacuum cap **263.** Tube **255***a* is connected to another hollow pipe **265** passing through a horizontal cross member **266** extending from the top of the body element **258.** The pipe **265** also carries a vacuum cup **268** and a compression spring **269** is interposed around the pipe **265** between the cross member **266** and the vacuum cup **268.** The tube **256***a* is connected to a hollow pipe **270** passing through another vertical cross member **271** straddling the body element **258.** The lower end of the pipe **270** also carries a vacuum cup **272.** Cross members **262** and **271** may be provided with hand screws, **273** and **274** respectively, so as to be laterally adjustable on body element **258** as shown in FIG. **7.**

It has been found that the display cards **22,** when stacked, have a tendency to cling to each other usually resulting from rough edges about the cut out portion or opening **23** and tabs **26** and **28** of the cards **22.** Also, some bowing of the stack, in an upward direction, may occur as a result of the scoring of tabs **26** and **28** to permit subsequent bending thereof when they are placed over an article **21.** Both of these factors can cause inadvertent movement of more than one card **22** by the display card transfer head **250.** To prevent this from occurring, the vertical cross members **262** and **271** are each provided with a blunt pin **264,** as depicted in FIGS. **5** and **6.** When the display card transfer head **250** descends upon the stack of cards **22,** as explained below, the pins **275** flatten the stack and jar the top card **22** enough so as to free it from the card immediately below thereby causing only one card **22** to be removed therefrom. In FIG. **6,** as the card **22** is despoited over the article **21,** the pins **275** also help to flatten the card **22** against the tray holder **43.**

As a further aid to preventing removal of more than one display card **22** at a time from the stack by the display card transfer head **250,** small resilient fingers or combers (not shown) may be employed. These combers may be conveniently attached to the support frame **204** and generally extend over the card **22** and are downwardly directed thereover as by a spring. As the display card transfer head **250** removes a card **22,** the combers pivot upwardly against the spring, seeking to hold the card. When the card **22** ultimately escapes the combers, they quickly snap down over the next card **22** thereby preventing it from being displaced.

The transfer head **250** is movable vertically over the display cards **22** and the conveyor belt **44,** and the vacuum transmitted through vacuum cups **263, 268** and **272** enables the head **250** to hold a display card **22** until the vacuum is released. In order to move vertically, the transfer head **250,** particularly the body element **258,** is attached to a plunger **280** which is movable within the lower rectangular housing **235.** The upper end of the plunger **280** has a front and a rear leg, **281** and **282** respectively, and is devoid of a central portion so as to clear the upper half of the chain **219** when the transfer head **250** is raised. The lower half of the plunger **280** is similarly hollow to clear the lower half of the chain **219.** A front clevis rod **283** is pivotally attached to the front leg **281** of the plunger **280** with a pin and snap ring combination **284,** and a rear clevis rod **285** is pivotally attached to the rear leg **282** of the plunger **280** with a pin and snap ring combination **286.** A flat connecting rod **288** is pivotally connected to a pin **289** ex-

tending from the slider block **222** and held thereto with a snap ring. Another flat connecting rod **290** is pivotally held between the prongs of the rear clevis rod **285**, both rods being pivotally connected to a pin **291** extending from the rear side of the slider block **222**. A second plunger **292** is movable within the upper rectangular housing **230** and the free end of the connecting rod **288** is pivotally attached to the lower end of the plunger **292** with a pin and snap ring combination **293**. Similarly, the free end of connecting rod **290** is pivotally attached to the lower end of the plunger **292** with a pin and snap ring combination **294**. For purposes of simplicity the aforedescribed clevis rods, connecting rods and pins will be referred to collectively as the plunger linkage. It is the linkage which permits reciprocation of the plungers **280** and **292** within their housings, **235** and **230** respectively.

The entire transfer head **250** and carrier plate **229** reciprocates laterally as one structure between the inboard and outboard bumper blocks, **212** and **210** respectively. In order to maintain the carrier plate **229** in its vertical position on the guide rod **211**, a small bracket **300** is mounted on the rear top side of the carrier plate **229**, having a roller **301** thereon which moves within a channel **302** carried by the top wall **202**.

At approximately both ends of the channel **302**, the top wall is recessed, there being an inboard recess **303** and an outboard recess **304**. The recesses **303** and **304** are provided as a clearance for extension of the upper plunger **292** therein when the gates **242** and **245** are opened, as will be described hereinbelow. Between the recesses **303** and **304** is a guard **305**, preferably made of nylon or similar material, and attached directly adjacent the channel **302**, above the gates **242** and **245**, its purpose being to maintain both gates in a closed position.

Operation of the display card transfer mechanism **45** is as follows: When the rack **184** is on its upswing, the pinion **193** and drive sprocket **208** are rotated counter-clockwise. Movement of the upper half of chain **219** is toward the inboard end which pulls the slider block **222**, carrier plate **229**, and transfer head **250** in that direction. As movement toward the inboard end continues along guide rod **211**, the slider block **222** is adjacent the slider block **228** and the plungers **280** and **292** are in a retracted position as depicted in FIG. **5**. In FIG. **7** the carrier plate **229** and transfer head **250** are at the inboard end, the slider block **226** has just contacted inboard bumper block **212** and lateral movement has ceased. As the sprocket **208** and chain **219** continue to move, the slider block **222** is drawn along the guide rod **211** towards the slider block **226**. When the slider block **222** is midway between the blocks **226** and **228**, the plunger linkage has pivoted from its folded position, depicted in FIG. **5**, to a straight position whereby the plungers **280** and **292** are totally extended. The extension of the lower plunger **280** also lowers the transfer head **250** carrying a display card **22** directly over the tray holder **43** and an article **21** placed therein. At the exact moment that the display card **22** is positioned, movement of the conveyor belt **44** has been interrupted as described hereinabove. Also, the rack **184** has activated the switch **198**, depressing the plunger **199** of the micro valve **196**, releasing the vacuum to vacuum cups **263**, **268** and **272** in order that the display card **22** will remain with the article **21** upon subsequent withdrawal of the transfer head **250**.

Because of the guard **305**, the lower plunger **280** cannot be extended until the upper plunger **292** is, which only occurs at the inboard and outboard ends, i.e., over the tray holder **43** and over the supply of display cards **22**. The slider continues to be drawn away from the outboard block **228**, folding the plunger linkage and retracting the plungers **280** and **292**, until it contacts the inboard block **226**. At this point, the plunger linkage is folded in the opposite direction than it appeared in FIG. **5**, the transfer head **250** is elevated, the gates **242** and **246** are closed and the rack **184** can go no higher. Continued rotation of the crank arm **180** drives the pitman **181** and the rack **184** downwardly, thus reversing the direction of rotation of the pinion gear **193**, the drive sprocket **208** and the chain **219**. Now the slider block **222**, carrier plate **229** and transfer head **250** are drawn towards the outboard end to pick up another display card **22**. The rack **184** disengages the switch **198** and the vacuum is again supplied to the vacuum cups **263**, **268** and **272**.

When the outboard slider block **228** contacts the outboard bumper block **210** the carrier plate **229** ceases to move and the transfer head **250** descends upon the stack of display cards **22** due to the continued movement of the slider block **222**, movement of the plunger linkage and of the plungers **280** and **292**. After the transfer head **250** has removed a display card **22** and has been elevated, the rack **184** again reciprocates upwardly and the carrier plate **229** and transfer head **250** move toward the inboard end. Simultaneous with these movements, another tray holder **43** carrying an article **21** is advanced for receipt of the display card **22** thereon.

Since the transfer head **250** can only descend a fixed distance it is imperative that the upper level of display cards **22** remain relatively constant. To accomplish this, the electric eye **205** is focused over the correct level of display cards **22** and activates a supply motor **310**, depicted in FIG. **4**. The supply motor **310** drives a sprocket **311** and chain **312** mounted thereon, around an upper sprocket **313** carried by a shaft **314** extending from the end wall **168**. The chain **312** is discontinuous and both ends are attached to threaded shafts **315** and **316** which are bolted to the adjustable tray **203**. Counter-clockwise rotation of the sprocket **311** will elevate the tray **203** and display cards **22** until the electric eye **205** senses the correct level has been attained and deactivates the motor **310**.

The label applying machine **41** is depicted in FIGS. **8–13**. As stated above, this portion of the apparatus **40** may be derived from a conventional label applying machine which has been somewhat altered. Such a machine has its own source of power and drive mechanism (not shown) for vertical and horizontal reciprocation of the various components. The machine **41** is connected in a suitable manner to the mechanism **42** so that the labels **24** and **25** may be applied directly over the article **21** and display card **22**, slightly downstream from the display card transfer mechanism **45**.

The label machine **41** has a label pick up head **330**, a label transfer head **331** and a label applicator **46**. Linkage arms **333–335** raise and lower the pick up head **330** and the transfer head **331** as well as reciprocate both heads horizontally. The lowest arm **335** is connected to a base plate **336** which carries the pick up head **330** and the transfer head **331**.

The label pick up head **330** consists of a metal frame **338** carrying pairs of suction cups **339** and **340**. In its rearmost position, the pick up head **330** is positioned over stacks of labels **24** and **25** contained in holders, **341** and **342** respectively. When the base plate **336** is raised, the pickup head **330** removes two labels **24** and **25**. Small combers (not shown) may be employed as described in conjunction with the display cards **22**, to prevent the removal of more than one label from a holder at a time. The plate **336** is then moved horizontally forward and then lowered so that the labels **24** and **25** are deposited in a preforming tray **342**. The preforming tray **342**, depicted in FIGS. **10** and **11** has a wide flat bottom surface **343** and two side walls **344** and **345** extending therefrom at an angle greater than 90°. A plurality of air passages **346** pass through the bottom surface **343** of the tray **342** and are connected to a vacuum supply (not shown) which removes the labels **24** and **25** from the pickup head **330**.

The label transfer head **331** consists of a hollow frame **348** carried by the base plate **336** and provided with a vacuum supply via a tube **349**. The underside of the frame **348** has a label forming plate **350** having a configuration complimentary to that of the tray **342**. A plurality of air passages **351** pass through the plate **350** communicating with the subatmospheric pressure within the hollow frame **348**. When the base plate **336** has retracted to its rearmost position, and the pickup head **330** contacts two new labels **24** and **25**, the transfer head **331** and particularly the forming plate **350** is brought down onto the preforming tray **342** creasing at least one of the labels **25** at both ends **33** and **34**.

While the use of two labels has been found to be advantageous, some packages may require only one. Moreover, none of the labels or all of the labels may be preformed for subsequent deposit upon the article **21** and display card **22**. In the preferred embodiment, one of the labels **24**, depicted in phantom in FIG. **11**, is shorter than the label **25** (also in phantom) and is therefore not preformed. Inasmuch as the machine **41** is basically a dry labelling variety, the labels utilized have a heat sensitive adhesive coating, and the transfer head **331** is therefore heated so the label forming plate **350** may activate the adhesive.

When the base plate **336** is again raised, the vacuum applied through the preforming tray **342** is either reduced or cut off so that the vacuum applied through the label forming plate **350** is able to remove both labels **24** and **25**. As the base plate **336** advances forwardly, heat from the transfer head **331** activates the adhesive coating applied to labels **24** and **25** which are carried with the adhesive side down. When the base plate **336** again descends, two new labels are deposited in the preforming tray **342** while the two preformed, heated labels **24** and **25** are applied directly to the article **21** as depicted in FIG. **9**. It is at this point of time that movement of the conveyor belt **44** has temporarily ceased in the manner described hereinabove. The adhesion between the labels **24** and **25** and the article **21** is sufficient to overcome the vacuum applied through the label forming plate **350** and as the base plate **336** is withdrawn, the labels **24** and **25** remain.

The label applicator **46** is positioned above the conveyor belt **44** as depicted in FIG. **12**. It consists of a vertically disposed arm **352** connected to a movable support **353** which slides vertically with respect to a frame member **354** which is in turn connected to a pair of lateral supports **355**. The base of the arm **352** carries the head **356** of the label applicator **46** which is formed of a generally flexible material such as rubber or plastic and which has a concave underside contoured to fit over the article **21**. As depicted in FIGS. **8**, **12** and **13**, after the label transfer head **331** has deposited labels **24** and **25** over the article **21** (FIG. **12**) it is withdrawn rearwardly and the label applicator **46** affixes both labels **24** and **25** to the article and display card **22**, with one rapid downward stroke before the conveyor belt **44** begins to advance. A wire spring **358** is carried by the head **356** which becomes biased against the display card **22** when the label applicator **46** is fully descended. The spring maintains the complete package **20** within the tray holder **43** as the applicator **46** is withdrawn thereby eliminating any premature displacement of the package **20** therefrom.

Simultaneous with the upstroke of the label applicator **46**, the conveyor belt **44** again advances bringing another article **21** and display card **22** thereunder for labelling. As the conveyor belt **44** eventually passes around the sprocket pair **50**, the package **20** falls from the tray holder **43** and may be removed from the apparatus **40**, via a conveyor **359**, to another location.

FIG. **14** depicts sequentially the three operations that are concurrently preformed by the apparatus **40** pursuant to the preferred method. As the empty tray holders **43** pass before an operator, an article **21** is placed therein. At the exact moment that movement of the conveyor belt is interrupted, the display card transfer mechanism **45** places a display card **22** over the article **21** as in position A and FIG. **15**. The cut out portion **23** fits over the article **21** and the tabs **26** and **28** are bent upwardly. While only two such tabs are illustrated, it is to be remembered that the number, size and position thereof may be varied according to the specific requirements of the particular article and display card being used. Thus, the tabs **26** and **28** could extend along the entire side of the article **21** or, other tabs could be utilized to support for example, the base of the article **21**. Moreover, a solid display card may be utilized and if desired, the card may be transferred to a holder initially and an article placed thereon.

Further downstream from the transfer mechanism **45**, and before the conveyor belt **44** resumes movement, at position B, the label transfer head **331** deposits two heated labels **24** and **25**, label **25** being preformed as in FIG. **16**, over the article **21**. While the transfer head **331** is retracting, the label applicator **46** permanently affixes the labels **24** and **25** to the article **21** and display card **22** without webbing the label **25** therebetween as in FIG. **17**. Although position C appears adjacent and to the left of position B, such is the case merely for purposes of illustration. During the actual operation, the transfer head **331** retracts and the label applicator **46** acts in rapid succession, before the conveyor belt **44** resumes movement.

As the conveyor belt **44** again resumes movement, the display card transfer mechanism **45** picks up another display card **22** and two more labels **24** and **25** are prepared for application during the subsequent cycle. By substituting different tray holders for the holders **43** and making other minor adjustments, a variety of different sizes and shapes of articles, display cards and labels may be combined to form display packages with the apparatus and method embodying the concept of the present invention.

What is claimed is:

1. Apparatus for the preparation of display packages having an article secured to a card and at least one joining means for fastening said article to said card, said apparatus comprising: an endless belt carrying said articles along a predetermined path so that the operations for forming the display package may be performed thereon, transfer means for depositing said card in juxtaposition to said article, means for periodically interrupting movement of said endless belt, and means for applying said joining means to said article and said card.

2. Apparatus, as set forth in claim 1, wherein said apparatus further includes a plurality of holder means for receipt of said articles thereon and wherein the underside of each said holder means carries a base plate which is periodically engaged by said means for interrupting movement of said endless belt.

3. Apparatus, as set forth in claim 2, wherein said means for periodically interrupting movement of said endless belt includes a motor, at least one drive finger periodically communicating with said base plate to move said holder means, and at least one pawl periodically communicating with said base plate interrupting movement of and accurately positioning said holder means.

4. Apparatus, as set forth in claim 1, wherein said transfer means includes a drive means, carrier means reciprocating between at least a first and a second position, transfer head means selectively gripping said card, guide means for said carrier means, a first means supporting said transfer head means from said carrier means and communicating with said drive means for moving said carrier means between said first and said second position and reciprocating said transfer head means with respect to said first and said second position.

5. Apparatus, as set forth in claim 4, including a frame and wherein said guide means includes a shaft supported by said frame and mounting means maintaining said carrier means on said shaft and wherein said first means includes a first plunger, housing means therefor carried by said carrier means, slider means connected to said drive means and linkage means connecting said slider means to said first plunger whereby said first plunger reciprocates in response to movement of said slider means.

6. Apparatus, as set forth in claim 5, wherein said mounting means includes a first and a second rigid block mounted on said carrier plate, slidably receiving said shaft and said slider means consists of a third block slidably receiving said shaft and reciprocable thereon between said first and said second rigid blocks.

7. Apparatus, as set forth in claim 5, wherein said linkage means includes at least a first rod pivotally attached to said slider means and said first plunger, said first rod pivoting as said slider means passes between said mounting means.

8. Apparatus, as set forth in claim 4, wherein said carrier means comprises: a flat metal plate having an open central portion.

9. Apparatus, as set forth in claim 4, wherein said transfer head means includes a frame carrying at least one cup means adapted for connection with a supply of subatmospheric pressure whereby said cup means grips said card in response to said subatmospheric pressure.

10. Apparatus, as set forth in claim 9, wherein a switch means selectively provides said subatmospheric pressure to said cup means.

11. Apparatus, as set forth in claim 4, wherein said first position resides over a supply of said cards and said second position resides over said endless belt.

12. Apparatus as set forth in claim 4, wherein said transfer means further includes a second means controlling reciprocation of said transfer head means.

13. Apparatus, as set forth in claim 12, wherein said second means includes a second plunger, a second housing means therefor carried by said carrier means, gate means movable between an opened and a closed position for maintaining said second plunger within said second housing in said closed position and guard means selectively maintaining said gate means in said closed position.

14. Apparatus, as set forth in claim 13, wherein said second means incorporates a second rod, pivotally attached between said slider means and said second plunger.

15. Apparatus, as set forth in claim 14, wherein said gate means comprises: at least one movable gate pivotally mounted to said carrier plate adjacent said second housing and having a portion thereof extending between said guard means and over said second housing.

16. Apparatus, as set forth in claim 15, wherein said guard means comprises: a flat track carried by said frame above said guide means and terminating before said first and said second position so that in said first and said second position, as said slider means passes between said mounting means, said second rod extends said second plunger while said first rod extends said first plunger.

17. Apparatus, as set forth in claim 1, wherein said means for applying said joining means includes a second transfer means for depositing at least one said joining means to said article, and applicator means having a contour similar to that of said article, totally affixing said joining means to said article and said card.

18. Apparatus, as set forth in claim 17, wherein said second transfer means is provided with means to apply subatmospheric pressure and means to apply heat.

19. Apparatus, as set forth in claim 1, wherein said apparatus further includes forming means for said joining means.

20. Apparatus, as set forth in claim 19, wherein said forming means comprises: a tray having a flat bottom and two side walls extending therefrom at an angle greater than ninety degrees.

* * * * *