April 14, 1970 A. J. FREEMANTLE 3,506,525

APPARATUS FOR MOUNTING ARTICLES ON A DISPLAY CARD

Filed July 7, 1967 5 Sheets-Sheet 1

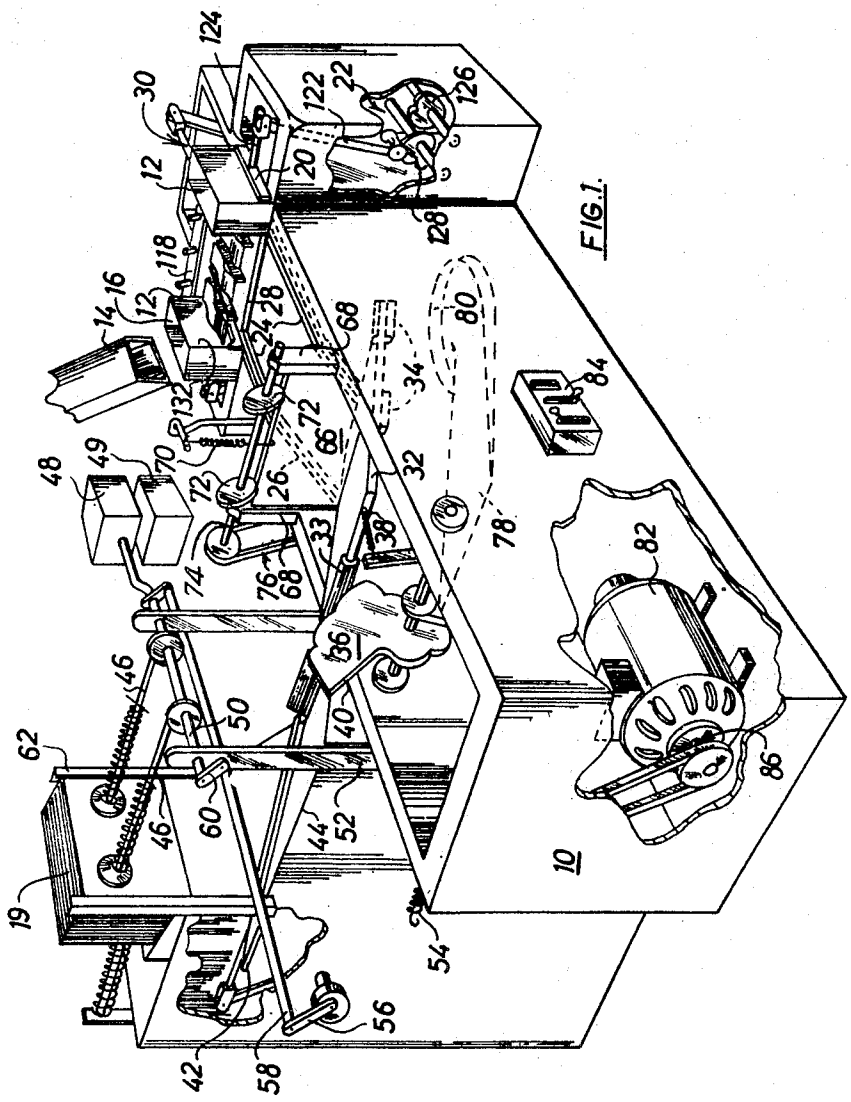


FIG. 1.

APPARATUS FOR MOUNTING ARTICLES ON A DISPLAY CARD

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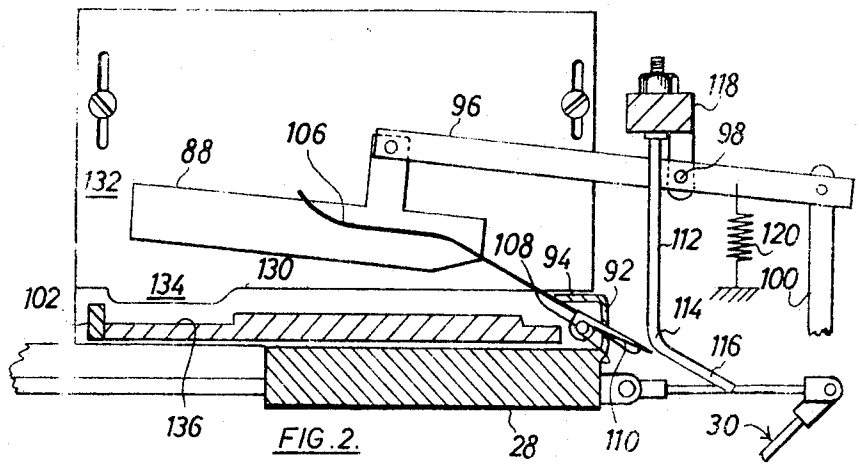


FIG. 2.

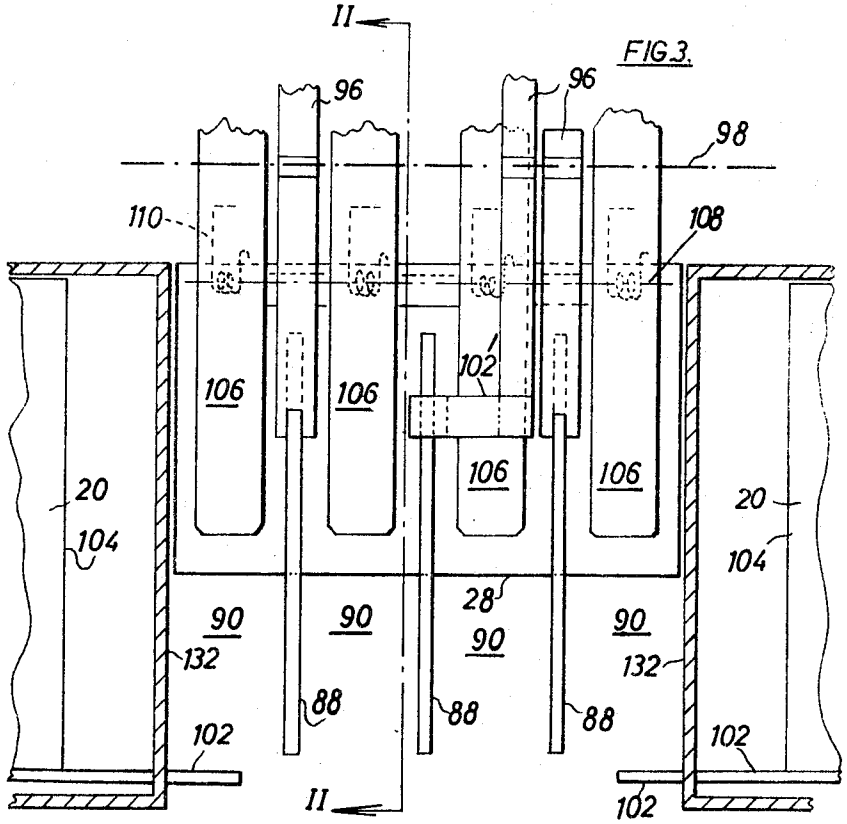


FIG. 3.

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APPARATUS FOR MOUNTING ARTICLES ON A DISPLAY CARD

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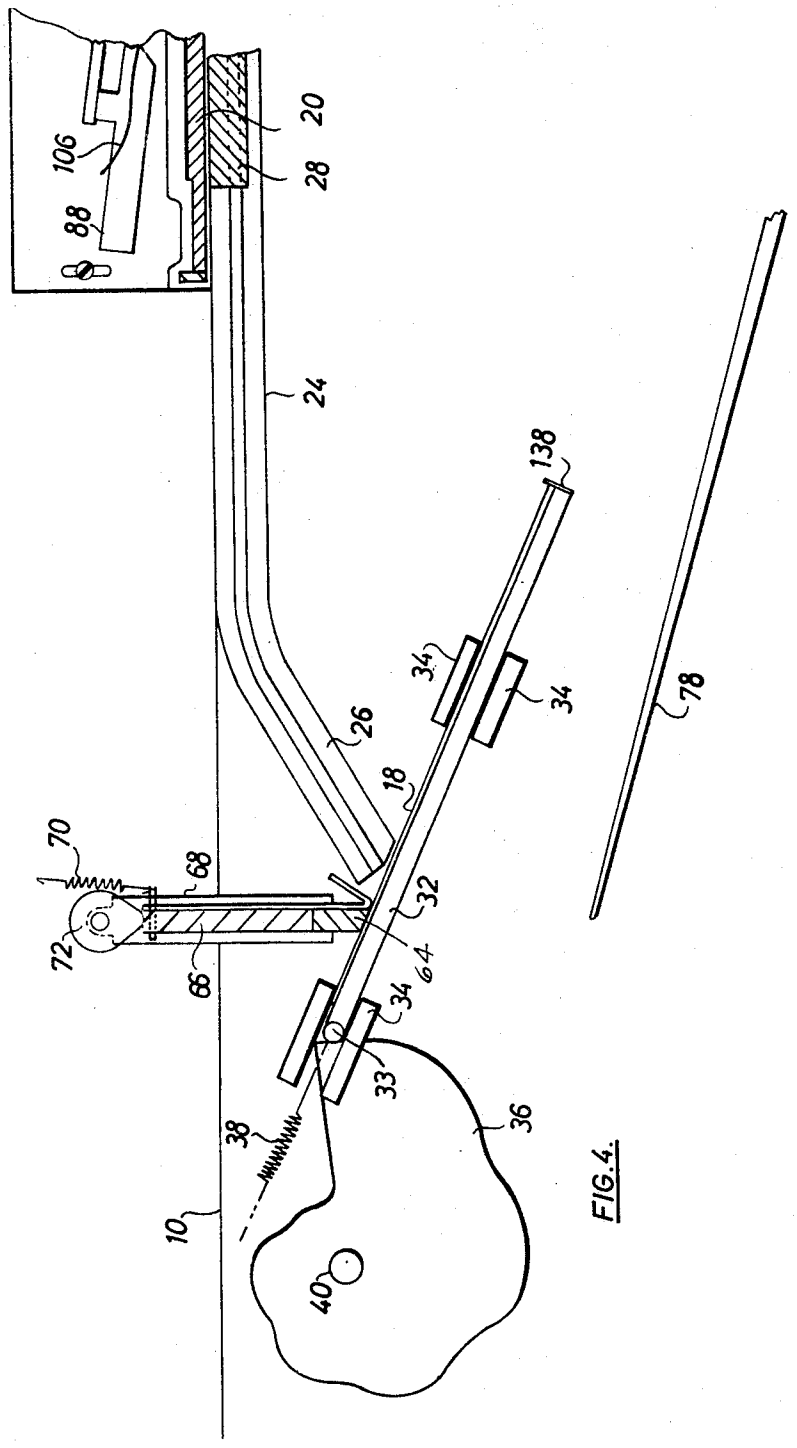


FIG. 4.

APPARATUS FOR MOUNTING ARTICLES ON A DISPLAY CARD

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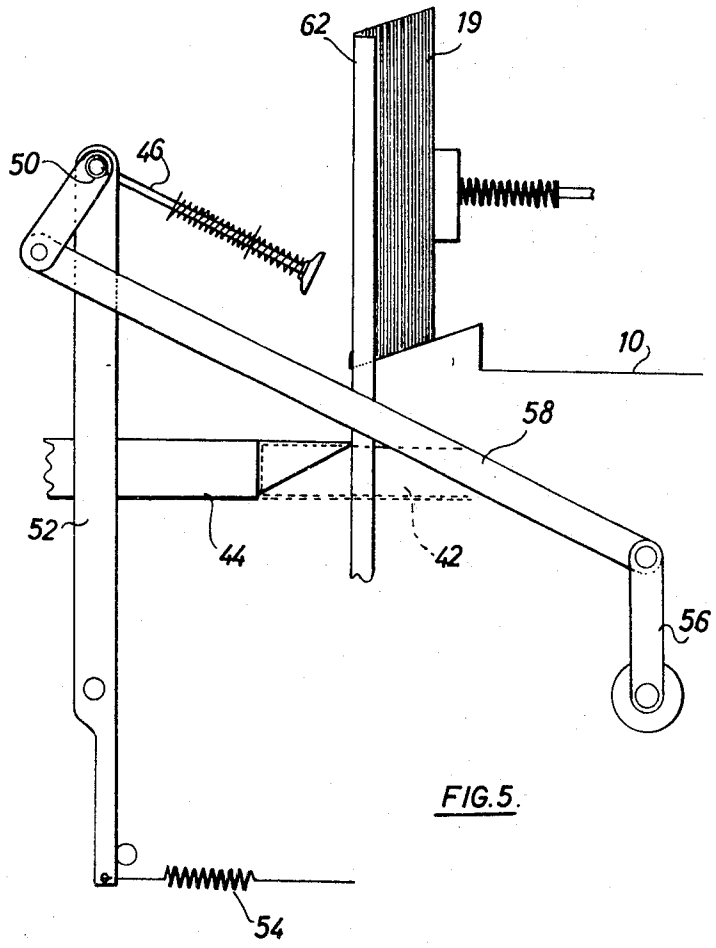


FIG. 5.

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APPARATUS FOR MOUNTING ARTICLES ON A DISPLAY CARD

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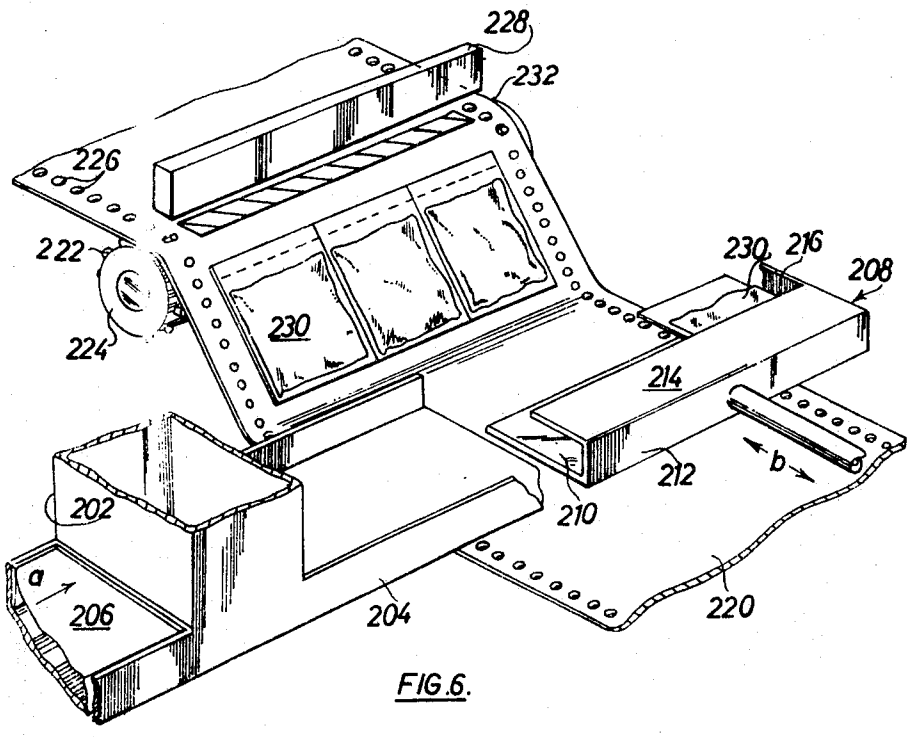


FIG.6.

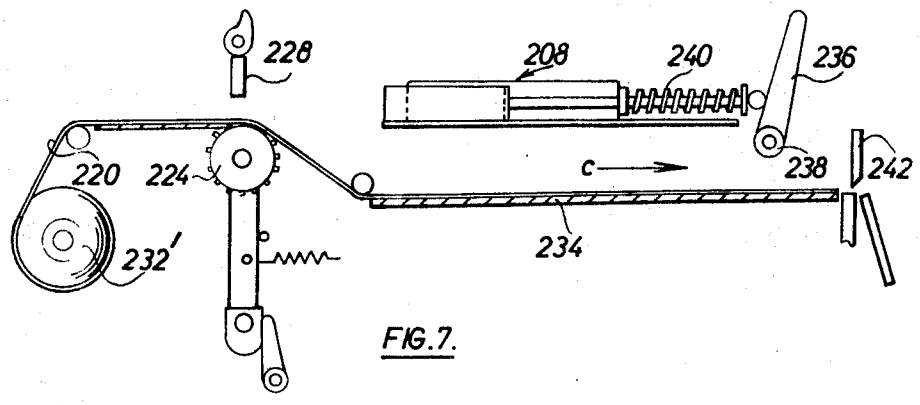


FIG.7.

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3,506,525

APPARATUS FOR MOUNTING ARTICLES ON A DISPLAY CARD

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Int. Cl. B32b *31/04*
U.S. Cl. 156—561 11 Claims

ABSTRACT OF THE DISCLOSURE

In the mounting of articles on a display card, individual articles are fed from a supply station to and collated at, a transfer station, into a group presenting projecting edge regions, after which the group is transferred to an article mounting station with the projecting edge regions in contact with a card previosuly positioned at the mounting station. The card contacting portion of each article is then secured to the card and the latter is advanced to displace at least the portion thereof having the articles secured to it away from the mounting station. Separate display cards may be used in which case each card is removed from the article mounting station when it becomes full and is replaced by a separate, empty card. Alternatively a continuous web of card may be employed, which is thereafter cut at predetermined intervals to form individual, filled cards.

This invention concerns an article handling method and apparatus and relates more particularly to a method and apparatus for conveying and fixing packages in succession to a display board or card.

According to the present invention in a method of mounting articles on a display card, a card is positioned at an article mounting station, individual articles are fed from a supply station to and are collated at a transfer station into a group, the collated group of articles is transferred from said transfer station to the mounting station and into contact with the card, said articles are secured to said card and at least the region of the card having the articles secured to it is moved away from said mounting station.

The articles may be secured to the card in any desired manner, as by a stapling, a taping or a stringing operation. Conveniently, however, they are adhered to the card and in a preferred method, the surface of the card to which the articles are presented is coated with a heat-activated adhesive and the aforementioned securing operation includes the step of applying heat to the portion of each article which contacts the card.

The method proposed by the invention may with advantage be applied to the mounting of articles in packets to display cards, when the card at the mounting station may be downwardly inclined with respect to the line of approach of the collated articles to the card, and said line of approach may itself be arranged to commence at a level somewhat above the card and to move downwards to meet the card at the mounting station. In this way, by advancing the card after each collated group of articles has been placed on it, successive groups may be superimposed on preceding ones.

The invention includes within its scope, an article handling apparatus comprising a collator plate, means for grouping articles on the plate with a part of each article projecting therefrom and means for removing the said collated group from said plate by means of said projecting parts.

Conveniently, the collating plate may take the form of a shovel, which in one embodiment of the invention may include a bottom, a back, a shortened top and one side, the opposite side and the front of the shovel being open to enable articles to be introduced into the shovel through said opposite side and to be removed from the front. In another embodiment of the invention, the shovel is a multiple part assembly comprising a reciprocable plate for receiving articles, a plurality of plane fingers aligned longitudinally with the plate and spaced transversely across it, said fingers lying in a plane perpendicular to that of the plate and being carried by means which brings them periodically against the plate in timed relation with the supply of articles thereto, and gripper means spaced transversely across the plate intermediate said fingers for holding the articles on the plate.

The means for grouping the articles on the shovel may include at least one hopper at one side of the shovel, although two hoppers with one arranged at each side of the shovel are preferred. Articles are stacked vertically one upon the other in the hopper, and the latter may have a slidable bottom reciprocable towards and away from the shovel, whereby on each stroke of the hopper bottom, the lowermost article in the hopper is pushed on to the shovel. A mechanism for reciprocating the hopper bottom may include cam means providing for a reducing length of stroke as successive articles are pushed on to the shovel.

In order to remove the collated articles from the shovel at the mounting station, a vertically displaceable bar may be arranged to descend and press the projecting parts of the articles against the card, and when the articles are packets intended for securing to the card by a heat-activated adhesive, the same bar may be heated to activate the adhesive and effect the securing of the packets to the cards.

As an alternative to separate cards, the display board may take the form of an intermittently moved web which is cut at predetermined intervals as a required number of articles is mounted thereon.

The invention will be described further, by way of example, with reference to the accompanying, generally diagrammatic drawings in which:

FIG. 1 is a perspective view of one article handling machine embodying the invention,

FIG. 2 is a side elevation of the collating shovel assembly,

FIG. 3 is a plan view thereof,

FIG. 4 is a side elevation of the mounting station,

FIG. 5 is a side elevation of a display card loading mechanism,

FIG. 6 is a perspective view of another apparatus according to the invention, and

FIG. 7 is a sectional elevation of a part thereof.

Both the apparatus to be described with reference to the drawings are intended for the mounting of packets of goods such as foodstuffs, pharmaceutical products, screws and other small hardware and so forth, and in both embodiments of the invention it is an essential feature that the leading ends of the packets shall overhang the forward edge of a collating shovel or equivalent member

as the latter approaches a mounting station. It will, of course, be appreciated that the invention is not restricted to the handling of packets, but that other articles capable of presenting a projecting leading edge for securing to a display card may be handled.

Referring now to FIGS. 1 to 5 of the drawings, the machine illustrated therein includes a frame **10** at each side and towards one end of which is arranged a hopper **12** supplied as through a chute **14** with packets **16** which are to be secured to a display card **18**. The hoppers **12** are of rectangular section and are arranged with their longer sides parallel to the main longitudinal axis of the frame **10**, these longer sides being open to accommodate a false hopper bottom in the form of a pusher **20** which is reciprocable by drive means generally designated **22**.

Adjacent and just below the inner face of each hopper **12**, the machine frame **10** carries a guide rail **24** having an initial portion which is horizontal and a terminal portion **26** which is somewhat downwardly inclined. Between the guide rails is slidably mounted a collator plate **28** which is reciprocable, by drive means generally denoted **30**, towards and away from an inclined table **32** supported in the frame **10** by guides **34** for displacement by a cam **36**. The cam **36** will be observed to have a periphery shaped such that during rotation of the cam, the table **32** is firstly advanced through a predetermined distance towards the collator plate **28** and then remains stationary for a period at a fixed distance from that plate, the cycle being repeated a number of times. The table **32** is biased by a spring **38** in a direction away from the plate **28** and the cam **36** is further formed at one point with a generally radial land **40**, with the result that, when the cam follower **33** on the table **32** comes into register with the land **40**, the spring **38** abruptly returns the table **32** to its position of maximum spacing from the collator plate **28**.

The inclined table **32** is a mounting table carrying the display card **18** to which the packets **16** on the collator plate **28** are to be secured. The card **18** is placed on the table by a pusher member **42** which displaces it from a stationary table **44** arranged at one side of the machine frame **10**. For the purpose of placing a card **18** on the stationary table **44** ready for feeding to the inclined mounting table **32**, the invention provides a pair of spaced, vacuum lifting arms **46** connected to a vacuum pump **48** and mounting on a rotatable spindle **50** carried between levers **52** pivoted intermediate their ends to the machine frame **10**. The spindle **50** is connected to a rotary crank **56** by a long connecting rod **58** and a short connecting rod **60** and the upper ends of the levers **52** are biased away from the crank **56** by one or more springs **54** connected to their lower ends. As the crank rotates, therefore, the vacuum lifting arms are moved towards and away from a holder **62** containing a stack **19** of fresh cards **18**, and a vacuum control **49** is actuated in timed relation with this movement of the lifting arms to apply vacuum for removing a card from the stack **19** when the free ends of the arms contact the stack. Thereafter, on continued rotation of the crank **56**, the spindle **50** is rotated and the levers **52** are pushed away from the stack to lift the card over, towards and to deposit it on, the stationary table **44**, the vacuum control **49** operating at this juncture to release the card.

A horizontal bar **64** is carried along the lower edge of a gate **66**, the latter being mounted for vertical displacement in a pair of vertical guide rails **68** mounted on opposite sides of the frame **10** in the above inclined table **32**. The bar **64** is heated for example by an electrical heating element (not shown). Alternatively the bar may be formed with a hollow interior and heated by fluid medium passed therethrough. The gate **66** is biased in an upward direction by a spring **70** against the underside of two cams **72** carried by an axle **74** mounted between the upper ends of the two guide rails **68** and rotated by drive means shown diagrammatically at **76**. Rotation of the cams **72** causes the gate **66** to reciprocate in a vertical plane, the phase and time relationship of the downward movement of the gate **66** being arranged to coincide with the arrival therebelow of the leading edges of the collated packets next to be secured to the card **18**.

The filling of a card corresponds to the complete rotation of the cam **36** and the end of the cycle is determined by the radial land **40** of this cam which causes the table **32** to return to its position of maximum spacing from the collator plate **28** into the action of its return spring **38**, as hereinbefore outlined. The card **18** on the table **32** cannot follow this abrupt return movement of the latter and with nothing to support it, the card **18** falls onto a chute **78**. This chute is downwardly inclined and includes a curved portion **80** to deliver full cards at an outlet station (not shown) on the far side of the apparatus as shown in FIG. 1.

Although separate motors either electric or hydraulic or pneumatic, may be employed to drive the various movable parts of the apparatus, separately, in the arrangement illustrated in FIGS. 1 to 5 of the drawings, a single electric motor **82** is provided. A control panel **84** is provided, to control the operation of the motor **84** and the drive is transmitted from the motor shaft **86** throughout the apparatus by means of chain and sprocket drive means and/or by gear trains (not shown in detail). This form of drive transmission is to be preferred since belt drive means and other friction dependent drives, can involve slip which will interfere with the phasing of the machine operations. However a friction clutch or belt drive between the motor shaft **86** and a first main drive shaft (not shown), is preferably provided to prevent the motor from stalling should the machine jam during operation and to assist in starting-up the machine.

The construction of the collating station can best be seen by considering FIGS. 2 and 3 in conjunction with the general view of FIG. 1. In order to position and align the packets on the collator plate **28**, a number of fingers **88** are mounted above the plate to define in total a number of similar compartments equally spaced apart across the plate **28**, the number of compartments corresponding to the number of packets to be positioned thereon. Three such fingers are provided in the machine illustrated to thereby define four compartments **90**, to receive four packets for collation. The rear of the compartments is defined by an upstanding rear edge **92** of the plate **28**, which is bent over at the top to form a lip **94**.

Each finger **88** is mounted at one end of an arm **96** which is carried on an axle **98**. The two outer fingers (see FIG. 3) are keyed to the axle **98**, which is itself rotatable while the middle finger is free to pivot on the axle. One of the two outer arms **96** is foreshortened and in order to prevent it from interfering with the drive means **30**, the middle arm **96** is stepped at **102** (see FIG. 3) towards the shortened outer arm **96**. The rear end of the longer outer arm **96** is pivotally joined to a vertically displaceable push rod **100** which is acted on by a reciprocatory drive means (not shown) and the rear end of the middle arm **96** is likewise joined to a similarly displaceable push rod **100** actuated by said drive means (not shown), the drive means actuating the two arms in sequence to lower and raise first the middle finger **88** and then the two outer fingers **88**. The middle finger **88** divides the collating area into two parts and in its lowered position serves as a wall against which two packets **16** can be pushed from opposite sides, by operation of the two pushes **20**. In a similar way the two outer fingers **96**, when in their lowered positions constitute two-walls against which two further packets can be pushed by the two pushers **20**, so that a total of four packets can be collated across the width of the plate **28**.

The length of the packets **16** is commensurate with the length dimension of the hoppers **12** and as is best seen from FIG. 2, the corresponding dimension of the plate **28** is considerably less than this length so that the

leading ends of the packets **16** protrude well beyond the leading edge of the plate **28** when positioned thereon. It will be seen that during the pushing operation, the packets are guided at their rear by the wall **92** and in order to provide a corresponding parallel guide for the front of the packets, each pusher **20** is provided with an upstanding front wall **102** which extends beyond the pushing edge **104** perpendicular thereto, by amount which is commensurate with the width of one packet.

Since the front wall provided by the upstanding wall **102** is removed after collation of the packets, upon withdrawal of the pushers **20** there is nothing to prevent the collated packets **16** from slipping in a forward direction, off the plate **28**, during subsequent movement of the plate towards the table **32**. Accordingly four grippers **106** are pivotally mounted about an axle **108** contained in the rear wall **92** of the plate **28** and springs **110** are provided to bias the grippers towards the plate **28**. The grippers **106** are spaced apart across the width of the plate **28** in register with the four compartments **90** so as to grip the packets **16** and hold them on to the plate. During collation the grippers are lifted clear of the plate **28** and the collating area by four fixed arms **112** each of which is bent to define an elbow **114** intermediate a vertical portion an a rearwardly and downwardly inclined portion **116**. The grippers **106** extend beyond the axle **108** and when the plate **28** occupies the collating position shown in FIGS. 2 and 3 the protruding ends of the grippers **106** are engaged by the inclined portions **116** of the arms **112** and are pushed in a downward direction against the action of the springs **110**, to raise the forward ends of grippers **106** clear of the collating area. Forward movement of the plate **28** moves the rearward ends of the grippers clear of the arms **112** to allow them to tilt under the action of the springs **110** and grip the packets. The arms **112** are carried by a cross-beam **118** (not shown in FIG. 3 for the sake of clarity) which also serves to carry the axle **98** on which the three arms **96** are mounted as hereinbefore described.

To ensure that the fingers **88** are raised clear of the collating area when not required, a spring **120** is provided between the rear portion of the longer outer arm **96** and the frame **10** and between the rear portion of the middle arm **96** and the frame **10** to bias the forward ends of the arms **96** in an upward direction.

The movement required of the pushers **20** is more than a simple reciprocatory motion since the stroke of successive movements is different, by virtue of the shorter distance over which the second pair of packets are required to travel during collation. This variable stroke is obtained from the reciprocable drive means **22**. The drive means **22** is not shown in detail but as is shown in FIG. 1, it includes a pivoted lever **122** the top end of which is coupled by a push rod **124** to the rear of a pusher **20** and the lower end of which is engageable by two cams **126**, **128** mounted on opposite sides thereof. Each cam inculdes two radial arm portions one of which is longer than the other, but both of which will engage the lower end of the lever **122**. The two cams rotate in opposite directions and are phased so that during rotation the lever **122** is engaged first by the long arm of cam **128**, then by the long arm of cam **126** to return the lever **122** to its first position, then by the short arm of cam **128** and last, by the short arm of cam **126** to again return the lever **122** to its first position.

The packet outlet (see FIG. 2) at the lower end of each inwardly facing hopper wall **132** comprises a narrow slit **130** between the lower edge of the wall **132** and the upper surface of the pusher **20** which also constitutes the floor of the hopper. Since the middle region of each packet is considerably thicker than the leading end region of the packet—which is substantially flat for securing on the card **18**, and the extreme rear edge of the packet, the slit **130** is shaped accordingly to prevent packets jamming. To this end the lower edge of the wall **132** is cut-away over the major portion of its length to leave an abutment **134** at its forward end and the pusher **20** is itself cut-away in the region of the abutment **134** to form a corresponding channel **136**, in the surface of the pusher. The bottom packet in each hopper lies on the pusher with its thicker central region in register with the cut-away in the wall **132** and its thin leading edge overhanging into the channel **136**.

In operation the middle finger **88** is lowered onto the plate **28** and two packets **16** are pushed by the two pushers **20** onto the plate **28** into contact with opposite sides of the middle finger. The two pushers **20** are then withdrawn into the hoppers **12**, the middle finger **88** is raised and the two outer fingers **88** are lowered and a further two packets **16** are pushed onto the plate **28** into contact with the two lowered fingers, to occupy the two outer collating positions. The distance moved by each pusher during the second pushing operation is less than the distance during the first pushing operation by an amount commensurate with the width of one packet.

The two pushers **20** are then withdrawn and the plate **28** moved forward by operation of the drive means **30**. This causes the four grippers **106** to drop onto the four collated packets to grip and retain them on the plate with their leading edges overhanging same.

The movement of the plate **28** is governed by the guide rails **24** and the final downward movement of the plate presents the overhanging leading ends of the packets to a card **18** carried on the inclined table **32**, such that the leading ends lie immediately under the heater bar and gate assembly **64**, **66**. The gate **66** is then lowered under the action of the cams **72** so that the packet ends are gripped between the heater bar **64** and the card **18**. The card is of the type which is coated with a heat-activated adhesive and the heat transmitted through the packet ends from the heater bar **64**, causes the packet ends to be secured to the card.

With the packet ends still gripped tightly between the heater bar **64** and the card **18**, the plate **28** is pulled backwards and returned to its initial position between the hoppers **16**, thereby leaving the four packets on the card. The gate **66** is then raised, thereby raising the heater bar **64** clear of the packets on the card after which the table **32** is pushed forward a predetermined distance, governed by the next step, around the cam **36**, to present a fresh area of card beneath the heater bar **64** ready to receive the next four packets.

This sequence of operations is repeated until the card is full, when the table **32** will occupy its nearest position to the collating station. Continued rotation of the cam **36** so that the point of engagement is beyond the large radial land **40**, allows the table **32** to return rapidly to its first position, furthest from the collating station, under the action of its return springs **38**. The rapid movement of the tables causes the card **18** to drop onto the discharge chute **78** by which it is conveyed to an outlet (not shown).

During the foregoing sequence of operations the first card of a stack of cards **19** is lifted and placed on a transfer table **44** by appropriate movement of the suction arms **46** and when the table **32** returns to its first position, furthest from the collating station, the card on the transfer table is pushed therefrom, by the pusher **42**, onto the table **32**, the upper face of which is in alignment with the transfer table **44** when the former is in its said first position. The card is prevented from sliding off the table **32** by a lip **138** formed at the bottom of the inclined surface of the table, and the freshly positioned card is ready to receive the first group of packets. In this way the collation and mounting of the packets can be performed continuously.

Referring now to FIGS. 6 and 7 of the drawings, the purpose of the apparatus is to apply filled bags, for example bags of nuts, to a sheet of cardboard suitable for a service display board whereby the bags can be individually removed from the backing board when required.

To this end a magazine **202** is arranged to be in open communication at the bottom with a guideway **204** and a pusher **206** located at the rear end portion of the guideway **204** moves backwards and forwards in the direction of the arrow *a* to push the bags in succession towards the front of the guideway. A collator shovel **208** reciprocates in a direction at right angles to the pusher **206** in the direction of the arrow *b*. The collator shovel **208** comprises a bottom **210**, a back **212**, a top **214** and one side **216**, the top **214** being shorter than the bottom **210**. The side opposite the side **216** is open to receive the bags from the guideway **214**. A web of cardboard **220** is moved intermittently under the guideway **204** and the shovel **208**, and is moved in register by means of the teeth **222** on the roller **224** engaging the holes **226** in the edge portions of the web **220**. A heat sealing bar **228** is provided above the roller **224**. Areas **232** of the heat sealable adhesives or hot melt are pre-applied to the web **220** at the intervals where it is desired to apply the set of packages. Only one such area **232** is shown in the drawing and it must be understood that other areas **232** are applied to the web **220**.

FIGS. 6 and 7 show diagrammatically the operation of the machine. The magazine **202** is filled with packages and the pusher **206** reciprocates to push three packages **230** into the collator **208** in turn through the open side. The upper ends of the bags **230** project beyond the open front. Only one bag **230** is shown in the shovel **208** for clarity. The collator shovel **208** moves forward until the tops of the bags **230** lie on the area **232**. The bags **230** are then gripped between the heat sealing bar **228** and the area **232**. The collator shovel withdraws leaving the three bags **230** adhering to the web and overlapping a previous set which has already been applied. In the drawing three packages **230** are shown as having been applied to the web **220** these are now situated on the inclined portion of the web so as to be out of the way when another set of bags **230** is being offered up to the web **220**. It must be understood that instead of heat sealing the bags to the web they can be applied by stapling or other means.

The web **220** is fed from the roll **232** to the indexing roller **224** then proceeds after the bags are applied by the bar **228** to the lower level of a table **234** so as to be out of the way of the collator shovel **208**. The reciprocating movement of the collator shovel **208** is made by means of the level **236** pivoted about the point **238**. The normal position for the collator shovel **208** is in the position shown and the action of the level **236** forces the shovel **208** forwards against the spring **240**. A cut-off device is provided at **242** so as to cut off the web **220** into the lengths each cut length containing a predetermined number of bags. It must be understood that the web **220** is printed with data suitable to the packaged product and if it is desired that, say, two dozen packets be applied on one backing board, the web **220** is indexed so as to move forward a certain distance for a predetermined number of times, and then to move forward a greater distance in the direction shown by arrow C so that there is a space between the groups of individual packages.

According to a modification, instead of one magazine being provided, three different packets can be put in the shovel at one time by having three magazines arranged in a series one after another.

Instead of the collator shovel being used to apply packets to a web, other articles could be applied to a web or alternatively applied to individual sheets or cartons which are placed in position instead of the moving web.

I claim:

1. An article handling apparatus comprising a reciprocating collator member, means for placing articles into said collator member with a part of each article projecting from said collator member, means for displacing the collator member in a direction at right angles to the in the front of the shovel being open to enable articles supply of articles thereto, a mounting station including means for presenting a display card with at least a portion of said card aligned with the path of movement of said collator member, said collator member displacing means being actuated in timed relation with the supply of articles to the collator member thereby to present the projecting parts of said articles to the card in said mounting station as each collated group of articles is assembled, and securing means for securing said projecting parts to said card.

2. An apparatus as set forth in claim **1** comprising at least one hopper adjacent the collator member and arranged to receive articles in vertically stacked relation and a slidable false bottom to said hopper reciprocable towards and away from said collator member to push the bottom articles in said hopper successively on to the collator member.

3. An apparatus as set forth in claim **1**, in which the collator member comprises a reciprocable plate displaceable towards and away from the mounting station, the hopper bottom is provided at its front edge with a fixed guide directed transversely to the hopper bottom and arranged to effect transverse alignment of articles deposited on to the collator plate, a plurality of transversely spaced and vertically displaceable plane fingers are arranged above the collator plate and are moved in timed relation with the supply of articles to the collator plate to effect longitudinal alignment and transverse spacing of said articles on said plate and a plurality of transversely spaced pivotally mounted gripper members are provided on said plate to engage and maintain said articles on said plate as the latter moves forward towards said mounting station.

4. An apparatus as set forth in claim **3** in which the collator plate is mounted between transversely spaced guide rails having a final portion which is inclined towards said mounting station thereby to present the projecting parts of said articles in superposed relation to articles previously secured on a card in said station.

5. An apparatus as set forth in claim **4**, in which the card is inclined in the direction of approach of said articles thereto.

6. An apparatus as set forth in claim **5**, in which the mounting station includes a displaceable inclined table and cam means for displacing said table incrementally in the direction of approach of said articles to said table to present a fresh portion of card to each newly collated group of articles.

7. An apparatus as set forth in claim **6** further comprising a card stacking station transversely adjacent the mounting station, a stationary table intermediate said mounting station and said card stacking station, vacuum lifting arms for transferring a card from said stacking station to said stationary table, pusher means for pushing a card from the stationary table into the mounting station and control means for actuating said vacuum arms and said pusher means in said timed relation with the movement of the collating member and the inclined table of the mounting station for depositing fresh cards on said inclined table.

8. An apparatus as set forth in claim **1** further comprising feed rollers for incrementally advancing a display card in the form of a continuous web through the mounting station.

9. An apparatus as set forth in claim **8** wherein the display cards and the articles to be mounted thereon are inclined relative to one another as they are brought together.

10. An apparatus as set forth in claim **1** in which the securing means includes a vertically displaceable heating bar arranged to press the projecting parts of the articles against the display card.

11. An apparatus as set forth in claim **1** in which the collator member is a shovel including a bottom, a

back, a shortened top and one side, the opposite side to be introduced into the shovel through said opposite side and to be removed from the front.

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