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Campbell, III

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[54] **ARTICLE LOADING MACHINE**

[75] Inventor: **William A. Campbell, III**, Athens, Ga.

[73] Assignee: **Quality Food Machinery Inc.**, Athens, Ga.

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[52] **U.S. Cl.** **53/251**; 53/154; 53/159; 198/170

[51] **Int. Cl.²** **B65B 5/06**; B65B 35/50

[58] **Field of Search** 53/154, 159, 160, 166, 53/237, 246, 247, 249, 250, 252; 198/23, 26, 170

[56] **References Cited**

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Primary Examiner—Robert L. Spruill
Attorney, Agent, or Firm—Walter M. Rodgers; Walter A. Rodgers

[57] **ABSTRACT**

A predetermined number of vertically stacked articles such as oatmeal cookies, for example, are manipulated into a horizontal disposition and deposited into a receptacle by means of a movable endless element having a feeder lug pivotally mounted thereon and held in normal relation thereto for engaging the vertically stacked articles while supported on a support means having a horizontal article supporting portion and a downwardly projecting article manipulating portion adjacent which a yieldably and adjustably mounted guide is disposed in spaced relation so that the stack of articles is pushed along the supporting surface and through the space between the downwardly projecting manipulating portion of the support means and the guide so as to deposit the articles in a receptacle disposed below the discharge end of the downwardly projecting portion of the support means, the feeder lug being swung about its pivot in a direction away from the loaded articles and their receptacle following completion of a loading operation.

13 Claims, 2 Drawing Figures

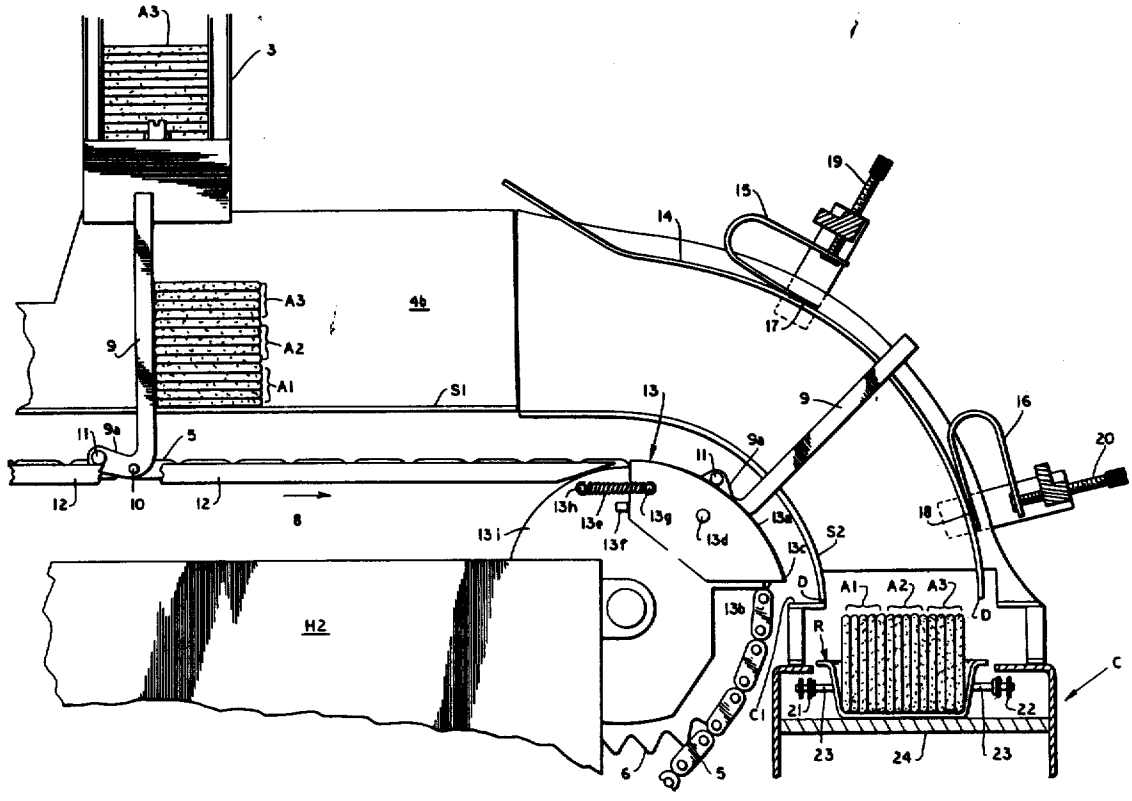


FIG 1

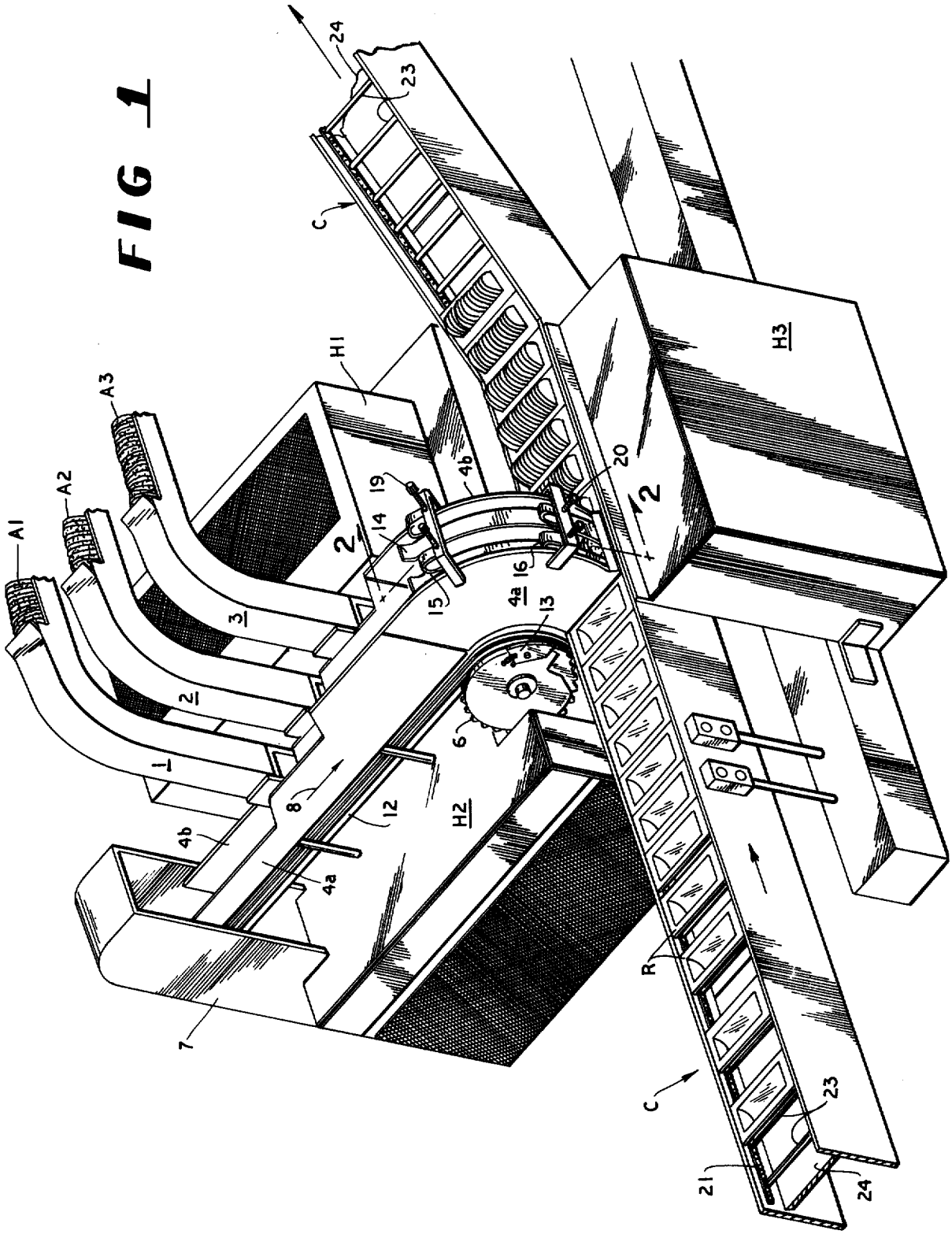
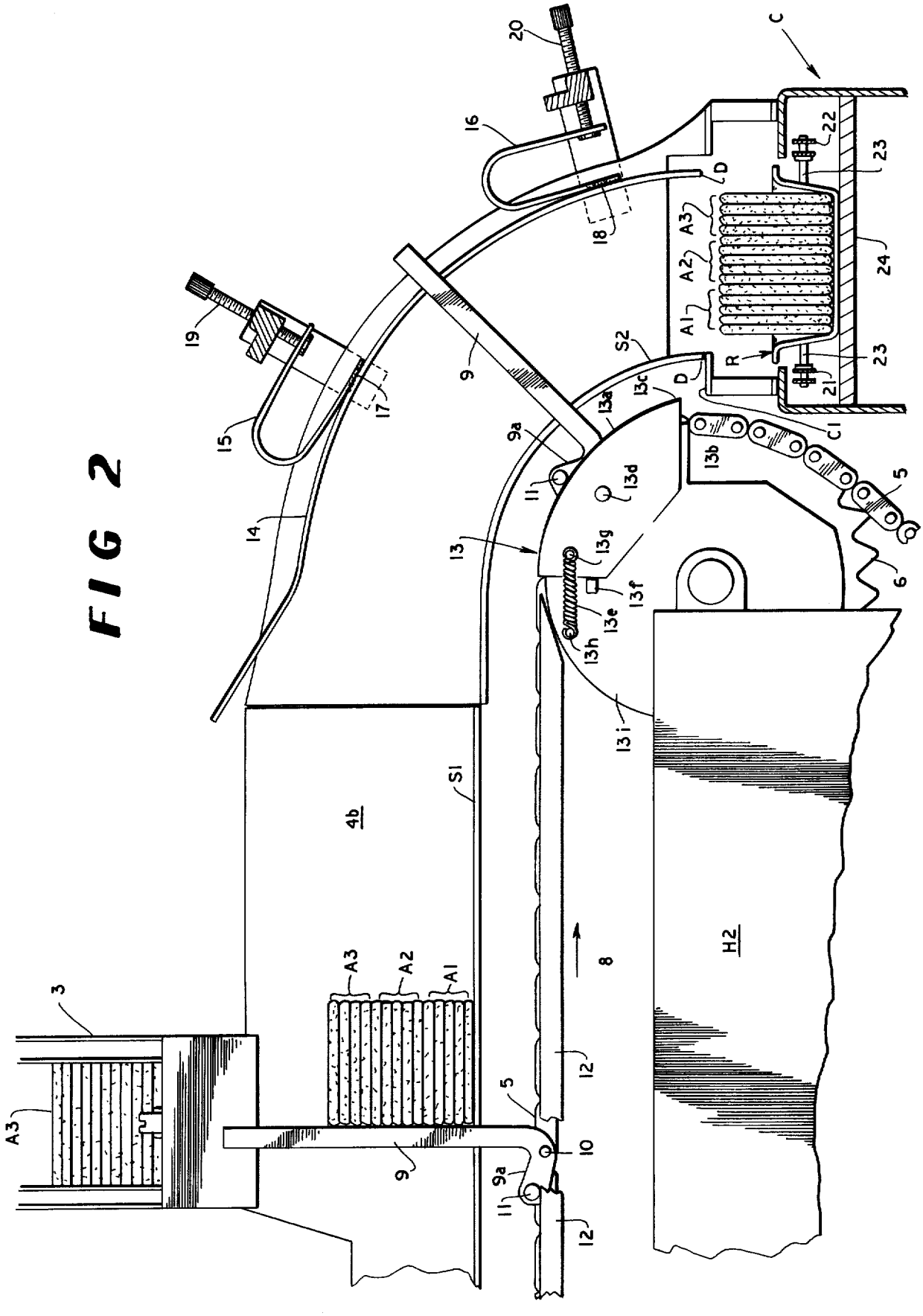


FIG 2


20
16
18
19
17
15
14
9
9a
11
13
13a
13b
13c
13d
13e
13f
13g
13h
13i
S1
S2
4b
H2
A1
A2
A3
3
5
6
8
10
12
21
22
23
24
R
D
C
C1

ARTICLE LOADING MACHINE

Consumable items such as oatmeal cookies, sugar cookies and chocolate chip cookies are commonly of the so-called wire cut variety and vary in diameter and in thickness and are mechanically quite fragile. For these reasons it is common practice at present to load such items in trays by hand. Such loading operations are time consuming, inefficient and may result in contamination of the consumable items.

According to this invention, a predetermined number of articles stacked vertically on a support means are engaged and moved along a horizontal portion of the support means and then downwardly along a downwardly projecting article manipulating portion of the support means by a feeder lug pivotally mounted on an endless element, a portion of whose path of movement closely parallels that of the horizontal and downwardly projecting portions of the support means so as to manipulate the vertical stack of items into a horizontal row and then to deposit the row into a receptacle. According to a feature of the invention a cam follower and cam are arranged so as to manipulate the lug in such manner as to swing it about its pivoted mounting and toward the associated articles to insure proper following action of the lug relative to the articles as they approach a receptacle disposed underneath a downwardly moving group of articles. The cam may be yieldably mounted so as to accommodate limited swinging movement of the feeder lug in a direction generally opposite to its direction of feeding movement so as to prevent damage in the event the lug or articles should encounter an obstacle which impedes feeding movement. Upon completion of a loading operation, the feeder lug swings about its pivot in a direction away from the loaded receptacle so as to accommodate continuous operation of the endless element in synchronism with the other movable components of the apparatus. According to another feature of the invention a guide is yieldably and adjustably mounted in spaced relation to the downwardly projecting article manipulating portion of the support means to aid in controlling manipulation of the stack of articles and to accommodate variations in the sizes thereof and the receptacles which are loaded in sequence are yieldably mounted on conveyor means to minimize possible damage to the articles and to the machine components should a malfunction develop.

For a better understanding of the invention reference may be had to the following detailed description taken in conjunction with the accompanying drawings in which FIG. 1 is an overall perspective view of an article stacking and receptacle loading apparatus which embodies the invention and in which FIG. 2 is a cross-sectional view taken along the line designated 2—2 in FIG. 1.

With reference to FIG. 1, a series of articles such as are designated at A1,A2 and A3 are fed downwardly through chutes 1, 2 and 3 onto a dead plate (not shown) and across which horizontally reciprocable pushers (not shown) operate in sequence to push a predetermined number of articles from each chute in sequence onto the horizontally disposed portion S1 of support means for the articles to form a stack designated A1A2A3 in FIG. 2. More specifically a predetermined number of articles such as A1 are moved into the space between side plates 4a and 4b and are then moved by pusher means adjacent to and below chute 2. Articles A2 are there stacked atop articles A1 and in like fashion the articles A3 from chute 3 are stacked atop the articles A1 and A2. These transversely reciprocal pushers are driven by motive means (not shown) in housing H1. Upon completion of horizontal pushing motion generally toward the left as viewed in FIG. 1, a predetermined number of articles are disposed between side plates 4a and 4b and atop the portion S1 of the support means and are designated A1A2A3.

For the purpose of imparting movement from left to right of the articles mounted on horizontal article supporting portion S1 so as to stack the articles into a single stack and so as to aid in manipulating the stack, an endless element in the form of chain 5 is mounted on driven sprocket 6 and an idler sprocket disposed within housing 7 but not shown in the drawings so that movement of the upper reach of endless element 5 as viewed in the drawings is from left to right as indicated by the arrows 8. A plurality of feeder lugs 9 are pivotally mounted at 10 on endless element 5 and arranged to ride in the space between two rails which form the horizontal part S1 of the support means. A cam follower 11 is mounted on the lower portion 9a of feeder lug 9 and arranged to ride along a horizontal fixed cam surface 12 to hold the lug 10 in normal position relative to support S1 so that rotation of sprocket 6 in a clockwise direction causes the upper reach of chain 5 to move from left to right and in turn moves the lugs 9 and the stack of articles A1A2A3 similarly. Chain 5 is driven by motive means disposed within housing H2. Preferably the lugs 9 are formed with an inner metallic rod about which a plastic sheath is disposed.

The above stacking operation is known. It will be understood that only one chute such as 1, 2 or 3 could be used in which event no stacking operation would be necessary. Similarly an additional chute or set of chutes could be added for high capacity systems in which event it probably would be desirable to provide an additional pusher or pushers and associated apparatus.

Mechanism constructed according to this invention is arranged to manipulate a vertical stack of articles such as A1A2A3 into a horizontal row and then to deposit the row of articles into a receptacle R disposed below the discharge end D of the downwardly projecting article manipulating portion S2 of the support means. The structure designated S2 comprises a pair of spaced rails between which the lugs 9 are moved. Cam follower 11 rides on cam surface 13a of cam 13 during movement of the articles through the manipulating phase. As shown in FIG. 2 one article stack A1A2A3 is shown immediately after it clears the discharge end D of the downwardly projecting article manipulating portion S2 of the support means and while the horizontally disposed row of articles is being deposited into the receptacle R.

In order to control the manipulating operation in such manner as to prevent damaging collision between a feeder lug 9 and a receptacle R and parts associated therewith, cam 13 is provided with a cutaway surface 13b so that cam follower 11 may ride off of cam surface 13a and allow the lug 9 to pivot in a counterclockwise direction as viewed in FIG. 2 about its pin 10. Each lug 9 may engage the abutment surface C1 alongside the conveyor C and such engagement imparts counterclockwise swinging movement to the lug about the pivot 10. By this means the feeder lug 9 is swung away from the receptacle R and its contents and the adjacent

associated apparatus. Thus each feeder lug 9 according to a feature of this invention is swung from the position shown in FIG. 2 wherein the lug is approximately normal to the adjacent part of downwardly projecting article manipulating support surface S2 to a position approximately tangent to the adjacent part of that surface.

In order to insure that each lug 9 closely follows an article group downwardly along the lower part of support S2, the cam surface 13a is flared outwardly toward the articles along the lower part thereof as is indicated at 13c.

In order to avoid a damaging collision between each lug 9 and part C1 the cam 13 is pivotally mounted on fixed pivot 13d and biased by tension spring 13e toward engagement with stop 13f. Spring 13e is secured to cam 13 at pin 13g and to pin 13h affixed to fixed plate 13i. Thus a lug 9 which encounters an obstacle may swing counterclockwise in coordination with clockwise movement of cam 13 about pivot 13d.

One series of feeder lugs and one endless element and the associated cams and surfaces S1, S2, 4a, 4b and 14 are shown. It will be understood that a plurality of systems such as that shown could be arranged alongside each other thus to increase the capacity of the system.

For the purpose of controlling the manipulating movement of the stack of articles as the stack is moved along downwardly projecting article manipulating surface S2 and between the side guides 4a and 4b, a fixed guide 14 is mounted in spaced relation to the surface S2. Guide 14 is yieldably mounted on a pair of leaf springs 15 and 16 which are secured to the guide 14 by welding or by any other suitable means at 17 and 18. The opposite ends of springs 15 and 16 are rotatably mounted to adjustable rotatable elements 19 and 20 which are threadedly related with brackets secured to the side walls 4a and 4b in any suitable manner. Rotation of elements 19 and 20 varies the compression of springs 15 and 16 as well as the initial position of guide 14 relative to manipulating support surface S2. Ordinarily the space between guide 14 and surface S2 is approximately equal to the height of the stack of articles A1,A2 and A3. Friction between a stack of articles and the surfaces S2 and 14 and between adjacent contacting articles insures the integrity of the stack during manipulation.

Once a stacking and loading operation is completed, the receptacle R and its contents are moved from underneath the lower or discharge end D of the surfaces S2 and 14 by conveyor C driven by motive means in housing H3. Of course such movement brings a subsequent receptacle R into position for loading via a succeeding feeder lug 9 and the process is thus continuous, the speed of continuously moving endless chain 5 being coordinated with other elements to effect a continuous and smooth operation. The receptacles after loading are transported on the conveyor C to suitable known wrapping equipment. Conveyor C comprises a pair of endless elements such as chains 21 and 22 operable on a driven and a driving sprocket in known manner and to which opposite ends of longitudinally spaced transversely disposed pins 23 are secured respectively. The receptacles are formed with upwardly flaring side walls opposite ones which engage a pair of spaced pins 23. Since the receptacles are of semi-rigid construction they are yieldably supported on pins 23 for limited vertical up and down movement. Plate 24 is also yieldably mounted to enhance up and down movement of receptacles R if need be. Each receptacle R may contain one or more rows of articles as may be desired.

Of course it will be understood that for certain applications of the invention, trays might not be used and the articles could simply be transported on the conveyor to suitable wrapping equipment but without using receptacles or trays.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

I claim:

1. A machine for manipulating a vertical stack of articles into horizontal disposition said machine comprising support means having a generally horizontal article supporting portion and a downwardly projecting article manipulating portion, a flexible endless element arranged to move along a path a part of which is generally parallel to and adjacent said article manipulating portion of said support means, a feeder lug pivotally mounted on said endless element, a cam follower mounted on said feeder lug, a cam having a cam surface adjacent said endless element and generally parallel to the article manipulating portion of said support means, said cam surface being engageable by said cam follower so as to hold said feeder lug approximately normal to said article manipulating portion of said support means for engaging and moving the articles therealong, said cam being configured to allow said feeder lug to swing about its pivotal mounting from its normal disposition relative to said manipulating portion of said support means to a position approximately tangent thereto and means yieldably mounting said cam so as to accomodate predetermined swinging movement of said lug about its pivotal mounting which is in a direction generally opposite to article feeding movement thereof.

2. A machine according to claim 1 wherein said feeder lug is disposed in a substantially horizontal position when swinging movement of said feeder lug about its pivotal mounting is initiated.

3. A machine according to claim 1 wherein swinging movement of said feeder lug about its pivotal mounting causes the part of said lug which engages and moves the articles to move in a direction generally opposite to the general direction of movement of the adjacent part of said endless element.

4. A machine according to claim 1 wherein the initially engaged part of said cam surface closely parallels said downwardly projecting portion of said article manipulating portion of said support means and wherein the subsequently engaged part of said cam surface diverges therefrom in a direction toward the articles to impart article following swinging movement to said lug.

5. A machine according to claim 1 wherein said cam is biased toward engagement with a fixed stop which fixes the initially engaged part of said cam surface in approximately parallel relation to the initially engaged part of said article manipulating portion of said support means.

6. A machine according to claim 1 wherein a guide is disposed in spaced relation to said article manipulating portion of said support means and generally parallel thereto for defining a manipulative path of movement of the articles therebetween.

7. A machine according to claim 6 wherein said guide is yieldably mounted and biased toward engagement with the articles.

8. A machine according to claim 7 wherein the magnitude of bias imparted to said guide and the position of said guide relative to said article manipulating portion of said support means are adjustable.

9. A machine according to claim 8 wherein adjustment of the bias imparted to said guide and of the position thereof are effected by a common adjustment means.

10. A machine according to claim 1 wherein an outfeed conveyor is disposed below the article manipulating portion of said support means for transporting the row of articles away from said machine.

11. A machine according to claim 10 wherein a receptacle is disposed on said outfeed conveyor and immediately below said manipulating portion of said support means for receiving a row of articles.

12. A machine according to claim 11 wherein said outfeed conveyor comprises a pair of transversely spaced endless elements on which a plurality of transverse longitudinally spaced support rods are mounted and wherein said receptacle comprises yieldable outwardly tapered side walls opposite ones of which are engageable with adjacent support rods intermediate the upper and lower edges thereof so as to provide a resilient support for said receptacle.

13. A machine according to claim 1 wherein a cam having a cam surface is arranged with its cam surface adjacent and generally parallel to the horizontal article supporting portion of said support for cooperation with said cam follower.

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