United States Patent

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[54] **TRANSFER MECHANISM**
21 Claims, 10 Drawing Figs.

[52] **U.S. Cl.** **198/27,** 198/143
[51] **Int. Cl.** **B65g 47/08**
[50] **Field of Search** ..... 198/27, 21, 143; 99/(Inquired)

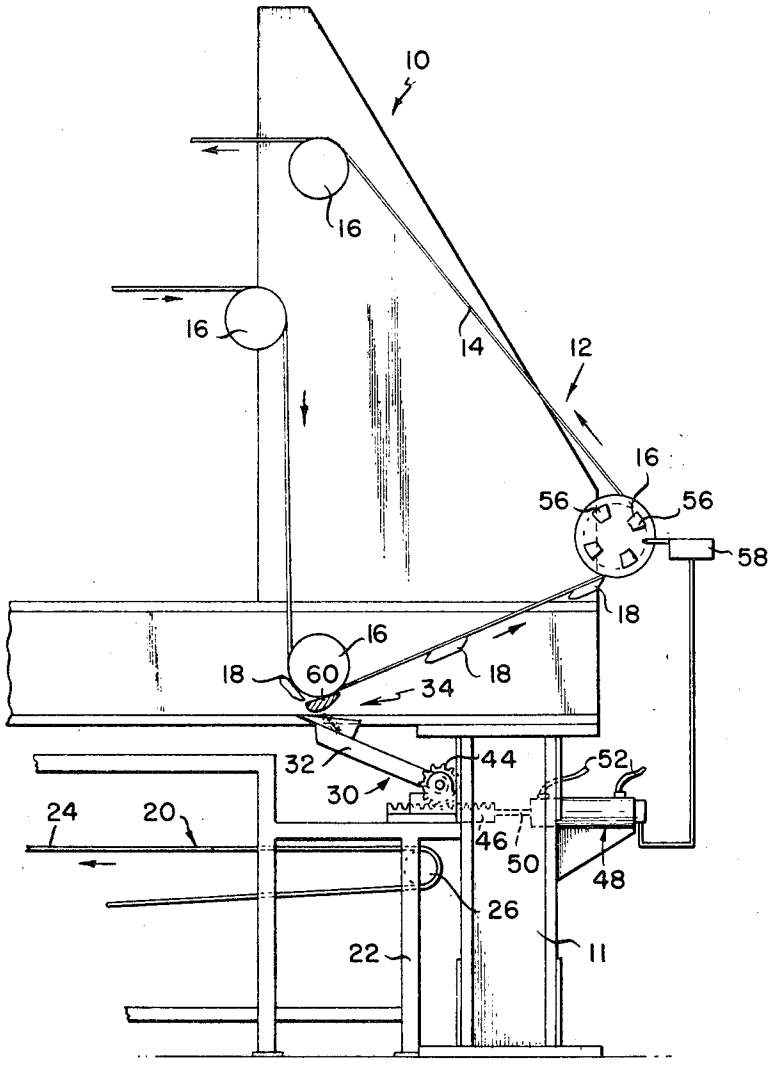
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ABSTRACT: A transfer mechanism wherein articles are transferred in a gentle manner from a first conveyor to a second conveyor located at a lower elevation with respect to the first conveyor. An article transfer means positioned between the conveyors receives a plurality of articles from an article holder means on the first conveyor and moves through an arcuate path to deposit them onto the second conveyor. Rack and pinion means are used to move the article transfer means in synchronism with the movement of the first conveyor. First camming means synchronize with the first conveyor control the actuation of the rack and pinion means and a second stationary camming means releases the articles from the article holder means to enable them to be received by the article transfer means.



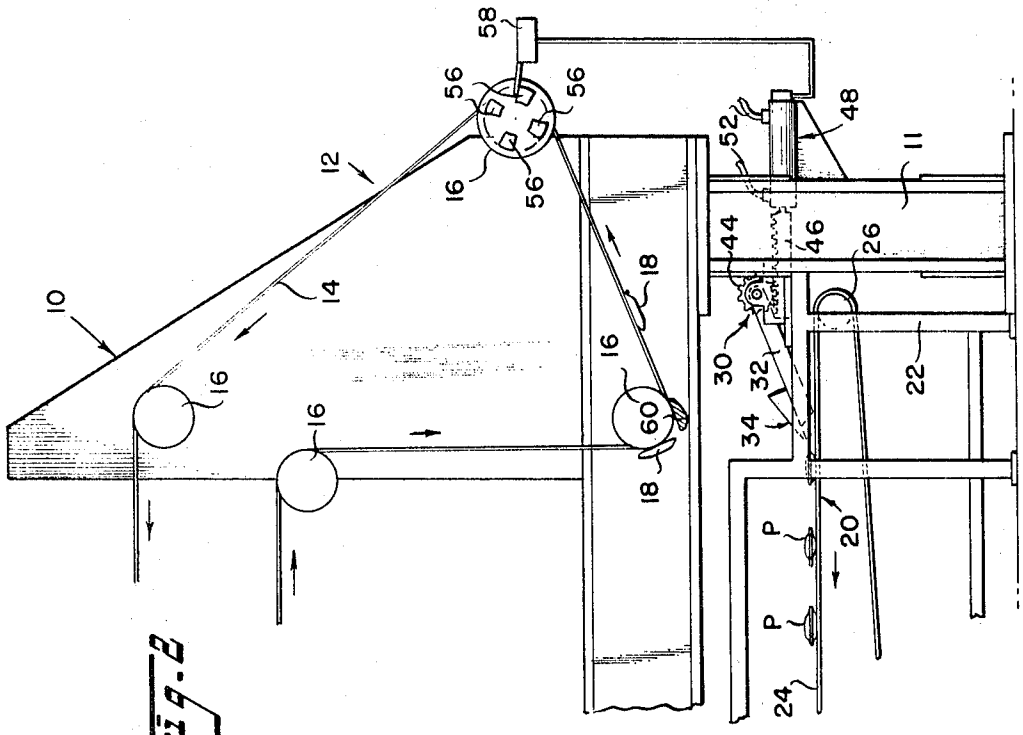


Fig. 2

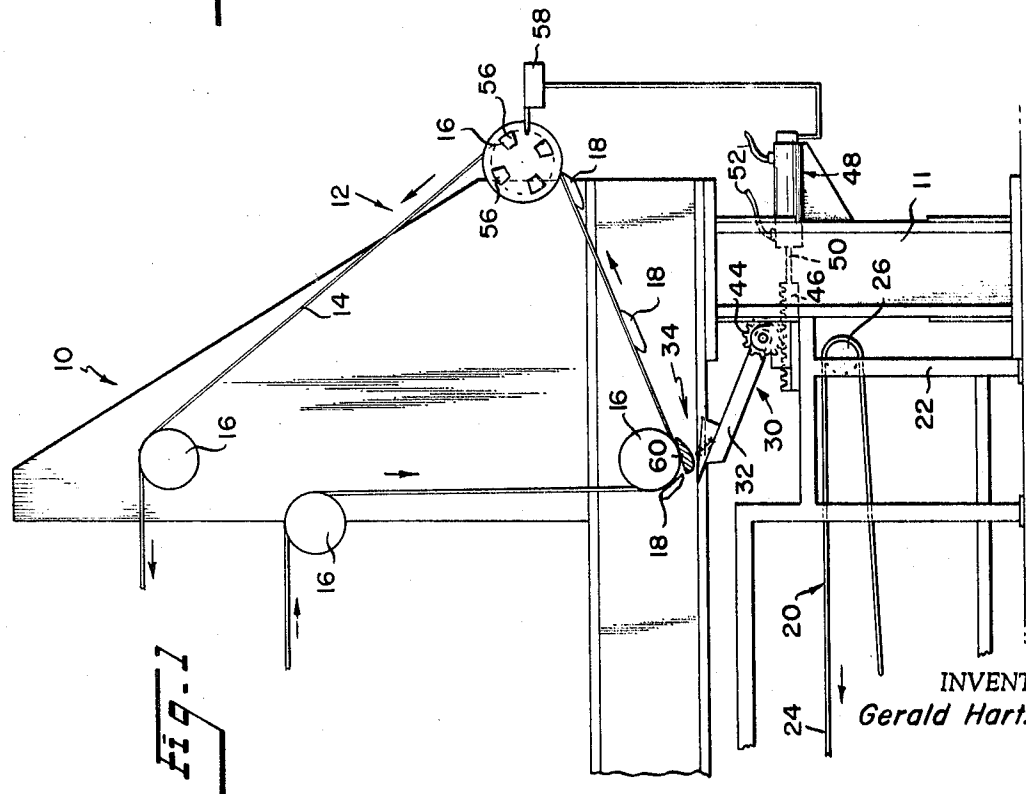


Fig. 1

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Fig. 3

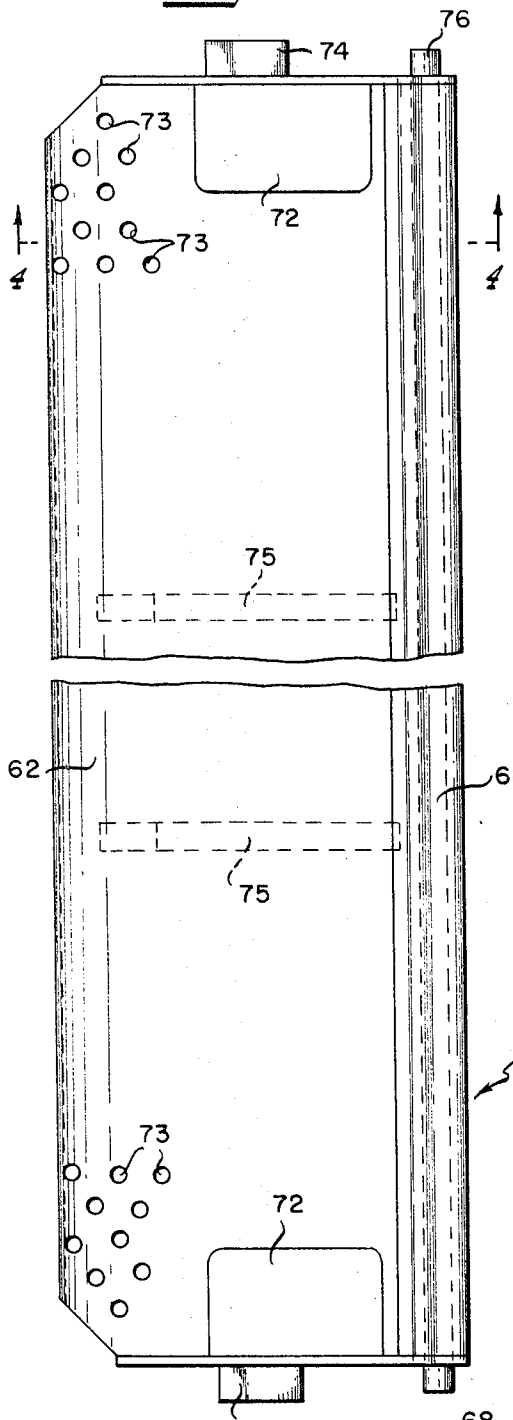


Fig. 5

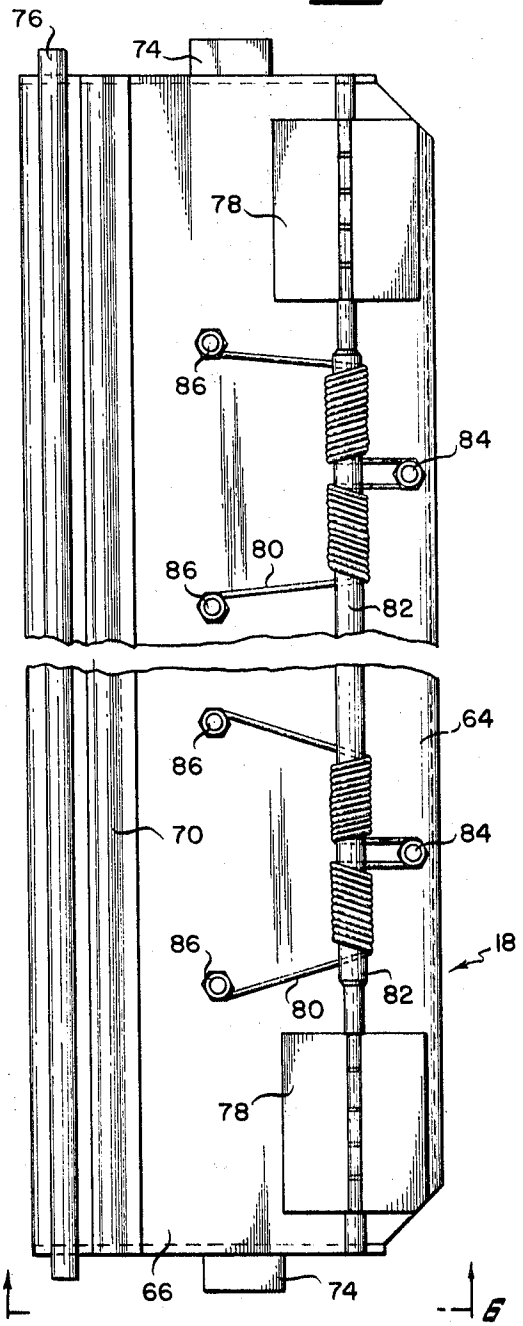


Fig. 6

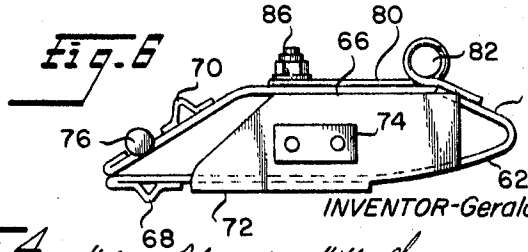
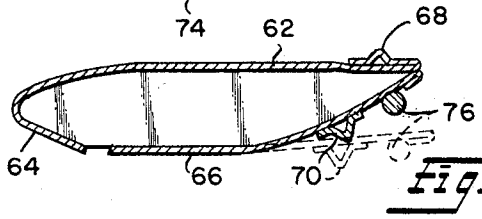


Fig. 4



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Fig. 7

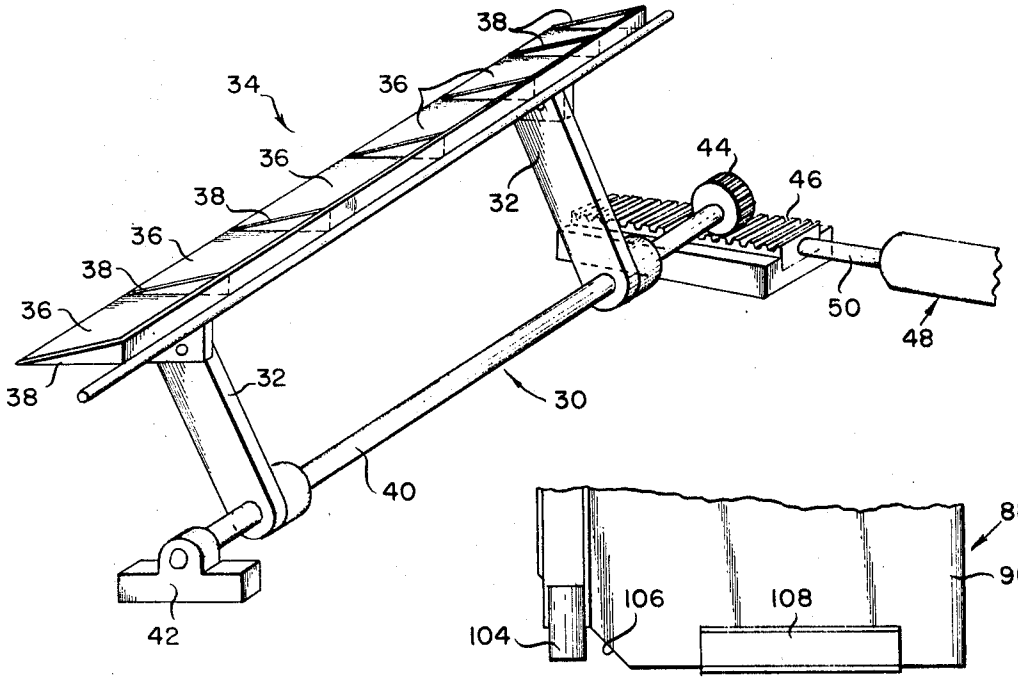


Fig. 8

Fig. 10

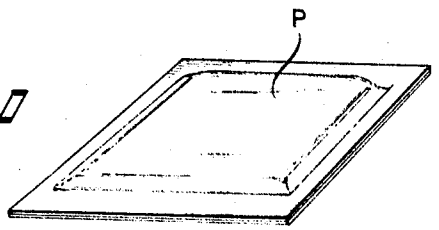
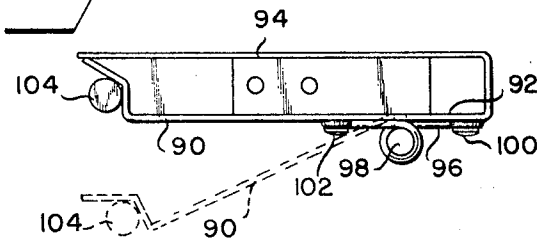


Fig. 9



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TRANSFER MECHANISM

This invention relates to an article transfer mechanism and, more particularly, to an article transfer mechanism wherein articles are transferred rapidly but gently from a first conveyor to a second conveyor with the latter located at a lower elevation with respect to the first conveyor.

It has heretofore been proposed to package food products in flexible pouch materials wherein the food products are cooked, sterilized and/or pasteurized in a retort. The package itself is constructed with a number of heat or heat and pressure-sealed areas which are subject to rupture and resultant leakage and spoilage of the product if the package is handled roughly.

A difficult transfer condition exists in transferring pouches from one conveyor to another, especially when one conveyor is located at a lower elevation than the other. Such a condition, for example, exists at the exit end of the aforementioned retort wherein pouches filled with food are to be transferred from a conveyor within the retort to another conveyor outside the retort to take the pouches into a drying apparatus. An attempt to release the packages by gravity onto the lower conveyor has resulted in extensive damage to the seals of the package and leakage and spoilage of the food products.

In accordance with the present invention, a transfer mechanism is interposed between the two conveyors in order to receive the pouches of the first conveyor and transfer them gently to the upper flight of the second conveyor so as not to destroy or damage any of the sealed areas of the pouches. The transfer mechanism is moved through an arcuate path by a cooperating rack and pinion means which is actuated in synchronism with the first conveyor.

In accordance with a preferred form of the present invention, the rack is attached to an air or hydraulic cylinder for reciprocation therewith. A first cam means synchronized with the first conveyor actuates a switch which in turn controls the actuation of the valve controlling the cylinder.

The pouches are contained within an article holder means which comprises a spring-loaded clamping member that carries its own cam follower means. The latter engages a fixed cam means in order to release the articles from the article holder so that they may be received by the transfer member. In the preferred form of the present invention the article holder carries a plurality of articles and the transfer member is designed to handle the aforesaid plurality of articles whereby the efficiency of food processing and article handling is considerably improved.

The inherent advantages and improvements of the present invention will become more readily apparent upon considering the following detailed description of the invention and by reference to the drawings in which:

FIG. 1 is a fragmentary, front elevational view illustrating a first position of the transfer mechanism of the present invention;

FIG. 2 is a fragmentary, front elevational view similar to FIG. 1 illustrating another position of the transfer mechanism of the present invention;

FIG. 3 is a fragmentary, top plan view of one article holder used in connection with the present invention;

FIG. 4 is a fragmentary, elevational view in vertical cross section taken along line 4–4 of FIG. 3;

FIG. 5 is a fragmentary bottom plan view of the article holder of FIG. 3;

FIG. 6 is an end elevational view of the article holder as viewed from line 6–6 of FIG. 5;

FIG. 7 is a fragmentary perspective view of the article transfer means of the present invention;

FIG. 8 is a fragmentary top plan view of a modified article holder;

FIG. 9 is an end elevational view of the article holder illustrated in FIG. 8; and

FIG. 10 is a perspective view of a typical article handled by the transfer mechanism of the present invention.

While the various features of this invention are hereinafter illustrated and described with respect to food products contained in pouches, it is to be understood that the various features of this invention can be utilized singly or in various combinations thereof with other products and with other packaging means. Therefore, this invention is not to be limited merely to the embodiments illustrated in the drawings because the drawings utilized herein merely illustrate one of a wide variety of uses of this invention.

Referring now to FIGS. 1 and 2 of the drawings, there are illustrated two different positions of the transfer mechanism of the present invention. In FIG. 1 the transfer mechanism is in article-receiving position and in FIG. 2 the article transfer means is illustrated in the article-dispensing position.

FIGS. 1 and 2 illustrate a portion of a retort, indicated generally at 10, supported by one of its end supporting members 11. A first conveyor, indicated generally at 12, has a pair of laterally spaced chains 14 only one of which is seen in this FIG. entrained over a series of sprockets or pulleys 16. The first conveyor 12 advances a plurality of article holders 18 which will be described in more detail hereinafter.

Positioned at a lower elevation than the first conveyor 12 is a second conveyor, indicated generally at 20, suitably mounted on a table support 22. Second conveyor 20 is shown to have its upper flight 24 entrained about a sprocket or pulley 26 at one end of conveyor 20. The upper flight 24 receives the articles to be transferred from the first conveyor 12 with the articles to be transported away in the direction of the arrow.

An article transfer means, indicated generally at 30, is interposed between the upper conveyor 12 and lower conveyor 20. Article transfer means 30 is seen best in FIG. 7 and comprises a pair of transfer arms 32 attached at their respective upper ends to an article-receiving means, indicated generally at 34. Article-receiving means 34 is shown to have a plurality of compartmentalized segments 36 formed with the aid of a series of dividers 38.

The respective lower ends of transfer arms 32 are mounted to a rotatable shaft 40 both ends of which are held within suitable bearing supports one of which is shown at 42. One end of shaft 40 carries a pinion gear 44 in mesh with a rack 46. An air cylinder indicated generally at 48, has a rod 50 which is attached to the rack 46 whereby upon actuation of the air cylinder 48 the rack 46 receives a reciprocatory motion in order to rotate pinion gear 44. The air cylinder is air-actuated and shown to have a pair of airhoses 52 connected thereto.

FIGS. 1 and 2 illustrate a first cam means 56 which rotates in synchronism with one of the sprockets or pulleys 16 of the first conveyor 12 and periodically makes and breaks contact with switching means 58 indicated to be a limit switch.

A second cam means is illustrated in FIGS. 1 and 2 at 60 and consists of a stationary cam which makes contact with cam follower means on the article holders 18 in a manner to b4 described hereinafter. Stationary cam 60 is fixedly secured adjacent the travel of article holders 18 which are advanced by the chain 14 of first conveyor 12.

Referring now to FIGS. 3 through 6, inclusive, there is illustrated details of the article holders 18. Thus each article holder 18 is provided with a top plate 62 which has a curved under mounting flange 64. A bottom plate is shown at 66 and is hingedly mounted to the curved under mounting flange 64. In order to provide suitable stiffening for the article holder 18 and to avoid sharp corners therefor, the top plate 62 is folded back in the manner illustrated at 68. Similarly, the bottom plate 66 is folded back and is provided with stiffener means at 70.

In order to secure the article holders 18 to the laterally spaced chains 14 of the first conveyor 12, mounting plates 72 and tapped plugs 74 are welded thereto on opposite sides of article holders 18. Attachment may be made from the tapped plug to the chains 14 of conveyor 12. The article holders 18 are preferably provided with a series of dividers indicated by dashed lines at 75. Each holder 18 has a plurality of holes 73 extending through its plates in order to ensure adequate circu-

lation of the heated atmosphere within the retort **10** to obtain the desired cooking, pasteurizing and/or sterilizing of the food products contained within the pouches.

A typical pouch P is illustrated in FIG. **10**. The article holder means **18** has a matching compartment for each of the compartmentalized segments **36** of the article-receiving means **34**. Thus in the illustrated embodiment, six pouches P are transferred at one time from the upper conveyor **12** to the lower conveyor **20** by the article transfer means **30**. Different numbers of articles may be transferred as desired.

Each article holder is provided with a plurality of hinges **78**, FIG. **5**. Each hinge member is biased into its closed position by a plurality of springs **80** which are wrapped around a rod **82**. Spring **80** is secured at **84** to the curved undermounting flange **64** and at **86** to the bottom plate **66**. Article holder **18** is further provided with a cam follower means **76** consisting of a rod which extends for the length of article holder **18**. As the article holder **18** approaches the region of the article transfer means **30**, the cam follower means **76** engages the stationary cam **60** which is positioned so as to open the article holder means **18** as indicated in the phantom position in FIG. **4**, so as to enable the pouches to be released from the compartmentalized segments **36** of the article holder **18** when the article transfer means **30** reaches the position illustrated in FIG. **2**. The article transfer means **30** is so positioned with respect to the conveyors **12** and **20** so that the pouches will slide from the article holder means **18** by gravity onto the upper flight **24** of conveyor **20**.

A modified article holder is illustrated at **88** in FIG. **8**. This modified article holder **88** is shown to consist of a bottom plate **90** which is hinged with respect to a bent under portion **92** of a top plate **94** with the aid of a spring at **96** (FIG. **9**) which encircles rod **98** and is secured at **100** to the bent under portion at **92** of top plate **94** and at **102** to the bottom plate **90**.

In this instance a stub cam follower **104** may be employed by virtue of having the bottom plate **90** cut away at **106** so that a cam similar to cam **60** may be positioned inwardly of the edge of the bottom plate **90** in order to open the article holder **88** as indicated in the phantom position in FIG. **9**. A bracket attachment **108** facilitates attachment of the article holder **88** to the conveyor in the same manner as the article holder **18** is attached in FIG. **1**.

In operation, the pouches containing the food product are cooked, pasteurized and/or sterilized in retort **10** and passed toward the article transfer means **30** as illustrated in FIG-. **1** and **2**. Cam follower means **76** contacts stationary cam **60** so as to open the article holder **18**, permitting a plurality of pouches containing processed food to slide onto the compartmentalized segments **36** of the article-receiving means **34** of the article transfer means **30** which is in the FIG. **1** position when the article holder **18** is opened. The first cam means **56** is in such a position at this instant to contact switching means **58** which actuates the solenoid **48** by application of compressed air through airhoses **52**, causing the plunger **50** to retract to the position shown in FIG. **2**. This results in oscillation of the transfer arms **32** whereby the articles slide out of the compartmentalized segments **36** onto the upper flight **24** of second conveyor **20**. As soon as the cam **56** passes the switching means **58**, the arm **32** is restored to its upright position in time for receipt of the next article holder **18** on the first conveyor **12**. The first cam means **56** is so positioned with respect to the engagement of the article holder **18** with the stationary cam **60** so as to be in proper time relationship thereto or synchronized therewith.

In accordance with the foregoing description, the pouches are transferred gently onto the upper flight of the lower conveyor so as to prevent damage to the pouches and especially to the sealed areas thereof which would result in leakage of a food product from the pouches and spoilage thereof.

While presently preferred embodiments of the invention have been illustrated and described, it will be recognized that the invention may be otherwise variously embodied and practiced within the scope of the claims which follow.

I claim:

1. A transfer mechanism comprising:
a. first conveyor means,
b. first article holder means advanced by said first conveyor means,
c. second conveyor means having an upper flight disposed at a lower elevation than said first conveyor means,
d. article transfer means adapted to receive articles from said article holder means and deposit them on said upper flight of said second conveyor means,
e. said article transfer means comprising:
1. cooperating rack and pinion means,
2. means for reciprocating said rack in synchronism with said first conveyor means,
3. and second article holder means mounted for oscillation by said rack and pinion means between said first and second conveyor means,
f. and means for releasing articles from said first article holder means whereby said articles may be received by gravity by said second article holder means.

2. A transfer mechanism as defined in claim **1** wherein said means for reciprocating said rack comprises solenoid means actuated in synchronism with said first conveyor means.

3. A transfer mechanism as defined in claim **1** wherein said article holder means holds a plurality of articles and said article transfer means receives said plurality of articles and deposits all of said articles on the upper flight of said second conveyor means.

4. A transfer mechanism as defined in claim **2** wherein said article transfer means comprises an oscillatable arm means mounted on a shaft rotated by reciprocation of said rack.

5. A transfer mechanism as defined in claim **2** wherein said means for reciprocating said rack comprises:
a. a first cam means synchronized with said first conveyor means,
b. and switching means actuated by said cam means,
c. said switching means providing driving power to reciprocate said rack.

6. A transfer mechanism as defined in claim **2** wherein said article holder means comprises:
a. a spring-loaded clamping member and cam follower means carried thereby,
b. and said first conveyor means have a second cam means engageable with said cam follower means in order to open said spring-loaded clamping member.

7. A transfer mechanism as defined in claim **6** wherein said second cam means is a stationary cam member engaged by said article holder means.

8. A transfer mechanism as defined in claim **2** wherein said article holder means comprises a plurality of articles in said article transfer means which receives said plurality of articles and deposits all of said articles on the upper flight of said second conveyor means.

9. A transfer mechanism as defined in claim **1** wherein said means for reciprocating said rack comprises:
a. a first cam means synchronized with said first conveyor means,
b. and switching means actuated by said first cam means,
c. said switching means providing driving power to reciprocate said rack.

10. A transfer mechanism as defined in claim **1** wherein said first article holder means comprises:
a. a spring-loaded clamping member and cam follower means carried thereby,
b. and said first conveyor means having second cam means engageable with said cam follower means in order to open said spring-loaded clamping member.

11. A transfer mechanism as defined in claim **10** wherein said second cam means is a stationary cam member engaged by said article holder means.

12. A transfer mechanism as defined in claim **1** wherein said article holder means carries a plurality of articles and said article transfer means receives said plurality of articles and deposits all of said articles on the upper flight of said second conveyor means.

13. A transfer mechanism comprising;

a. first conveyor means,
b. article holder means advanced by said first conveyor means,
c. second conveyor means having an upper flight disposed at a lower elevation than said first conveyor means,
d. article transfer means adapted to receive articles from said article holder means and deposit them on said upper flight of said second conveyor means,
e. said article transfer means comprising:
1. cooperating rack and pinion means,
and means for reciprocating said rack in synchronism with said first conveyor means,
f. said means for reciprocating said rack comprises:
1. a first cam means synchronized with said first conveyor means,
2. and switching means actuated by said first cam means,
3. said switching means providing driving power to reciprocate said rack.

14. A transfer mechanism as defined in claim **13** wherein said article holder means comprises:
a. a spring-loaded clamping member and cam follower means carried thereby,
b. and said first conveyor means having second cam means engageable with said cam follower means in order to open said spring-loaded clamping member.

15. A transfer mechanism as defined in claim **14** wherein said second cam means is a stationary cam member engaged by said article holder means.

16. A transfer mechanism as defined in claim **13** wherein said article holder means comprises a plurality of articles and said article transfer means receives said plurality of articles and deposits all of said articles on the upper flight of said second conveyor means.

17. A transfer mechanism comprising:
a. first conveyor means,
b. article holder means advanced by said first conveyor means,
c. second conveyor means having an upper flight disposed at a lower elevation than said first conveyor means,
d. article transfer means adapted to receive articles from said article holder means and deposit them on said upper flight of said second conveyor means,
e. said article transfer means comprising:
1. cooperating rack and pinion means,
2. and means for reciprocating said rack in synchronism with said first conveyor means,
f. said article holder means comprising:
1. a spring loaded clamping member and cam follower means carried thereby,
2. and said first conveyor means having a second cam means engageable with said second cam follower means in order to open said spring-loaded clamping member.

18. A transfer mechanism as defined in claim **17** wherein said second cam means is a stationary cam member engaged by said article holder means.

19. A transfer mechanism as defined in claim **17** wherein said article holder means carries a plurality of articles and said article transfer means receives said plurality of articles and deposits all of said articles on the upper flight of said second conveyor means.

20. A transfer mechanism as defined in claim **17** wherein said second cam means is a stationary cam member engaged by said article holder means.

21. A transfer mechanism as defined in claim **20** wherein said article holder means carries a plurality of articles and said article transfer means receives said plurality of articles and deposits all of said articles on the upper flight of said second conveyor means.