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CYLINDRICAL FOOD CONSISTING OF PLURALITY OF CONCENTRIC
CYLINDRICAL LAYERS OF FOOD MATERIAL AND METHOD AND
APPARATUS FOR MAKING THE SAME

BACKGROUND OF THE INVENTION

5 This invention relates to a cylindrical food consisting of a plurality of concentric cylindrical layers of food material and a method and apparatus for making the same.

 In Japan, a hollow cylindrical food made from fish
10 paste material called "Chikuwa" is well known, and is made by first shaping a fish paste material into a cylinder around a bar, then broiling the cylindrical material and thereafter removing the broiled material from the bar.

Japanese Laid-Open Patent Application

15 No. Hei 7-23747 discloses a new type of "Chikuwa" containing a cylindrical cheese embedded in a cylindrical fish paste material. The new type of "Chikuwa" is, as shown in Fig. 1, produced by putting a rectangular
20 cheese paste sheet C on a rectangular fish paste sheet F (Fig. 1(b)), then, winding those sheets around a cylindrical bar B (Fig. 1(c)), then broiling the cylindrical material consisting of the sheets and, thereafter, removing it from the bar (Fig. 1(d)). However, the cheese sheet C in the hollow cylindrical food produced through such steps
25 rarely has the form of a true cylinder. In other words, it is difficult to make opposite end edges of the wound cheese sheet abut against each other.

REPLACED SHEETS		SG
☐	Description : paged	to paged
☐	Claim(s) : paged	to paged
☒	Drawing(s) : paged <u>111</u>	to paged <u>111</u>
☒	Abstract : paged <u>22</u>	to paged <u>22</u>
DATE OF RECEIPT		

SUMMARY OF THE INVENTION

Further, according to the above-noted Japanese Patent Application, winding of fish paste and cheese paste sheets are effected manually which is inefficient.

5 Accordingly, it is an object of this invention to provide a hollow cylindrical food consisting of a plurality of food paste sheets which are concentric with each other and opposite end edges of which abut against each other.

 Another object of this invention is to provide
10 an apparatus and method of producing such a hollow cylindrical food.

 According to one aspect of this invention, there is provided a new method of producing a cylindrical food consisting of a plurality of concentric cylindrical layers
15 of food material. The method includes the steps of conveying at least one set of a plurality of rectangular paste food sheets which are spaced from each other in the conveying direction at predetermined distances along a predetermined path in such a manner that the leading
20 edge and the tailing edge of each rectangular paste food sheet are substantially normal to the conveying direction or extend widthwise relative to the path, and, providing a bar in such a manner that the bar extends transversely of, in parallel with and adjacent to the path and is
25 rotatable about its axis and movable vertically relative to the path, whereby the rectangular paste food sheets of the set conveyed to the position where the bar is provided are engaged with and wound up around the bar in sequence.

The method is characterized in that the lengths of the rectangular food sheets of the above-noted set are increased successively from the leading or first sheet in the conveying direction so that each of the sheets wound up to be cylindrical has leading and tailing edges thereof engaged with each other and, the rectangular sheets of the above-noted set are spaced from each other so that winding of one of the sheets commences after the preceding sheet has been completely wound up.

10 In a preferred embodiment, at least one of the rectangular sheets of the above-noted set has an inclined tailing end surface extending rearward from the tailing edge of a surface of the rectangular sheet which will become a radially inside surface of the wound material to the tailing edge of a surface of the rectangular sheet which will become a radially outside surface of the wound sheet. The rectangular food sheets which will be made radially outermost and innermost when the sheets of the set are wound up are wider than the remaining sheets so that when they are wound up, the outermost and innermost sheets are engaged with each other along their opposite edges, whereby the remaining materials can not be seen from the outside. It is preferred that vertical end face shaping surfaces are provided at opposite sides of the path downstream of the position where the bar is set as stated above. The bar on which all the rectangular paste sheets of the above-noted set have been wound up to form a cylindrical food is conveyed downstream with the bar

rotated about its axis passing between the end face shaping surfaces, whereby the opposite end faces of the cylindrical food on the bar are made substantially normal to the bar. Further, it is preferred that when the bar with the above-
5 stated cylindrical food is conveyed downward between the vertical end face shaping surfaces, the bar is rotated so that the cylindrical food rotates on the surface of the conveying path with the bar being kept at a predetermined level above the surface of the conveying path in such
10 a manner that the distance between the axis of the bar and the surface is generally the same as the radius of the cylindrical food on the bar, whereby the food on the bar is applied with a slight pressure from the surface so that the shape of the food is rectified into a true cylinder
15 and all the wound paste sheets constituting the cylindrical food firmly attach to each other.

According to another aspect of this invention, there is provided an apparatus for producing a cylindrical food consisting of a plurality of concentric cylindrical layers
20 of food material. The apparatus includes means for shaping paste food materials into a plurality of rectangular sheets, means for conveying at least one set of a plurality of the rectangular sheets which are spaced from each other in the conveying direction at predetermined distances along
25 a predetermined path in such a manner that the leading edge and the tailing edge of each of the rectangular sheets are normal to the conveying direction or extend widthwise relative to the path, and, means for supporting a bar in

such a manner that the bar extends transversely to, in parallel with and adjacent to said path and is rotatable about its axis and movable vertically relative to the path, whereby the rectangular sheets of the set conveyed
5 to the position where the bar is provided are engaged with and wound up around the bar in sequence. The apparatus is characterized in that the shaping means forms the rectangular sheets such that the longitudinal lengths of the rectangular sheets of the above-noted set are
10 increased successively from the leading or first sheet in the conveying direction so that the leading and tailing edges of each of the sheets wound up are engaged with each other and, the conveying means conveys the rectangular sheets of the above-noted set in such a manner that the
15 sheets are spaced from each other so that winding of one of the rectangular sheets is started after the preceding rectangular sheet has been completely wound up.

The shaping means includes at least one mold adapted to receive a food material therein to shape the
20 material into a rectangular sheet. The mold including a rectangular recess defined by a rectangular surrounding wall, a rectangular bottom wall and a rectangular opening opposite to the bottom wall. The bottom wall is generally flat but inclined at the tailing end portion thereof in the
25 conveying direction such that the end portion approaches the opening as it approaches the tailing edges of the bottom wall. It is preferred that the apparatus further includes vertical end face shaping surfaces at opposite

sides of the path downstream of the position where the bar is set as stated above. The bar is conveyed downstream from the position with the bar rotated about its axis when all the food sheets of the above-stated set have been
5 wound up to form the cylindrical food passing between the end face shaping surfaces, whereby the opposite end faces of the cylindrical food on the bar are made substantially normal to the bar. Further, it is preferred that the apparatus includes means for keeping the bars conveyed
10 between the end face shaping surfaces at a predetermined level above the surface of the path in such a manner that the distance between the path surface and the axis of the bar is generally equal to the radius of the cylindrical food on the bar, whereby the food is applied with a slight
15 pressure from the path surface so that the shape of the food is rectified into a true cylinder and all the wound paste sheets constituting the cylindrical food firmly attached to each other.

According to the other aspect of this invention,
20 there is provided a hollow cylindrical food which is produced by winding a plurality of rectangular food paste sheets around a bar concentrically with each other and then removing the bar. The food is characterized in that the leading and tailing edges of each rectangular sheet in the
25 conveying direction are engaged with each other under the wound condition. In a preferred embodiment, at least one of the wound sheets or a radially outermost wound sheet has an inclined end surface extending rearward from the tailing

edge of the radially inside surface thereof to the tailing edge of the radially outside surface of the same. Further, the radially outermost and innermost wound sheets are wider than the remaining sheets so that the outermost and innermost sheets are engaged with each other along their opposite edges, whereby the remaining materials can not be seen from the outside.

These and other objects of this invention will become clear from the following detailed description of preferred embodiments when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figs. 1(a) - 1(d) are explanatory views showing how a hollow cylindrical food is produced in accordance with a prior art;

Fig. 2 is a perspective view of a main portion of an apparatus for producing a hollow cylindrical food in accordance with this invention;

Fig. 3 is a perspective view of a paste shaping means used in connection with the apparatus of Fig. 2;

Figs. 4(a) - 6(c) are views showing how a hollow cylindrical food is produced by the apparatus of Fig. 2;

Fig. 7 is a perspective view of an apparatus for producing a hollowing cylindrical food in accordance with another embodiment of this invention;

Fig. 8 is a perspective view of a hollow cylindrical food produced by the apparatus of Fig. 7;

Fig. 9 is a perspective view of a paste shaping means in accordance with the second embodiment of this invention;

Fig. 10 is a perspective view of a paste shaping
5 means in accordance with the fourth embodiment of this invention;

Fig. 11 is a cross-sectional view of the paste shaping means of Fig. 10;

Figs. 12(a) - 12(c) are views showing how a second
10 paste sheet formed by the paste shaping means of Fig. 11 is wound up;

Fig. 13 is a perspective view of a paste shaping means in accordance with the fourth embodiment of this invention;

15 Fig. 14 is a side-elevation view of a shape rectification means used in connection with the apparatuses for producing a cylindrical food in accordance with this invention;

Fig. 15 is a plan view of the shape rectification
20 means of Fig. 14;

Fig. 16 is a cross-sectional view of an upper portion of a shape rectification drum of the shape rectification means shown in Fig. 14;

Fig. 17 is a perspective view of the shape
25 rectification means of Fig. 14 as viewed from the upstream side thereof in the flow of material to be processed; and

Fig. 18 is a perspective view of the shape rectification means as viewed from the downstream side thereof.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to Figs. 2-4, there is shown an apparatus in accordance with a first embodiment of this invention for producing a cylindrical food or "Chikuwa" of the new type as mentioned above which consists of three concentric cylindrical layers, i.e., innermost and outermost layers of fish paste, and a cheese paste layer embedded between the outermost and innermost fish paste layers.

10 The apparatus includes paste shaping means 10 (Fig. 3) for shaping food paste into a plurality of sheets, conveyor means or an endless conveyor 12 (Fig. 2) for conveying sets S of a predetermined number of rectangular food paste sheets or three paste sheets in this embodiment in such a manner that the leading edge and the trailing edges of each of the rectangular sheets are substantially normal to the conveying direction or extend widthwise relative to the conveyor, and, bar supporting means for supporting a bar 16 above the conveyor belt surface in such a manner that the bar extends transversely of, in parallel with and adjacent to said path and is rotatable about its axis and movable vertically relative to said conveyor, whereby the rectangular paste sheets of the set conveyed to the bar are engaged with and wound up around the bar in sequence.

25

 The shaping means shown in Fig. 3 includes first and second rectangular frame 20, 21 each of which is supported at its opposite sides by a pair of parallel links 22 and 22

which are of equal length and opposite ends of which are pivotably connected to the sides of the first and second rectangular frames 20, 21 and side members 23 of the conveyor extending along opposite sides of the conveyor

5 to form a parallel link mechanism, whereby the first and second rectangular frames can be move up and down keeping them in parallel with the conveyor belt surface so that, at a lower position where they substantially contact with the surface of the conveyor, an operator can, in this

10 embodiment, fill fish paste into their rectangular openings 24, 25 while stopping the movement of the conveyor and, then, lift the frames resuming the movement of the conveyor thereby conveying rectangular fish paste sheets F1 and F2 which have been formed by the first and second rectangular

15 frames 20 and 21 and left on the conveyor. As shown, the opening 24 of the first frame is shorter than the opening 25 of the second frame in the conveying direction. The first and second frames 20 and 21 are separated from each other so that a rectangular cheese paste sheet C is put on

20 the conveyor appropriately between the first and second fish paste sheets F1 and F2. The cheese paste sheet C is supplied by other paste shaping means (not shown) which, for instance, includes a hopper with a flat nozzle for containing cheese paste and delivering an elongated cheese

25 sheet the width of which is smaller than that of the first and second fish paste sheets F1 and F2, cutter means for cutting the elongated cheese sheet into a plurality of the above stated cheese sheets C, and means for conveying the

cheese sheets and intermittently supplying them onto the conveyor in such a manner that each of them is positioned between the first and second fish paste sheets as stated above. Regarding the details of the lengths of the first
5 and second fish paste sheets and the distances between the first and second fish paste sheets and the cheese paste sheet will be explained later.

The bar supporting means includes a pair of support plates 28 provided at the opposite sides of the conveyor
10 which include elongated vertical grooves 30 which are aligned with each other in the widthwise direction of the conveyor. As shown, the grooves are adapted to receive the opposite ends of the bar 16 in such a manner that the bar is supported by the bottom walls of the grooves above the
15 conveyor belt surface with the height of a space between the bar and the conveyor belt surface is less than the thickness of the first fish paste sheet F1 but can move vertically up. The bar 16 is designed to have a certain amount of weight which enables the bar to impose pressure
20 on the first fish paste sheet F1 thereby facilitating winding up of the sheet F1 therearound.

In Fig. 2, reference numeral 32 designates a piano wire which substantially contacts the upper surface of the conveyor belt and extends normal to and under the bar so as
25 to scrape the paste sheets from the belt surface thereby facilitating winding up of the sheets around the bar.

Figs. 4-6 show how the paste sheets are wound up around the bar. When the first fish paste sheet F1 has

been conveyed to the bar support means, the upper surface of the sheet F1 is engaged by the bar 16 and the lower surface of the sheet is simultaneously engaged with the piano wire 32. Thus, the piano wire scrapes the sheet
5 from the upper surface of the conveyor 12 and the bar simultaneously starts winding of the sheet thereabout with the bar rotated about its axis by the sheet. After the first fish paste sheet F1 has been wound up around the bar, the following cheese sheet C arrives at the bar and then
10 engages the first fish paste F1 wound around the bar and the piano wire, whereby the sheet is wound up around the first fish paste likewise. As shown in Fig. 6, the second fish paste sheet is also wound up in the same manner.

Fig. 6(c) shows a hollow cylindrical food of
15 "Chikuwa" formed by removing the bar from the cylindrical sheets wound as stated above. As shown, the first and second fish paste sheets and the cheese sheet are concentric and their opposite end edges abut against each other.

20 According to this invention, the lengths of the first fish paste sheet F1, the cheese paste sheet C and the second fish paste sheet F2 are designed to increase successively in that order so that the leading edge and the tailing edge of each of the sheets abut against each other
25 when they are wound as stated above. Further, those sheets are put on the conveyor in that order at predetermined distances so that winding operations of the cheese paste sheet C and the second fish paste sheet F2 are started

after their preceding sheets have been completely wound up.

Figs. 7 and 8 shows another embodiment in which the cheese sheets are divided into three pieces C1, C2 and C3 which are spaced from each other at an equal distance in
5 the widthwise direction of the conveyor.

Fig. 9 shows another embodiment in which first and second fish paste sheets F1 and F2 are formed by a drum including first and second molding recesses 33, 34. Each of the molding recesses is defined by a rectangular
10 surrounding wall 36, a rectangular bottom wall 38 and a rectangular opening opposite to the bottom wall. The bottom wall is adapted to be moved radially outwardly from the position shown in Fig. 9. The molding recesses are adapted to receive fish paste from fish paste supply means
15 (not shown) to shape the material into the first and second fish paste sheets F1 and F2, respectively. Such formed rectangular sheets can be pushed out from the recesses by moving the bottom wall radially outwardly.

Figs. 10 and 11 show a third embodiment of the
20 fish paste shaping means including a drum similar to that of the second embodiment. The construction of the molding recesses are generally the same as that of the second embodiment. The first recess 40 for forming the first fish paste sheet is the same as that of the above-stated second
25 embodiment. However, the second molding recess 42 is different from that of the second embodiment. As shown, the second fish paste sheet F2 has an inclined tailing edge surface S which extends from the tailing edge of an upper

surface of the sheet which will become a radially inside surface when the sheet is wound to the tailing edge of a lower surface of the sheet which will become a radially outside surface when it is wound. In order to form the inclined surface S, as best shown in Fig. 11, the surface of the bottom wall 38 is designed such that the tailing end portion thereof in the rotational direction of the drum as designated by an arrow in Fig. 11 approaches the opening of the recess 42 as it approaches the tailing edges of the bottom wall. As noted from Fig. 11, the bottom walls are associated with cam means 46 including stationary cams 48 and 50 provided at the center of the drum and followers 52 and 54 connected to the bottom walls and engaged with the cams 48 and 50, respectively, so that when the recesses are positioned under paste supply means or hopper 56, the bottom walls are moved to the radially innermost position and, when the recesses come to face the upper conveyor surface, the bottom walls are radially moved outwardly to push rectangular paste sheets F1 and F2 out of the recesses.

Fig. 12 shows how the second fish paste sheet F2 having the inclined tailing edge surface S is wound up. Since the second fish paste sheet is wound radially outermost relative to the other sheets, the difference in circular lengths between radially inner and outer surfaces of the second fish paste sheet F2 is larger than those of the other inner sheets F1 and C and thus the leading edge surface of the second fish paste sheet will be

inclined to a greater extent than those of the inner ones. The inclined tailing edge surface S compensates for such inclination of the leading edge surface as shown in Figs. 12(b) and 12(c).

5 Fig. 13 shows the fourth embodiment of the fish paste shaping means including a drum similar to that of the third embodiment. The differences in features as compared with the third embodiment are that the first fish paste sheet F1 has an inclined tailing edge surface S like the
10 second fish paste sheet F and that the first and second fish paste sheets are wider than the cheese sheet C. Further, the second fish paste sheet F includes a recess R which, when those sheets have been wound, receives the cheese sheet C therein. As in the embodiments explained
15 above, the first and second fish paste sheets are attached to each other along the opposite side edges, whereby the cheese sheet can not be seen from the outside. According to this embodiment, since the cheese sheet is received in the recess R of the second fish paste sheet, a cylindrical
20 food formed by winding those sheets has the same diameter at any axial position thereof.

 Figs. 14-18 show means for rectifying the whole shape of the food F formed as stated above on the bar 16 so as to make the shape of the food closer to a true cylinder
25 and to make the sheets firmly attached to each other.

 The rectifying means includes a means for taking out bars around which a set of the sheets F1, C and F2 have been wound up to form the food F from the bar support

means 28 and a rectifying drum means 61. The bar taking out means includes a pair of bell cranks 62 pivotably connected to the side frames of the conveyor. The short arms 64 of the bell cranks are engaged with rotating cams 5 66 pivotally provided on the side frames of the conveyor 12 so that the bell cranks 62 are moved in the clockwise direction for one rotation of the cams 66 to take out the bar 16 with the food F from the bar support plates 28. In the shown embodiment, the bar support plates 28 are 10 provided with bar guide rails 68 integrally formed with the support plates 28 and extending rearwardly therefrom to the rectifying drum means 61. The rectifying drum means includes a rotational shaft 70, a drum 72 fixedly provided on the rotational shaft 70 and adapted to be rotated in the 15 counterclockwise direction, a pair of sprockets 74 fixedly provided on the rotational shaft axially outside of the opposite ends of the drum 72, a pair of discs 76 fixedly provided on the rotational shaft axially outside of the sprockets, a pair of endless chains 78 engaged with the 20 sprockets 74 and lower smaller sprockets 80 one of which is driven by a motor (not shown), and endless belts 82 engaged with a drive roller 84 and idle rollers 86.

The chains are provided with a plurality of hooks 88 at a predetermined interval which are adapted to receive 25 the opposite ends of the bars 16 discharged from the bar support plates 28 and hold at the left ends of the bar guide rails 68. When the bars supported by the hooks 88 come to upper portion of the sprockets 74, the opposite

ends of the bars are engaged by the circular peripheral surfaces 76' of the discs 76. As shown in Fig. 16, the drum has a pair of flanges 90 at the opposite end of the drum. The axially inner surfaces of the flanges 90 are
5 substantially vertical to the axis of the drum and adapted to cooperate with the peripheral surface 72' of the drum to receive a portion of the cylindrical food F on the bar 16. The diameter of the flanges 90 is smaller than that of the discs 76 and thus the bars do not engage with the flanges
10 90. When the bars come to the generally uppermost portion of the sprockets 74, they are engaged by the endless belt 82. The endless belt 82 is driven in the direction shown by an arrow X, whereby the bars are rotated in the clockwise direction on the discs 76 so that the cylindrical
15 foods on the bars thus rotate on the peripheral surface 72' of the drum which is rotating in the counterclockwise direction, whereby the cylindrical foods F are rotated within the confined spaced defined by the peripheral surface 72' of the drum and the vertical axially inner
20 surfaces of the flanges 90 thereby being subject to shape rectification to be shaped into a true cylinder.

In Figs. 14, 15 and 18, reference numeral 94 designates brush means adapted to engage with the bars conveyed by the chain 78 just axially outside of the
25 foods F on the bars which have been subject to the shape rectifying operation so as to remove paste adhering there, because if such paste remains and is subject to broiling operation, it becomes difficult to remove the broiled

cylindrical food smoothly from the bar. Reference numeral 96 designates a bar guide rails for receiving the opposite ends of the bars with the shape-rectified foods discharged from the rectifying drum means to guide them to
5 a subsequent process such as broiling.



WHAT IS CLAIMED IS:

1. A method of producing a cylindrical food consisting of a plurality of concentric cylindrical layers of food material, said method including the following steps:

conveying at least one set of a plurality of rectangular food paste sheets which are spaced from each other in the conveying direction at predetermined distances along a predetermined path in such a manner that the leading edge and the tailing edge of each rectangular paste sheet are substantially normal to the conveying direction or extend widthwise relative to the path; and,

providing a bar in such a manner that the bar extends transversely of, in parallel with and adjacent to said path and is rotatable about its axis and movable vertically relative to said path, whereby said rectangular paste sheets of said set conveyed to the position where said bar is provided are engaged with and wound up around the bar in sequence;

said method being characterized in that:

the lengths of said rectangular paste sheets of said set are increased successively from the leading or first sheet in the conveying direction so that the leading and tailing edges of said sheets wound up to be cylindrical abut against each other; and,

said rectangular sheets of said set are spaced from each other so that winding of one of said sheets is started after the preceding sheet has been completely wound up.



2. A method as set forth in Claim 1 wherein at least one of said rectangular paste sheets of said set has an inclined tailing end surface extending rearwardly from the tailing edge of a surface of the sheet which will become a radially inside surface of the wound sheet to the tailing edge of a surface of the sheet which will become a radially outside surface of the wound sheet.

3. A method as set forth in Claim 1 or 2 further including the steps of: providing vertical end face shaping surfaces at opposite sides of said path downstream of the position where said bar is set as stated above, conveying said bar downstream from said position with the bar rotated about its axis when all the paste sheets of said set have been wound up to form said cylindrical food passing between said end face shaping surfaces, whereby the opposite end faces of the cylindrical food on said bar are made substantially normal to the bar.

4. A method as set forth in Claim 3 in which when said bar with all the paste sheets of said set wound thereabout is conveyed downward between said vertical end face shaping surfaces, the bar is rotated so that the cylindrical food consisting of all the wound paste sheets rotates on the surface of said conveying path with the bar kept at a predetermined level above said surface in such a manner that the distance between the axis of the bar and said path surface is generally equal to the radius of the food on the bar so that the food is applied with a slight pressure from the path surface.



5. An apparatus for producing a cylindrical food consisting of a plurality of concentric cylindrical layers of food paste, said apparatus including:

means for shaping food paste into a plurality of rectangular sheets;

means for conveying at least one set of a plurality of said rectangular paste sheets which are spaced from each other in the conveying direction at predetermined distances along a predetermined path in such a manner that the leading edge and the tailing edge of each of said rectangular paste sheets are normal to the conveying direction or extend widthwise relative to the path; and,

means for supporting a bar in such a manner that the bar extends transversely of, in parallel with and adjacent to said path and is rotatable about its axis and movable vertically relative to said path, whereby said rectangular sheets of said set conveyed to the position where said bar is provided are engaged with and wound up around the bar in sequence;

said apparatus being characterized in that:

said shaping means forms said rectangular sheets such that the longitudinal lengths of said rectangular paste sheets of said set are increased successively from the leading or first material in the conveying direction so that the leading and tailing edges of the wound sheets abut against each other; and,

said conveying means conveys said rectangular sheets of said set in such a manner that the sheets are spaced



from each other so that winding of one of said rectangular sheets is started after the preceding rectangular sheet has been completely wound up.

6. An apparatus as set forth in Claim 5 wherein said shaping means includes at least one mold adapted to receive said food material therein to shape the material into a rectangular sheet, said mold including a rectangular surrounding wall, a rectangular bottom wall and a rectangular opening opposite to said bottom wall, said bottom wall being generally flat but inclined at the tailing end portion thereof in said conveying direction such that the end portion approaches said opening as it approaches the tailing edges of the bottom wall.

7. An apparatus as set forth in Claim 5 or 6 further including means for removing said bars around which all of said rectangular paste sheets of said sets have been wound up from said bar supporting means, end face shaping surfaces provided at opposite sides of said path downstream of said bar supporting means, means for conveying said bar removed from said bar supporting means downstream from said bar supporting means with the bar rotated about its axis passing between said end face shaping surface, whereby the opposite end faces of the cylindrical food consisting of said all of the wound paste sheets on said bar are made substantially normal to the bar.

8. An apparatus as set forth in Claim 7 further including means for keeping said bars conveyed between said end face shaping surfaces at a predetermined level



above the surface of said path in such a manner that the distance between the axis of the bar and said path surface is generally equal to the radius of the cylindrical food on the bar and means for rotating the bars so that the cylindrical foods on the bar rotate on said surface of said path.

9. A hollow cylindrical food formed by winding up a plurality of rectangular food paste sheets concentrically on a bar and then removed from the bar, said food being characterized in that:

the leading edge and the tailing edge of each of said wound rectangular food paste sheets in the winding direction abut against each other.

10. A hollow cylindrical food as set forth in Claim 9 characterized in that at least one of said rectangular food paste sheets has an inclined tailing end edge surface extending from the tailing edge of a surface of the rectangular sheet which has been made a radially inner surface under the wound condition to the tailing end edge of a surface of same which has been made a radially outer surface under the wound condition.

CYLINDRICAL FOOD CONSISTING OF PLURALITY OF CONCENTRIC
CYLINDRICAL LAYERS OF FOOD MATERIAL AND METHOD AND
APPARATUS FOR MAKING THE SAME

ABSTRACT OF THE DISCLOSURE

5 A hollow cylindrical food consisting of a plurality
of concentrically wound rectangular sheets is characterized
in that the leading and tailing edges of the wound sheets
abut against each other. Such a food is produced by
conveying at least one set of a plurality of the paste
10 sheets which are spaced from each other in the conveying
direction at predetermined distances along a predetermined
path in such a manner that the leading edge and the tailing
edge of each rectangular paste sheet are substantially
normal to the conveying direction, and, providing a bar
15 in such a manner that the bar extends transversely of, in
parallel with and adjacent to said path and is rotatable
about its axis and movable vertically relative to said
path. The rectangular paste sheets of the above-noted set
conveyed to the bar are engaged with and wound up around
20 the bar in sequence. The lengths of the rectangular
paste sheets of the set are increased successively from
the leading sheet in the conveying direction so that the
leading and tailing edges of the sheets wound up about
against each other. The rectangular sheets are spaced
25 from each other so that winding of one of the sheets is
started after the preceding sheet has been completely wound
up. The rectangular paste sheet has an inclined tailing
end surface to make the tailing end surfaces engage with
the leading end surface as a whole.

This Sheet Has Been Replaced





Fig.1 (a)

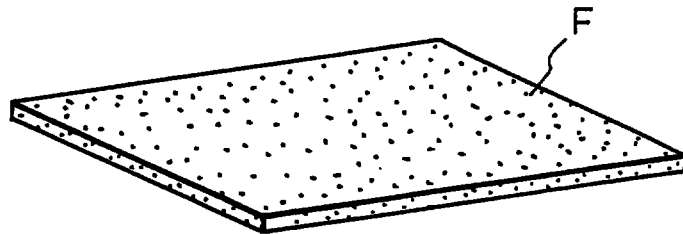


Fig.1 (b)

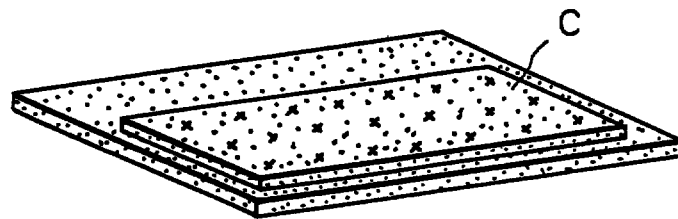


Fig.1 (c)

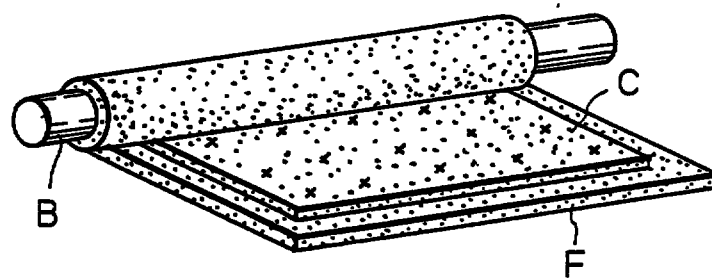


Fig.1 (d)

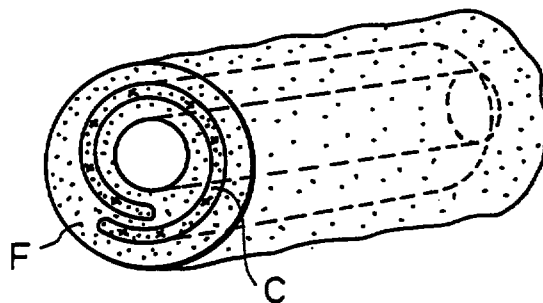




Fig. 2

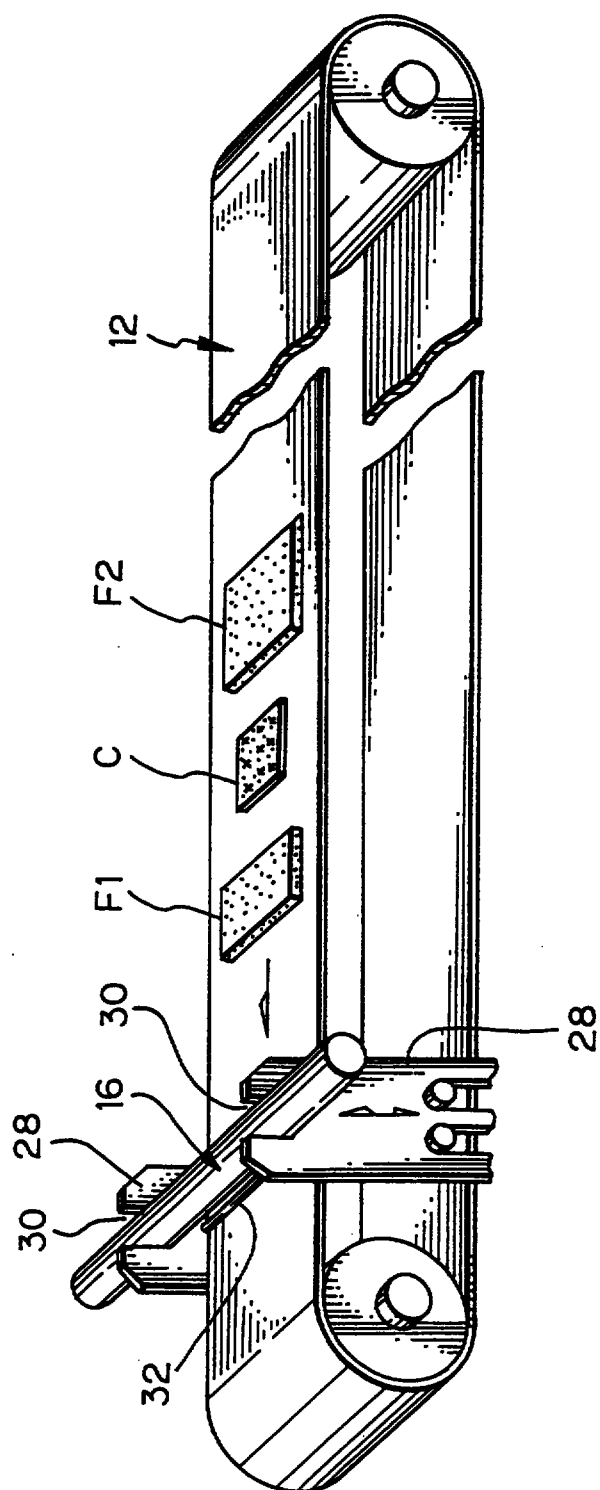




Fig. 3

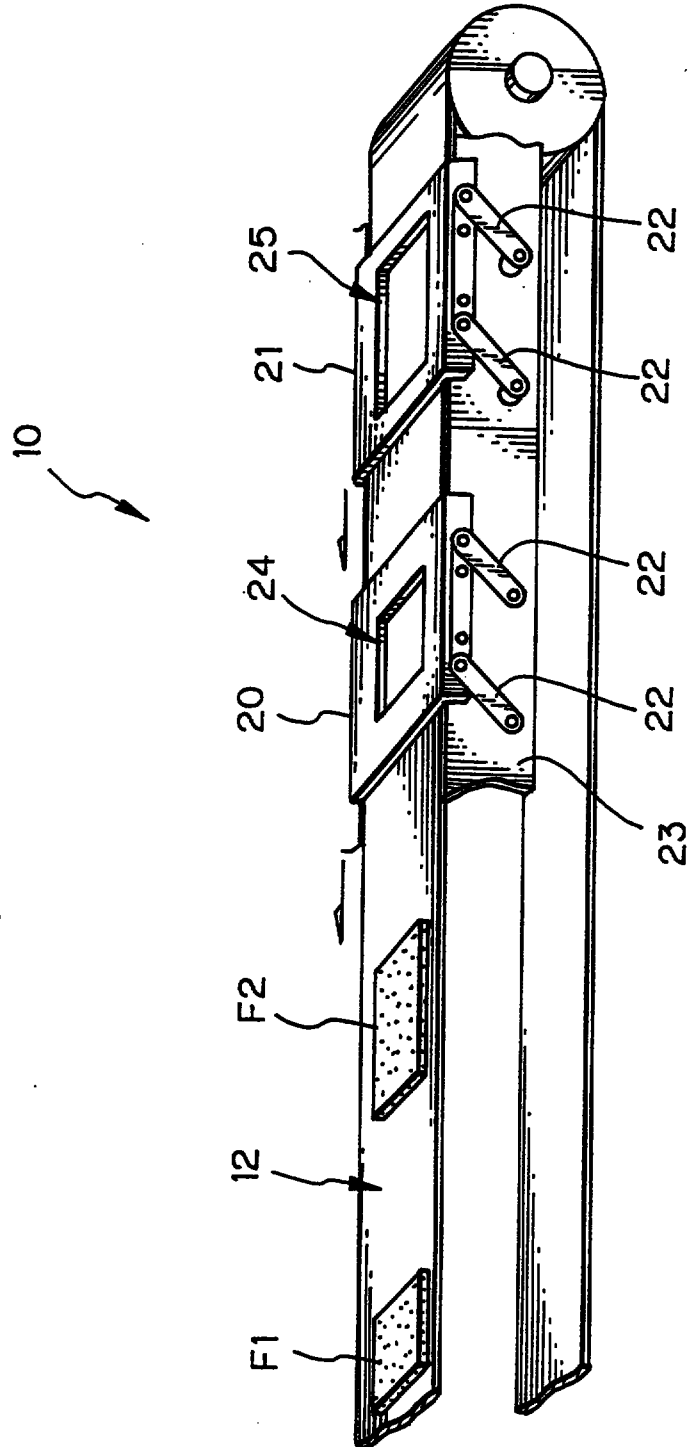




Fig4 (a)

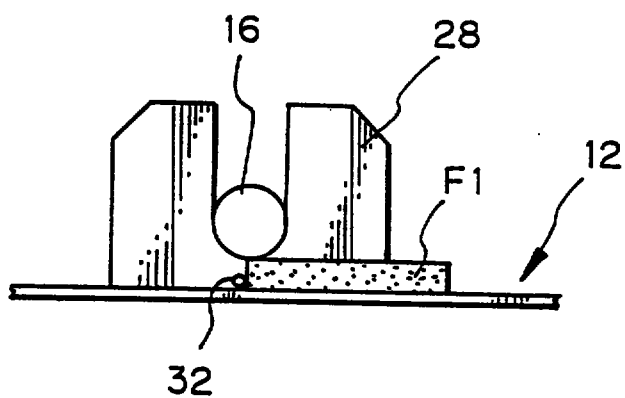


Fig.4 (b)

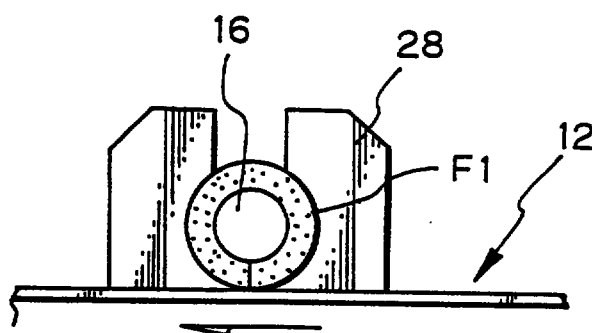




Fig.5(a)

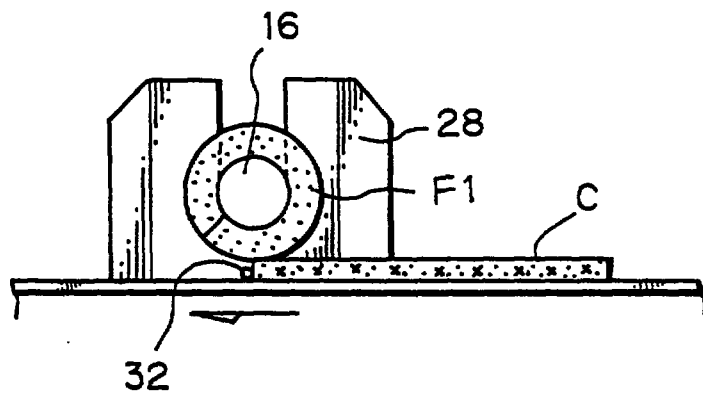


Fig.5(b)

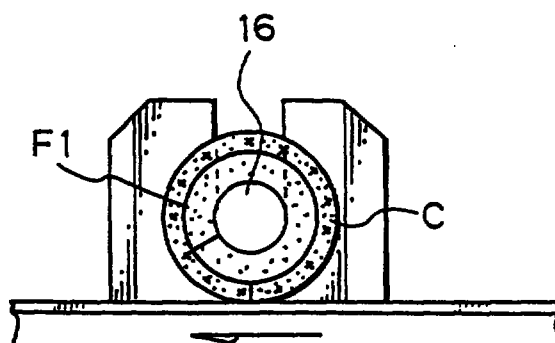




Fig.6(d)

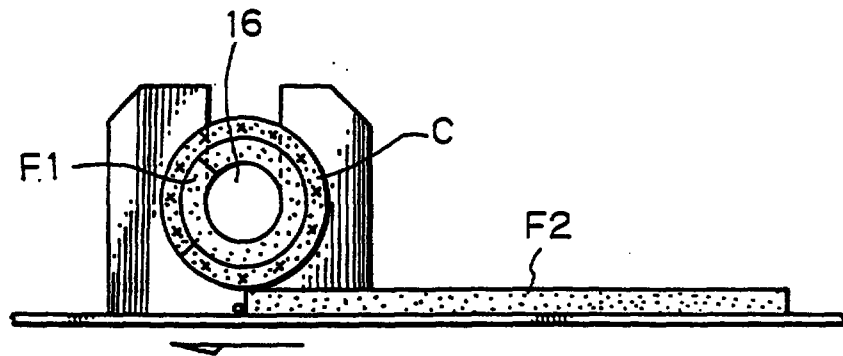


Fig.6(b)

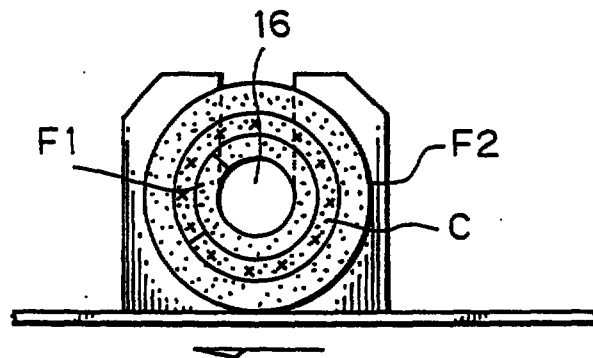


Fig.6(c)

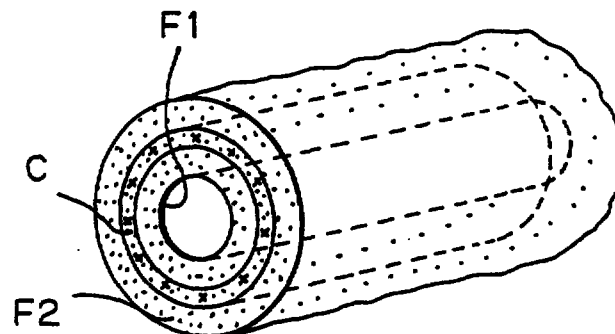
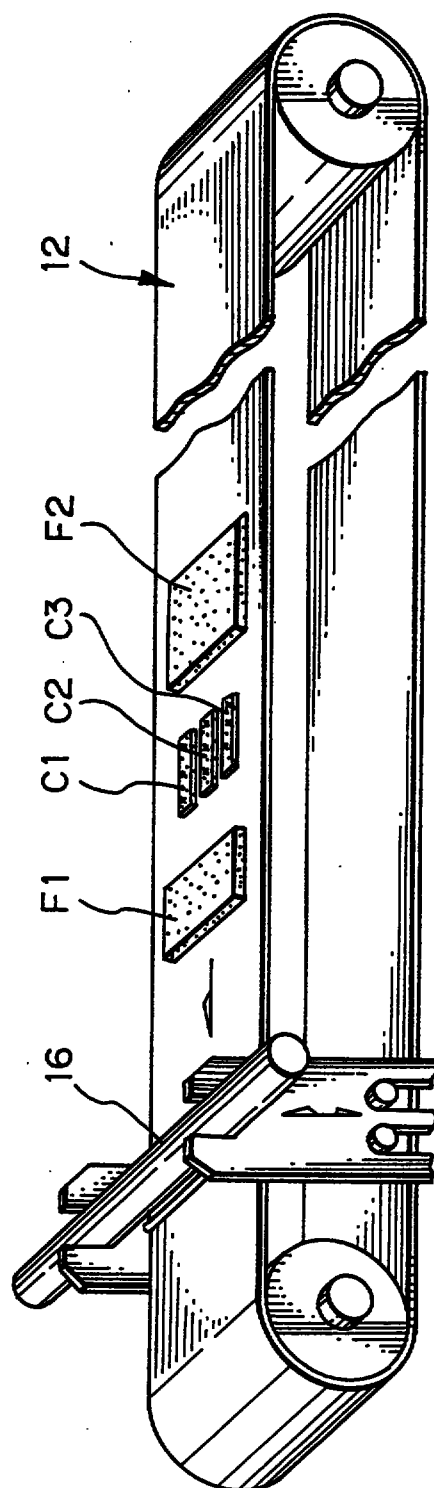




Fig. 7



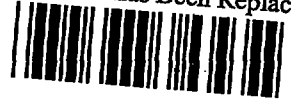


Fig. 8

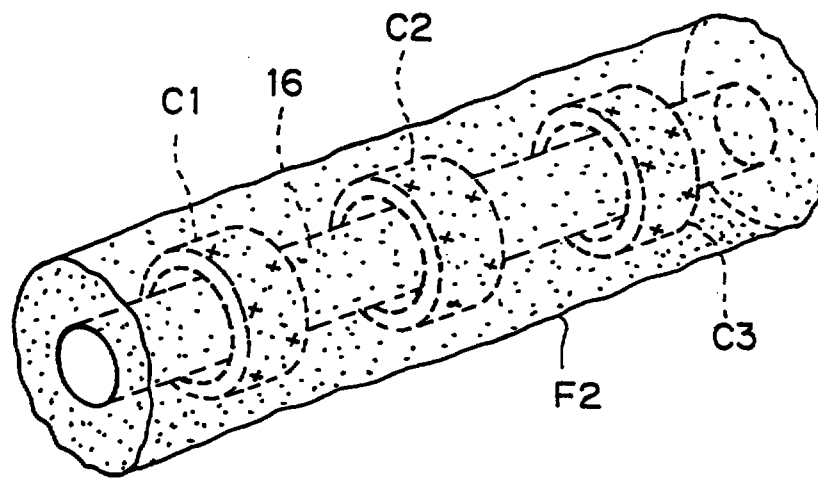
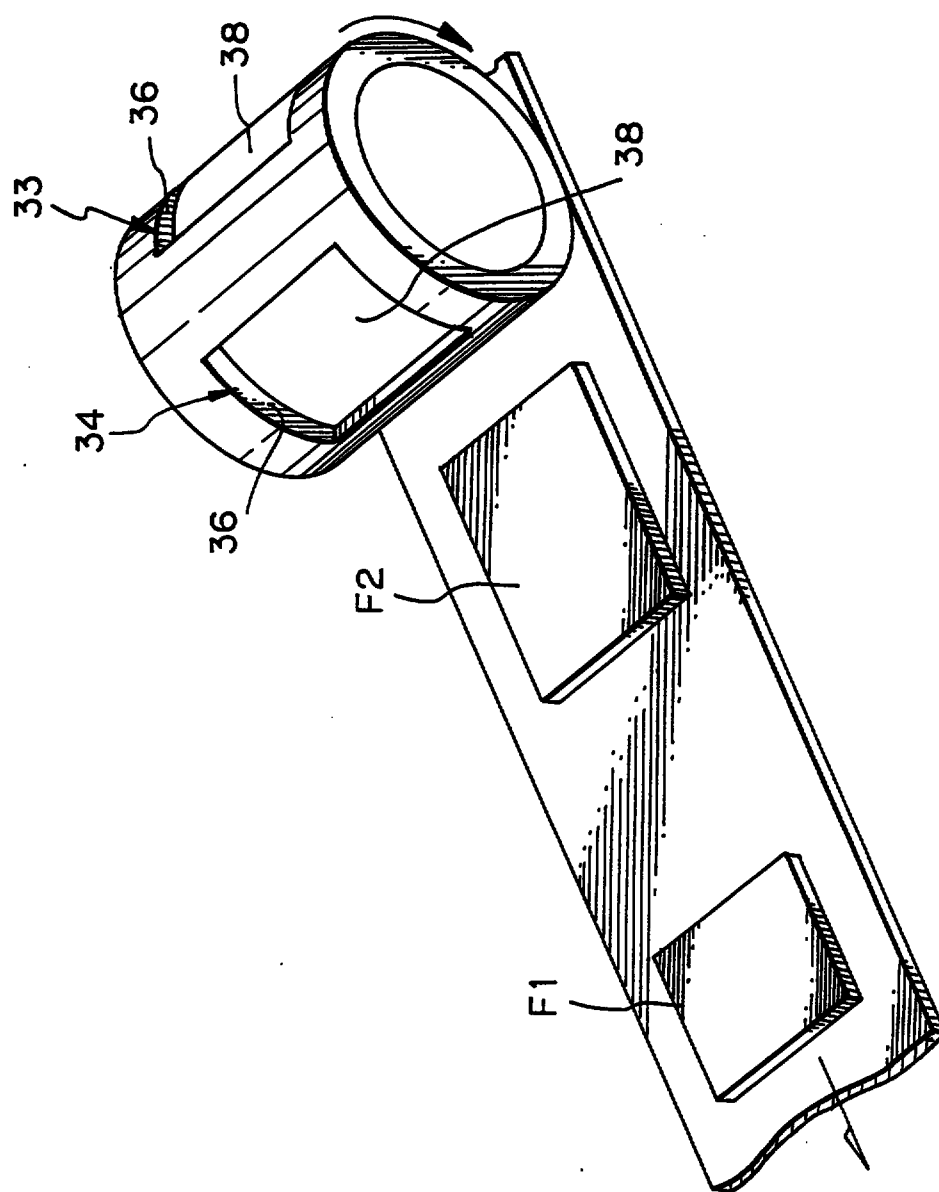




Fig. 9



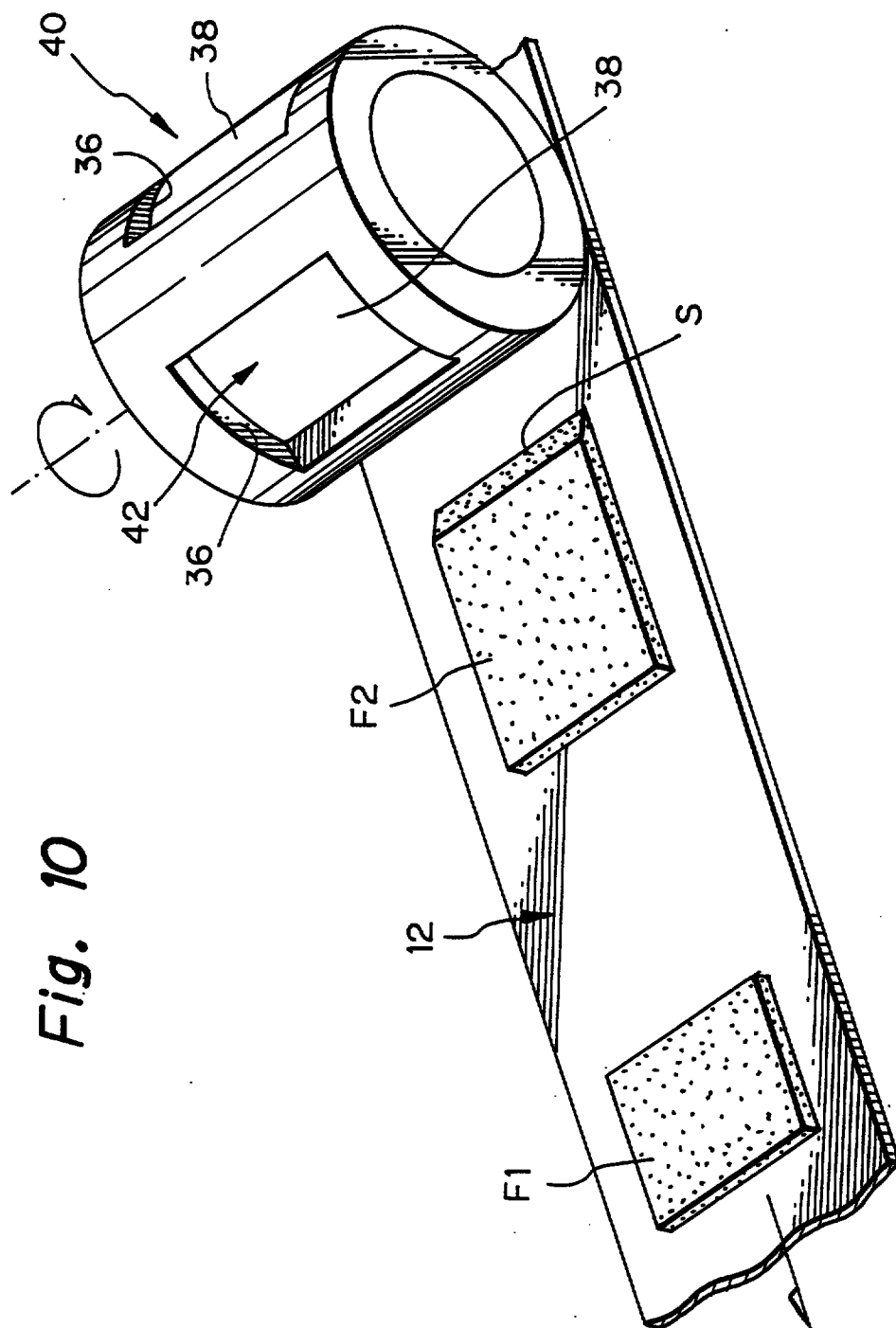
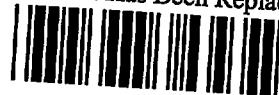


Fig. 10



Fig. 11

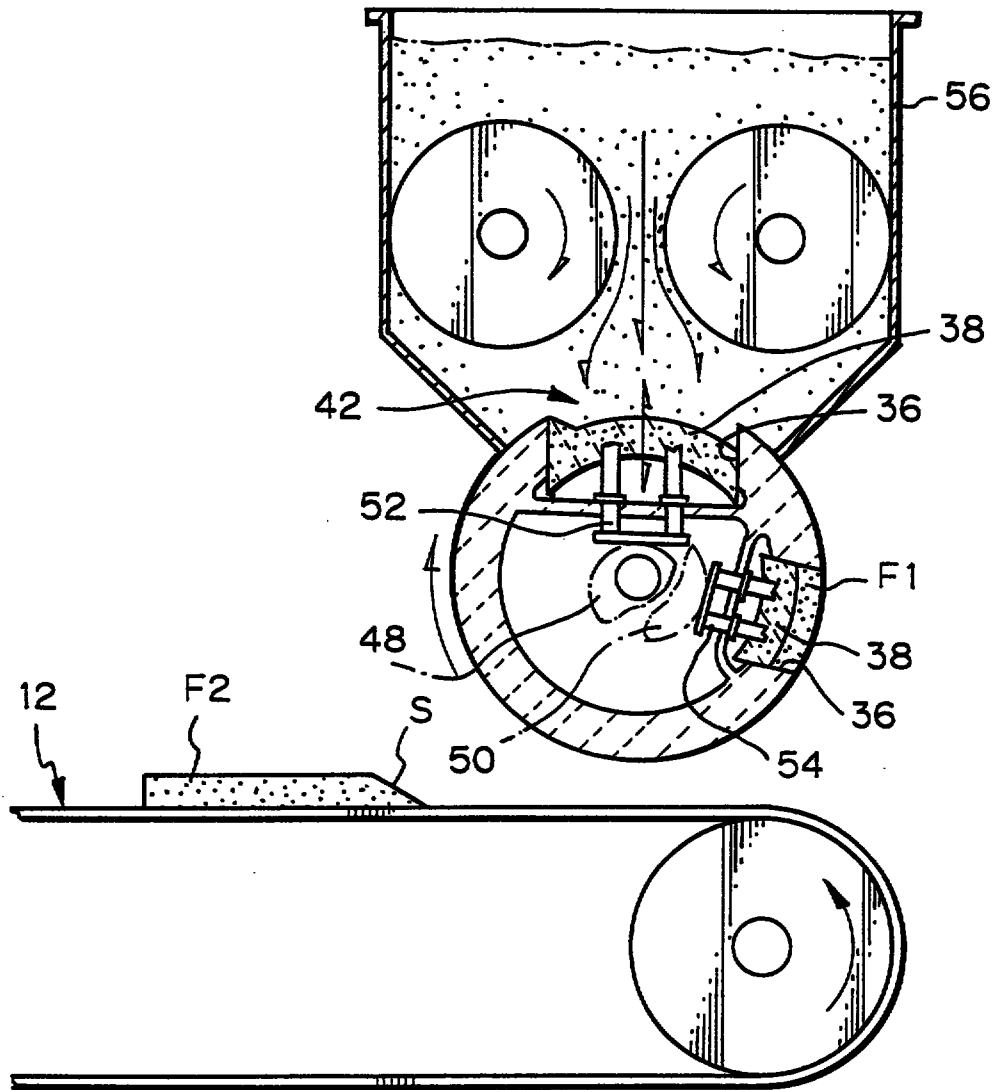




Fig.12(a)

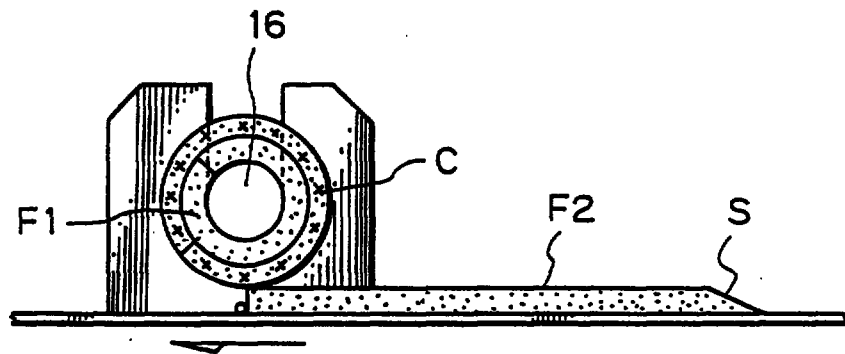


Fig.12(b)

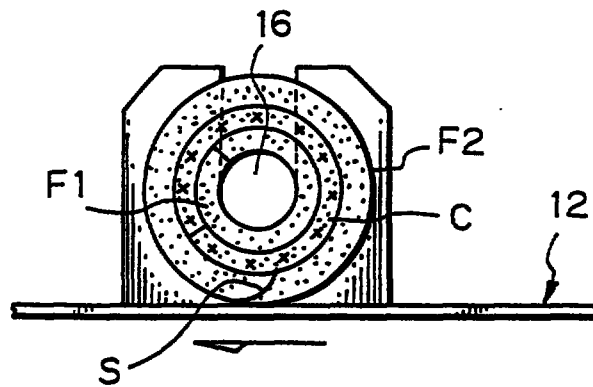
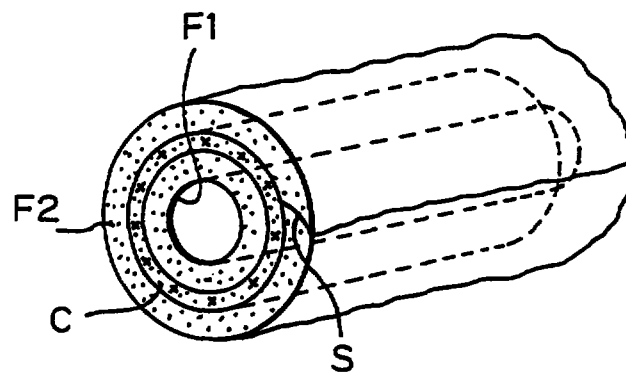


Fig.12(c)



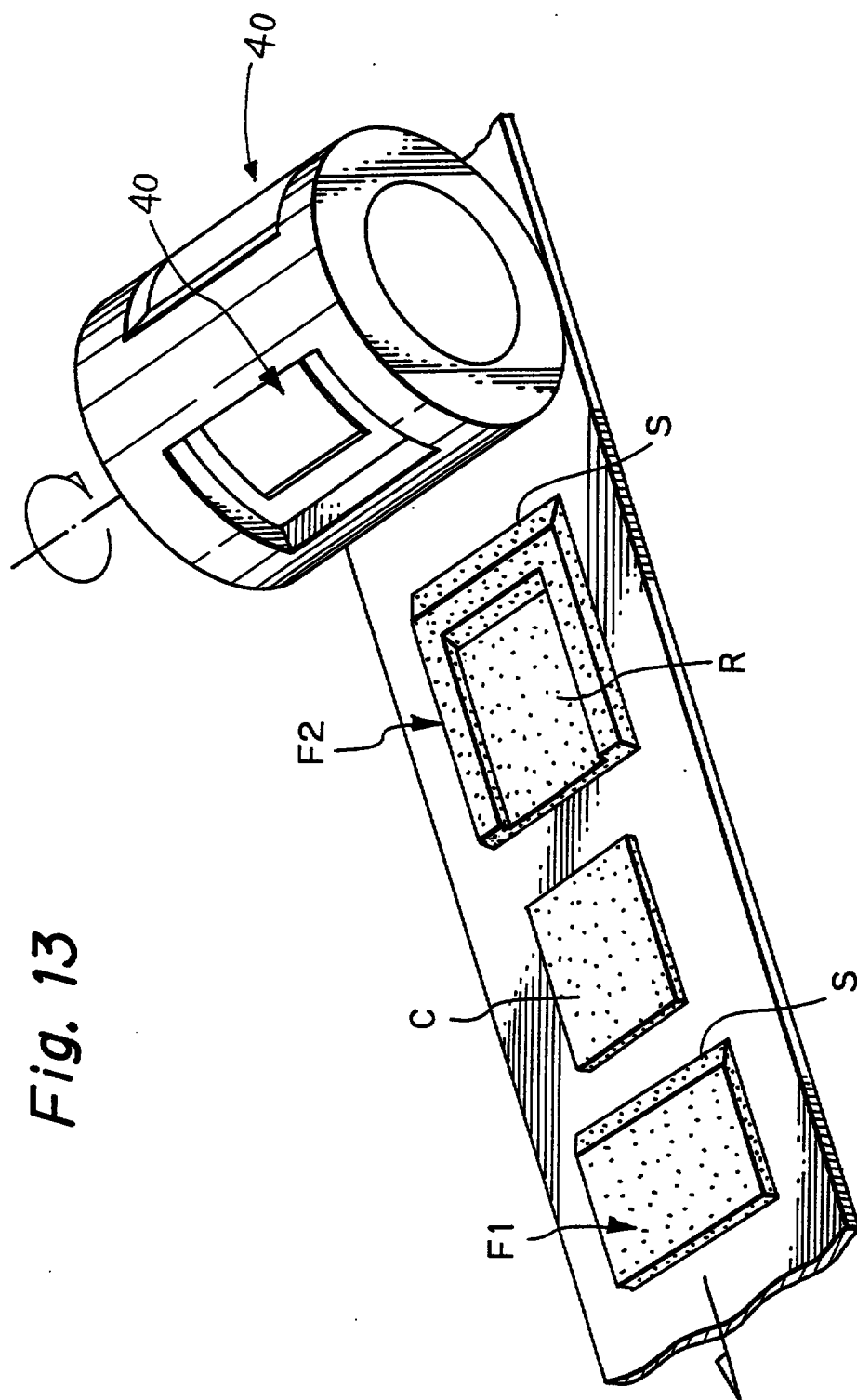
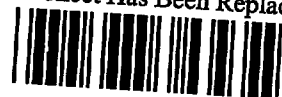
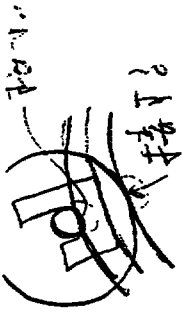
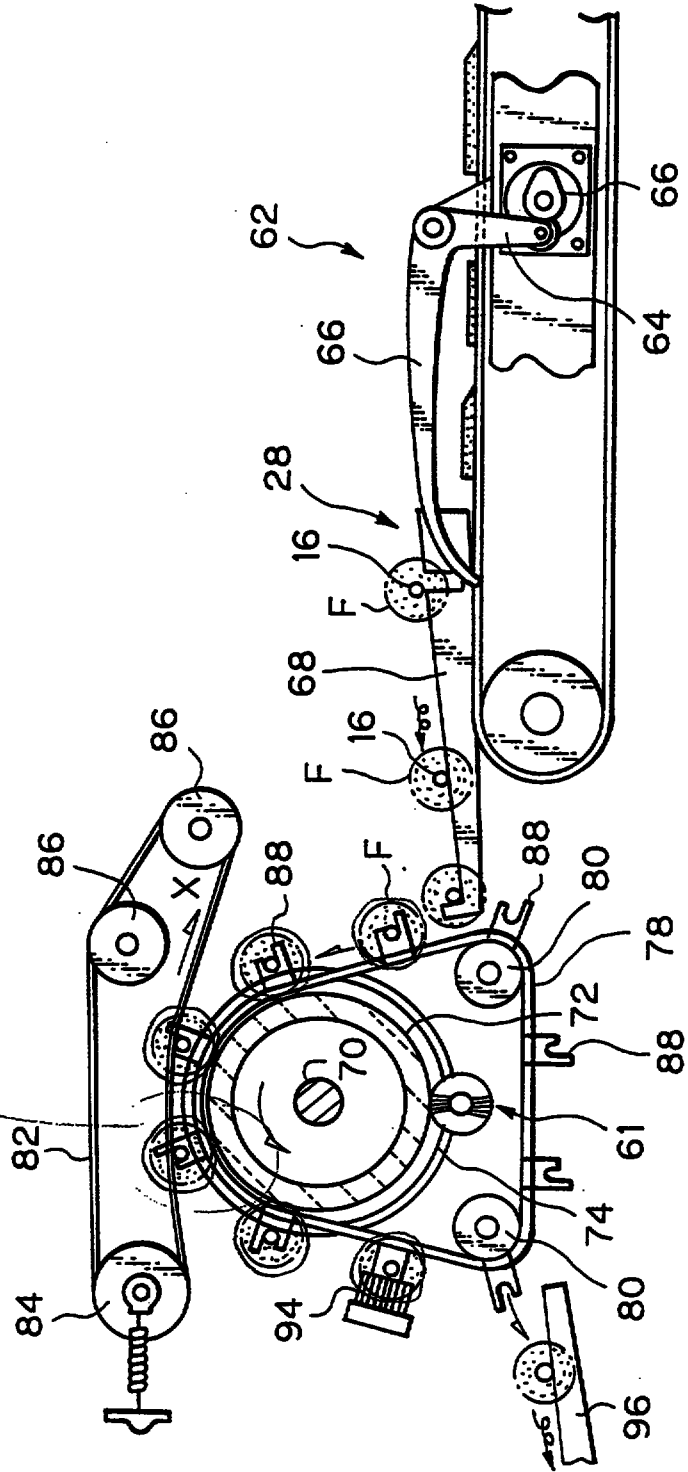


Fig. 13



Fig. 14



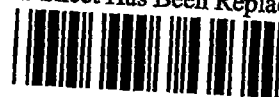


Fig. 15

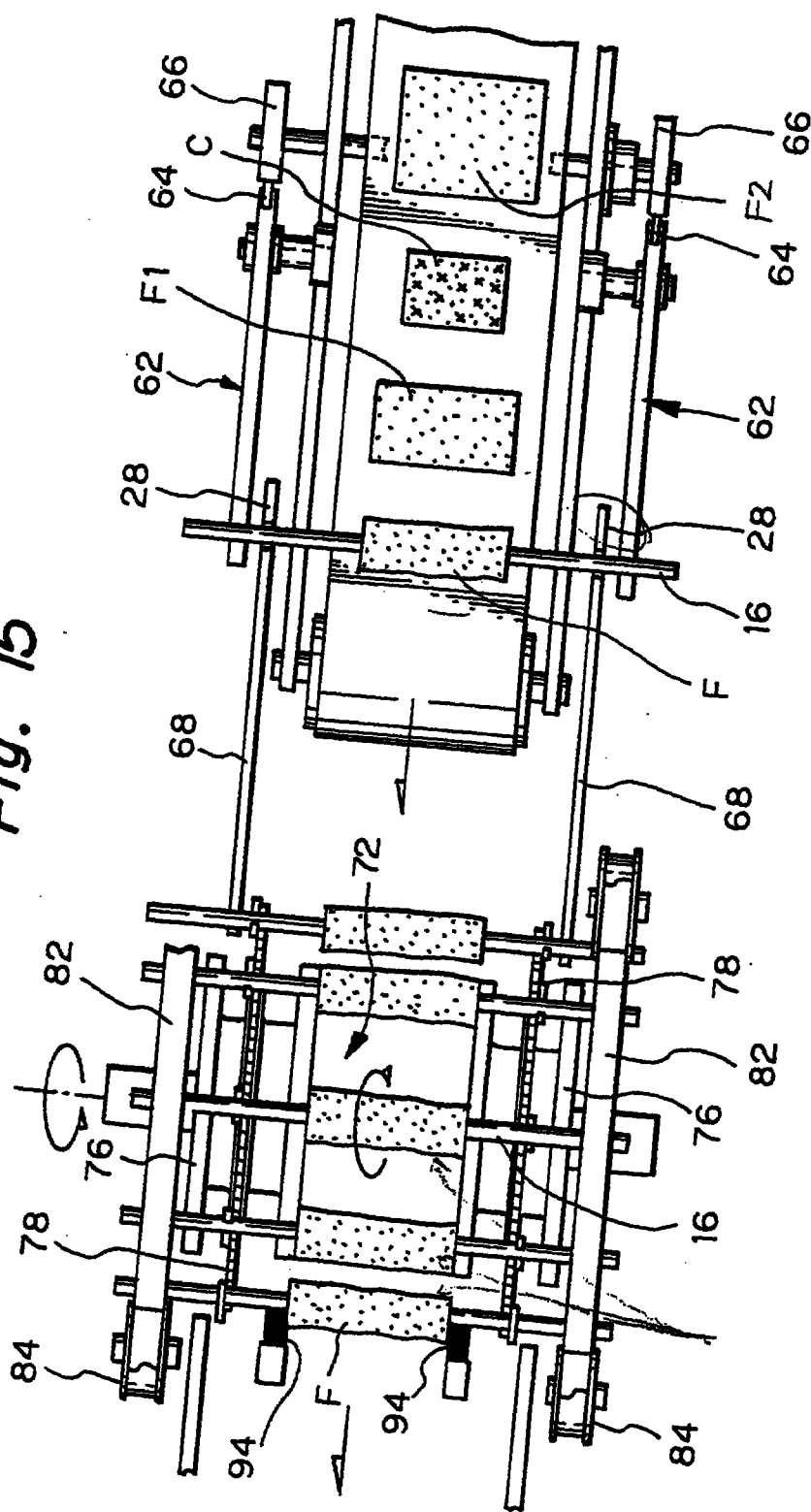




Fig. 16

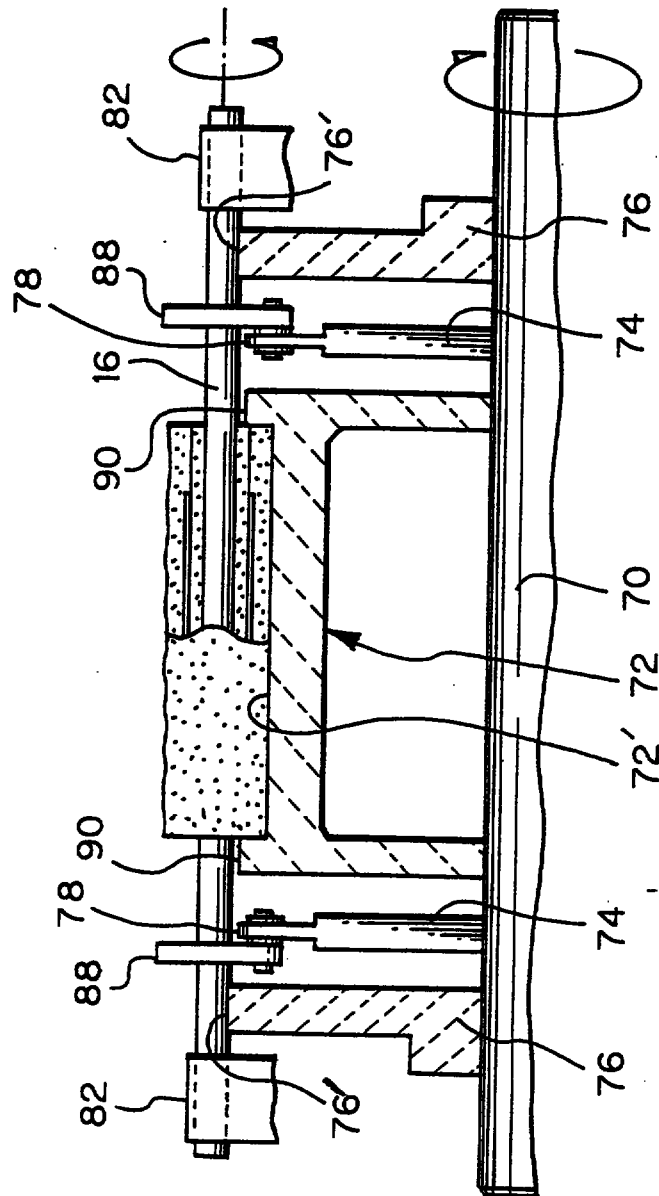
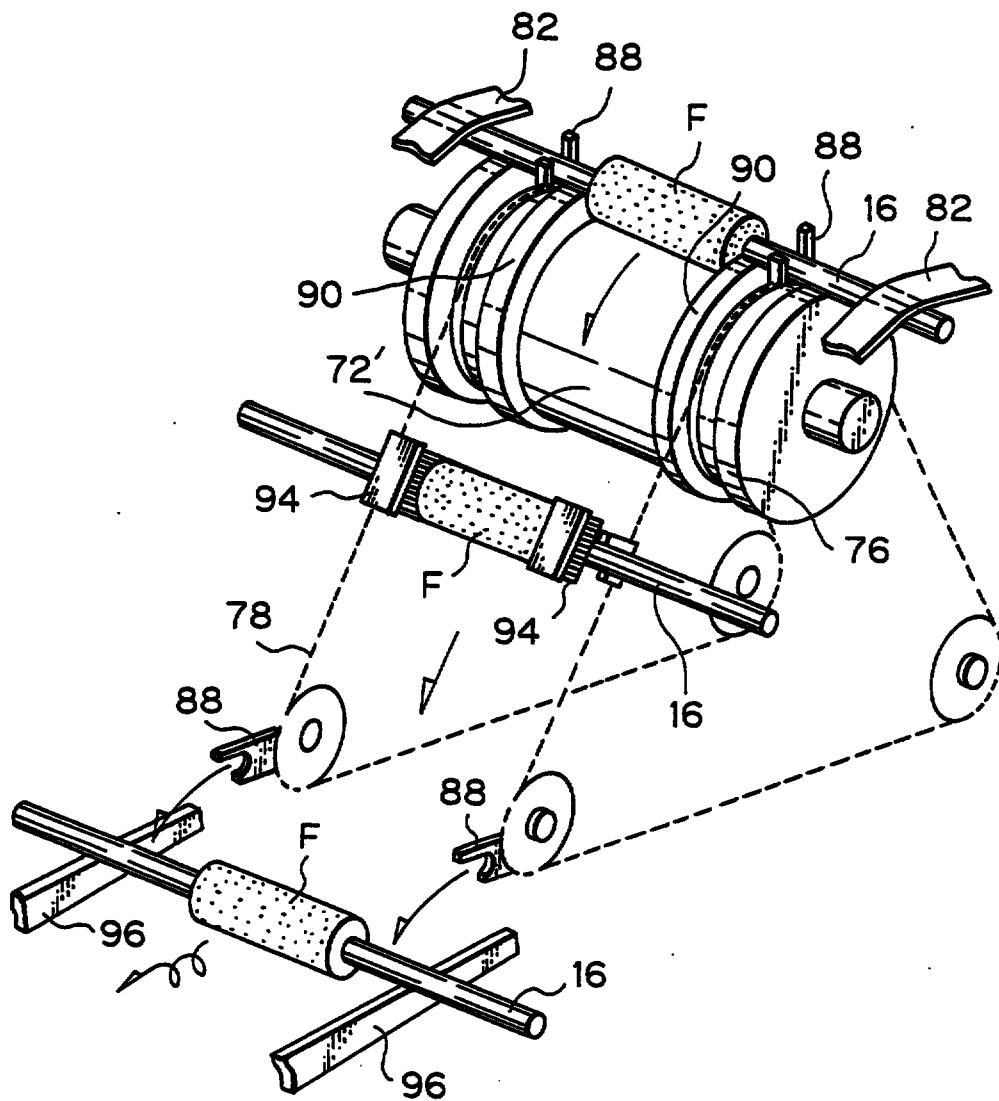




Fig. 17



Fig. 18



SINGAPORE PATENT
GRANTED

- 24 -

REPLACEMENT SHEET 1700011(-1 350)
22 APR 1997

CYLINDRICAL FOOD CONSISTING OF PLURALITY OF CONCENTRIC
CYLINDRICAL LAYERS OF FOOD MATERIAL AND METHOD AND
APPARATUS FOR MAKING THE SAME

ABSTRACT OF THE DISCLOSURE

5 A hollow cylindrical food consisting of a plurality
of concentrically wound rectangular sheets is characterized
in that the leading and tailing edges of the wound sheets
abut against each other. Such a food is produced by
conveying at least one set of a plurality of the paste
10 sheets which are spaced from each other in the conveying
direction at predetermined distances along a predetermined
path in such a manner that the leading edge and the tailing
edge of each rectangular paste sheet are substantially
normal to the conveying direction, and, providing a bar
15 in such a manner that the bar extends transversely of, in
parallel with and adjacent to said path and is rotatable
about its axis and movable vertically relative to said
path. The rectangular paste sheets of the above-noted set
conveyed to the bar are engaged with and wound up around
20 the bar in sequence. The lengths of the rectangular
paste sheets of the set are increased successively from
the leading sheet in the conveying direction so that the
leading and tailing edges of the sheets wound up about
against each other. The rectangular sheets are spaced
25 from each other so that winding of one of the sheets is
started after the preceding sheet has been completely wound
up. The rectangular paste sheet has an inclined tailing
end surface to make the tailing end surfaces engage with
the leading end surface as a whole.

FIG. 5

This Sheet Has Been Replaced



REPLACEMENT SHEETS		SG
☐ Description	: paged to paged	
☐ Claim(s)	: paged to paged	
☒ Drawing(s)	: paged 40 to paged 176	
☐ Abstract	: paged 22 to paged	
DATE OF RECEIPT		22/4/97

1

Fig.1 a

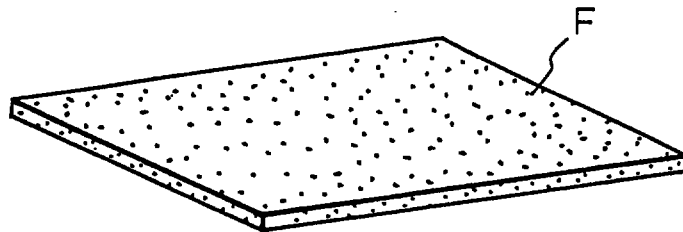


Fig.1 b

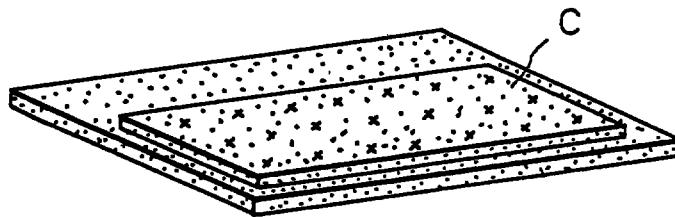


Fig.1 c

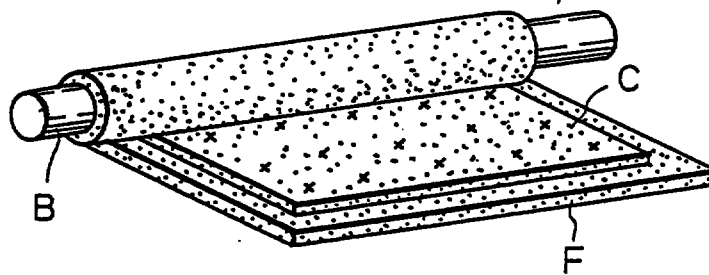


Fig.1 d

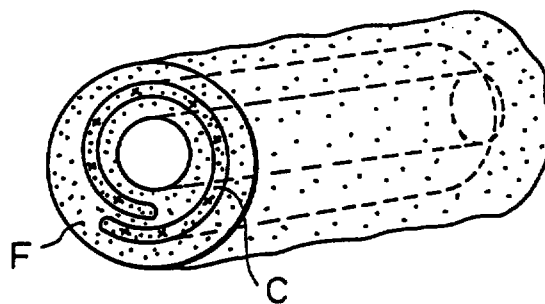


Fig. 2

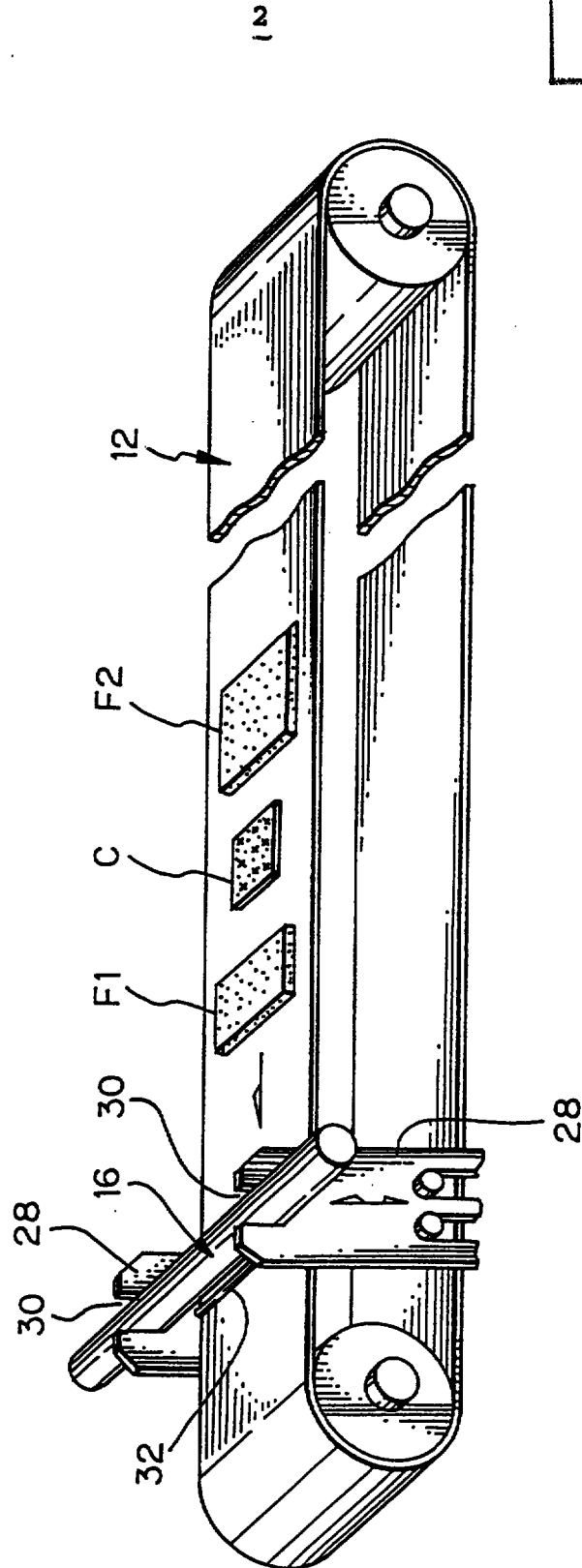


Fig. 3

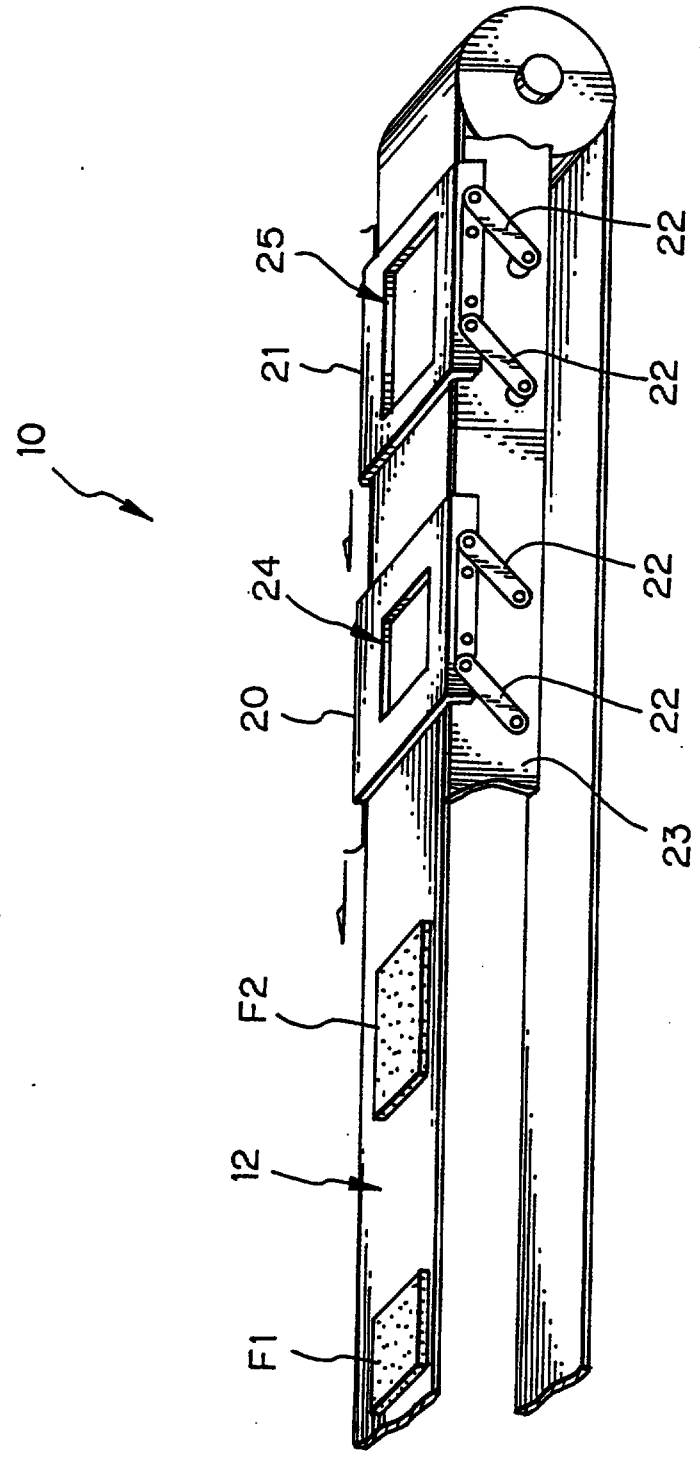


Fig4 a

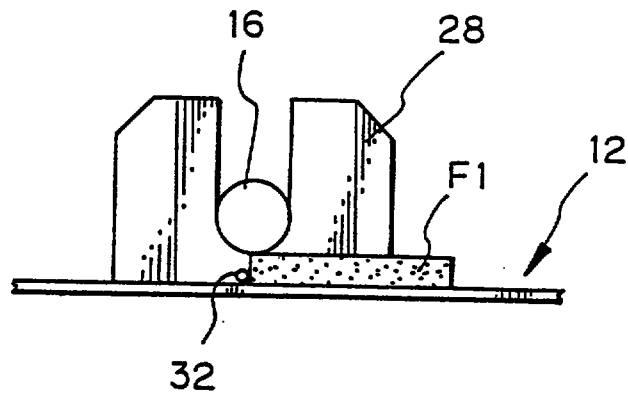
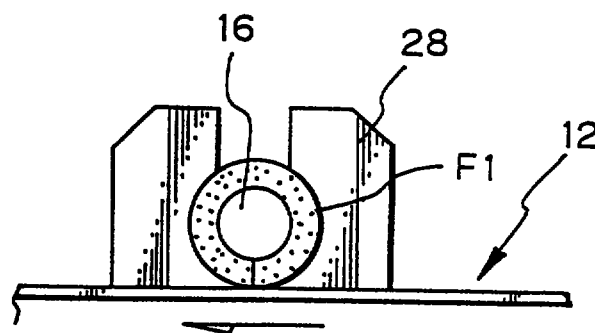


Fig.4 b



5

Fig.5 a

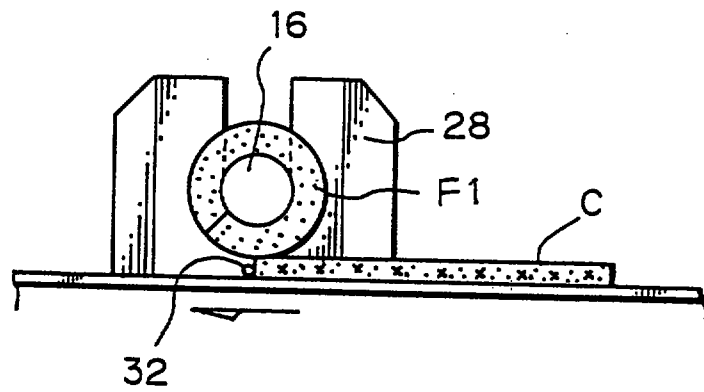


Fig.5 b

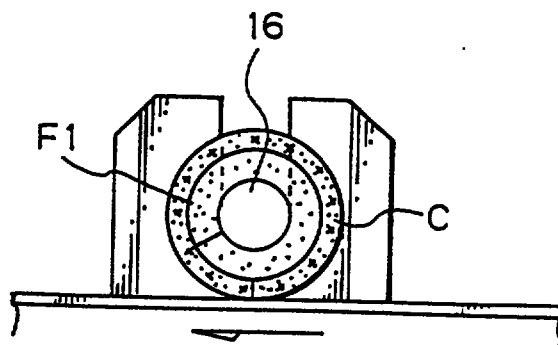


Fig.6 a

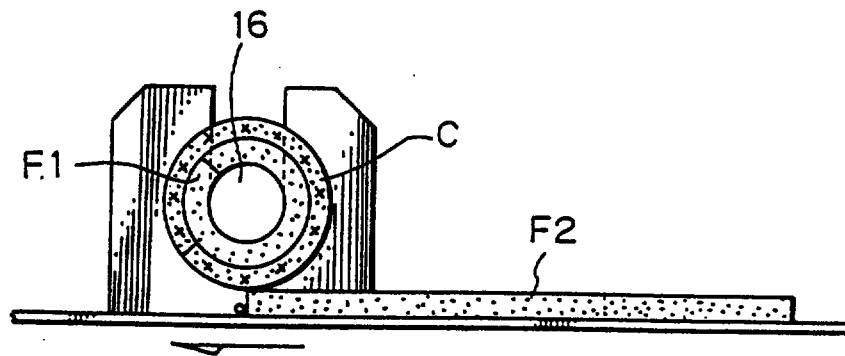


Fig.6 b

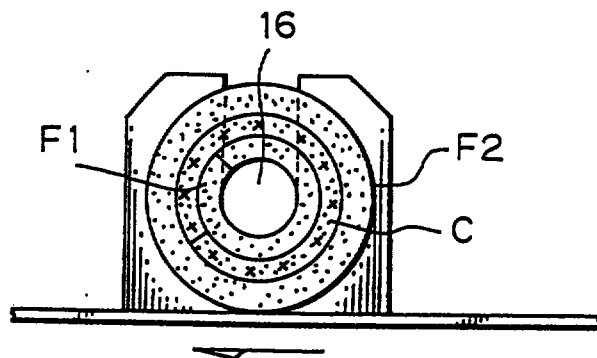


Fig.6 c

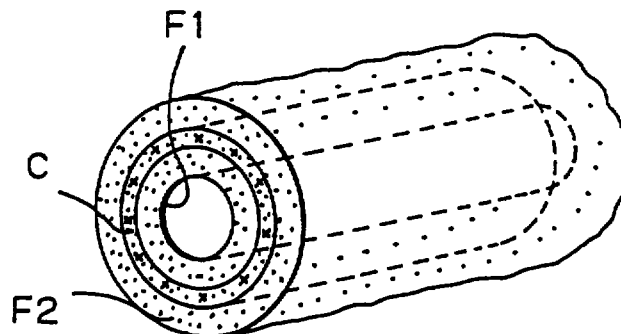
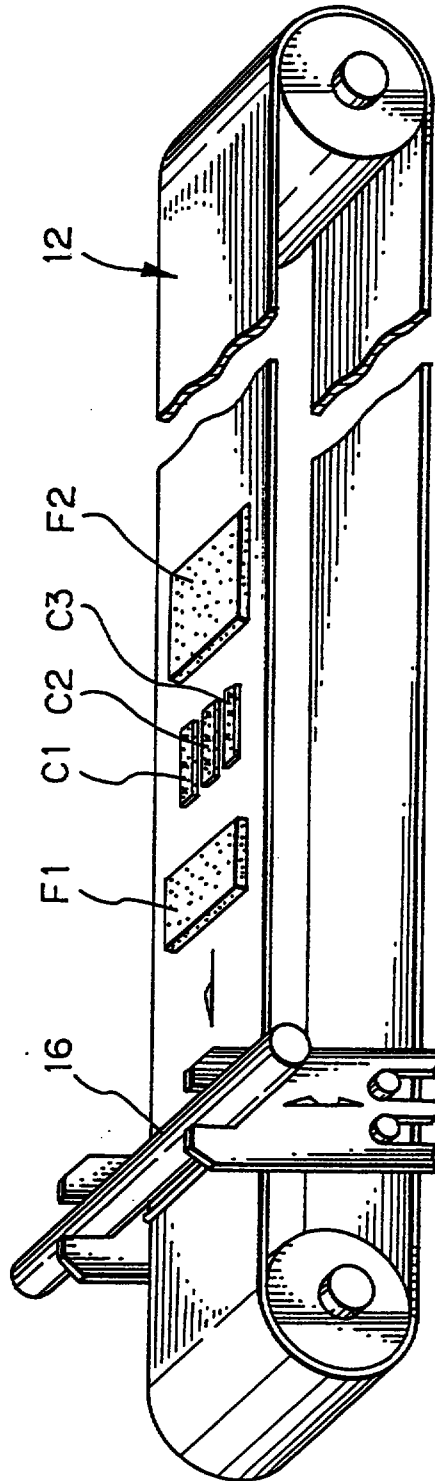


Fig. 7



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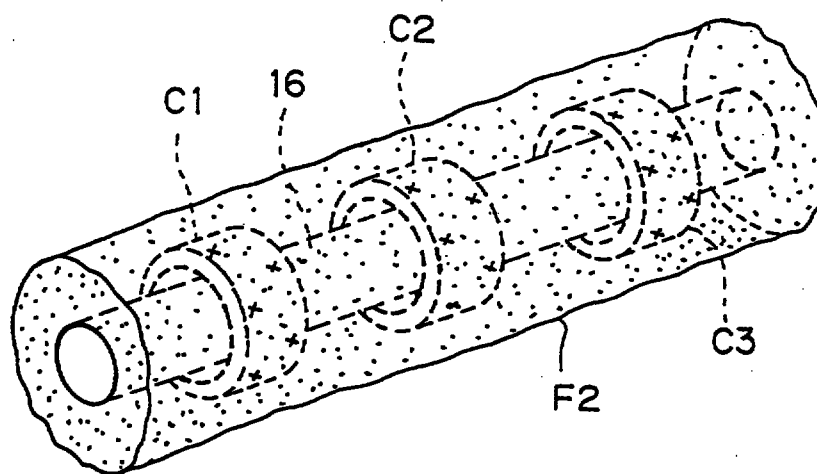
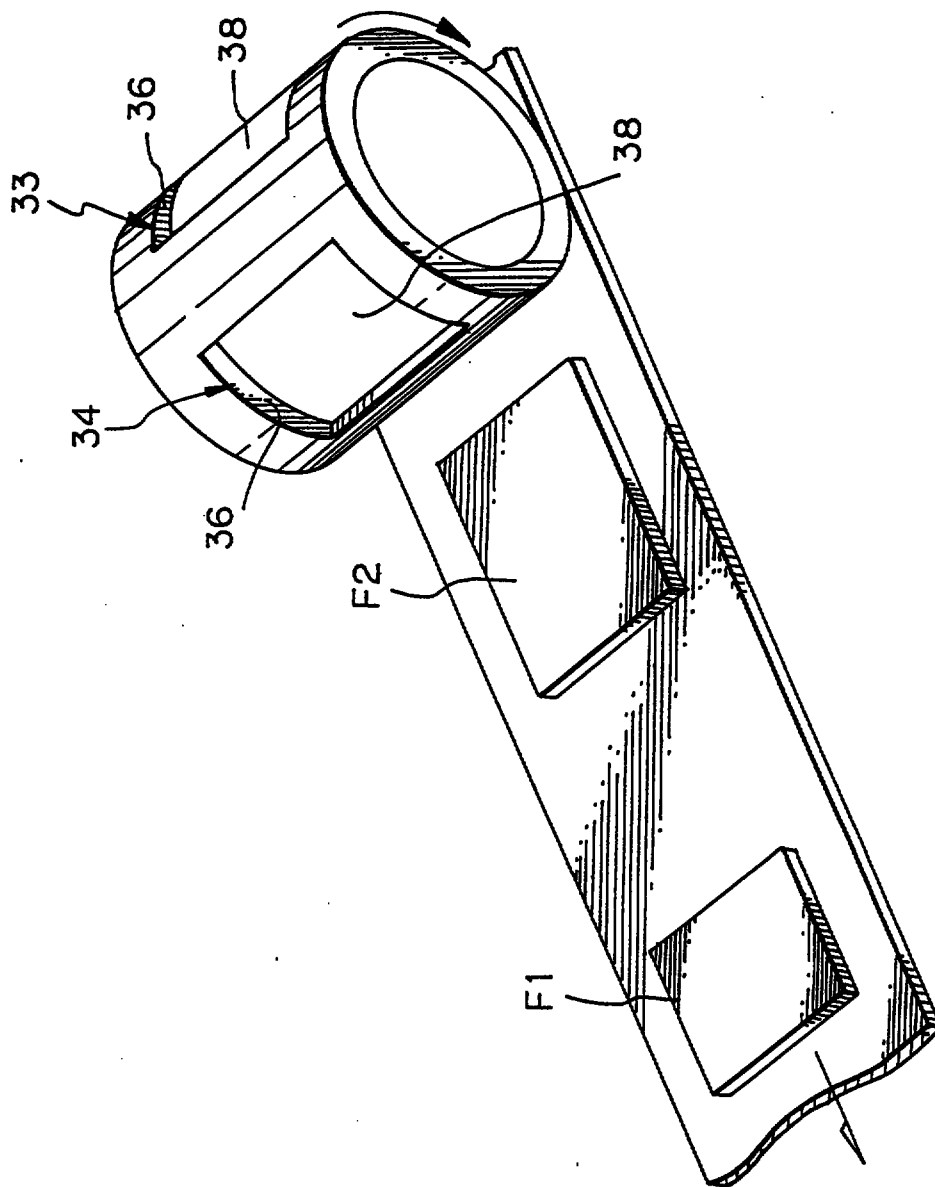
Fig. 8

Fig. 9



10

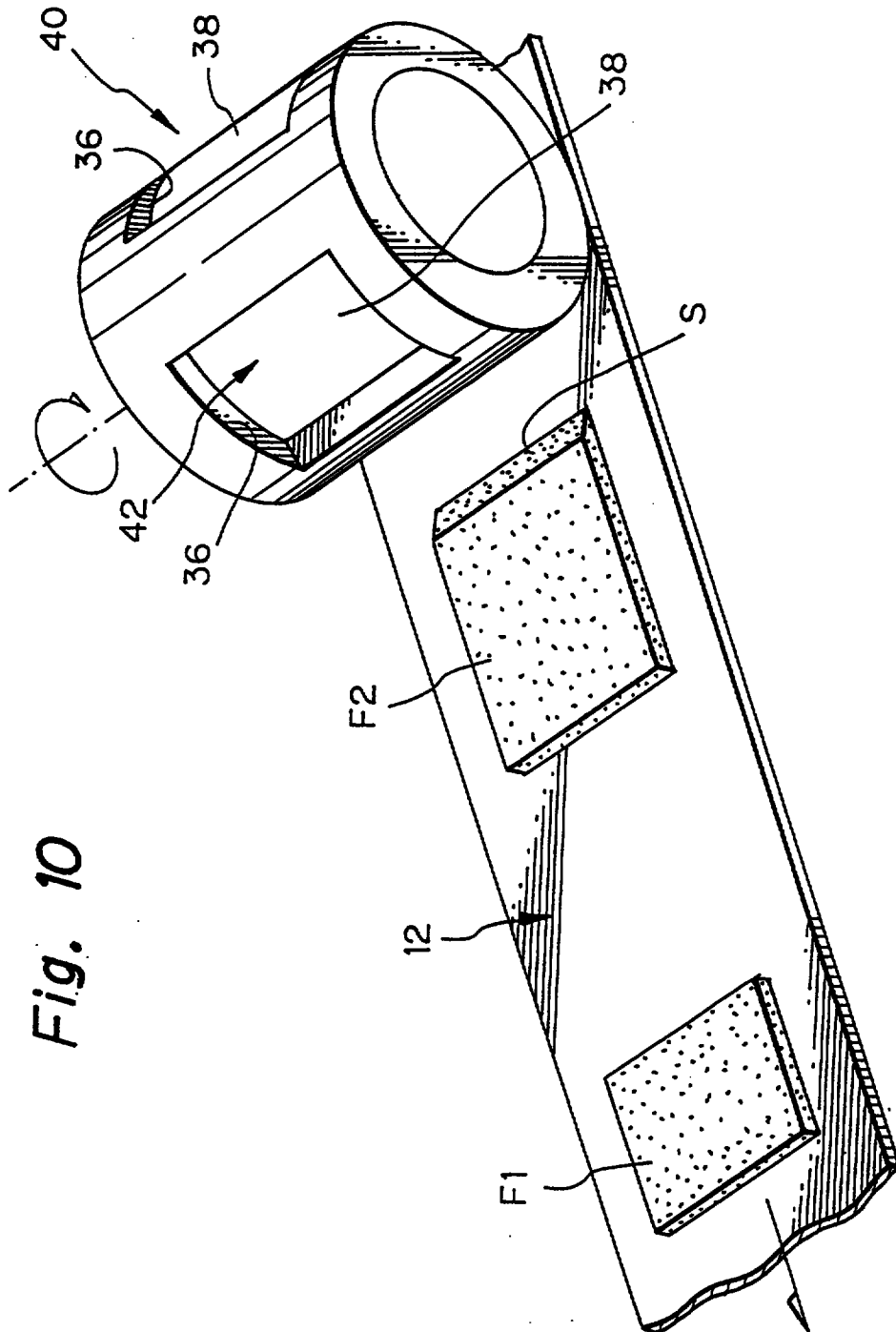
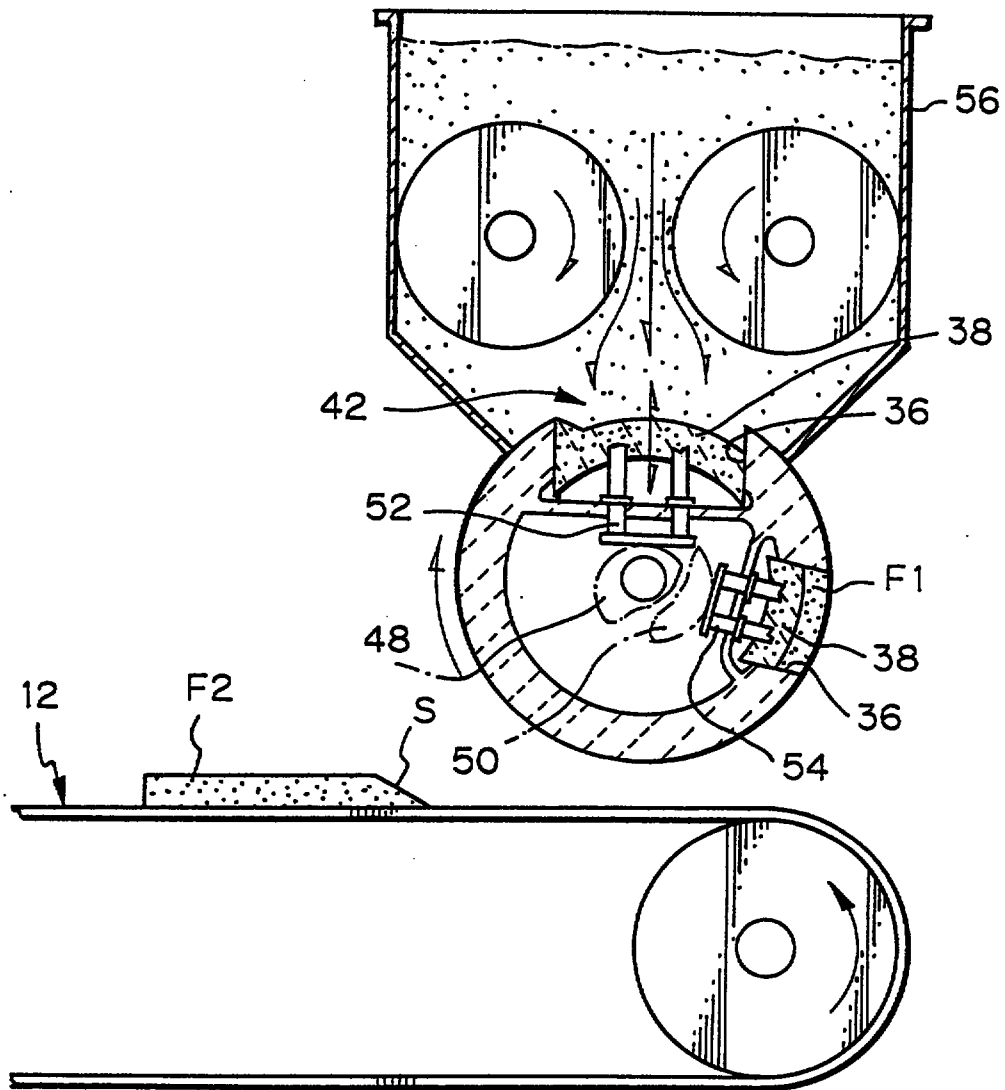


Fig. 10

Fig. 11



22 APR 1997

12

Fig.12 a

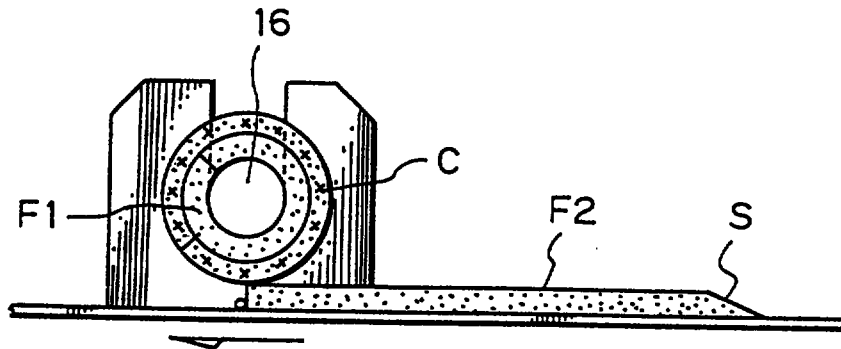


Fig.12 b

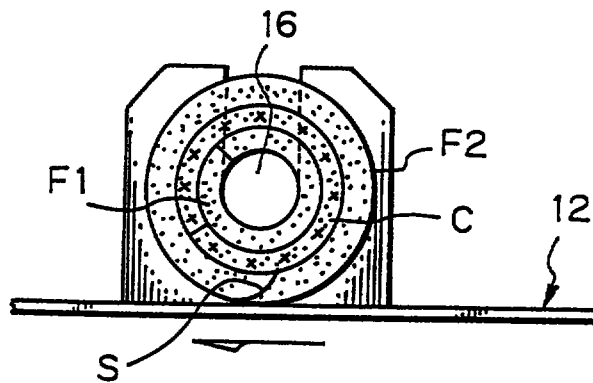
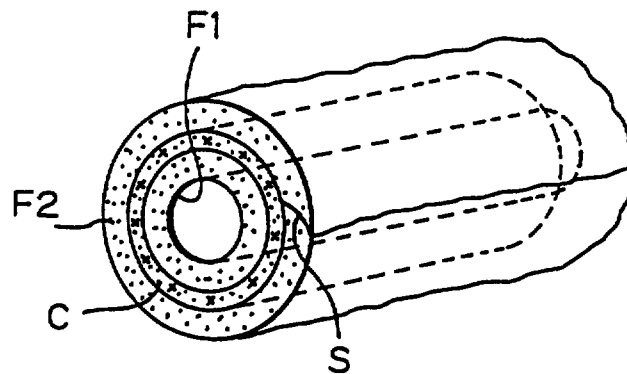


Fig.12 c



13
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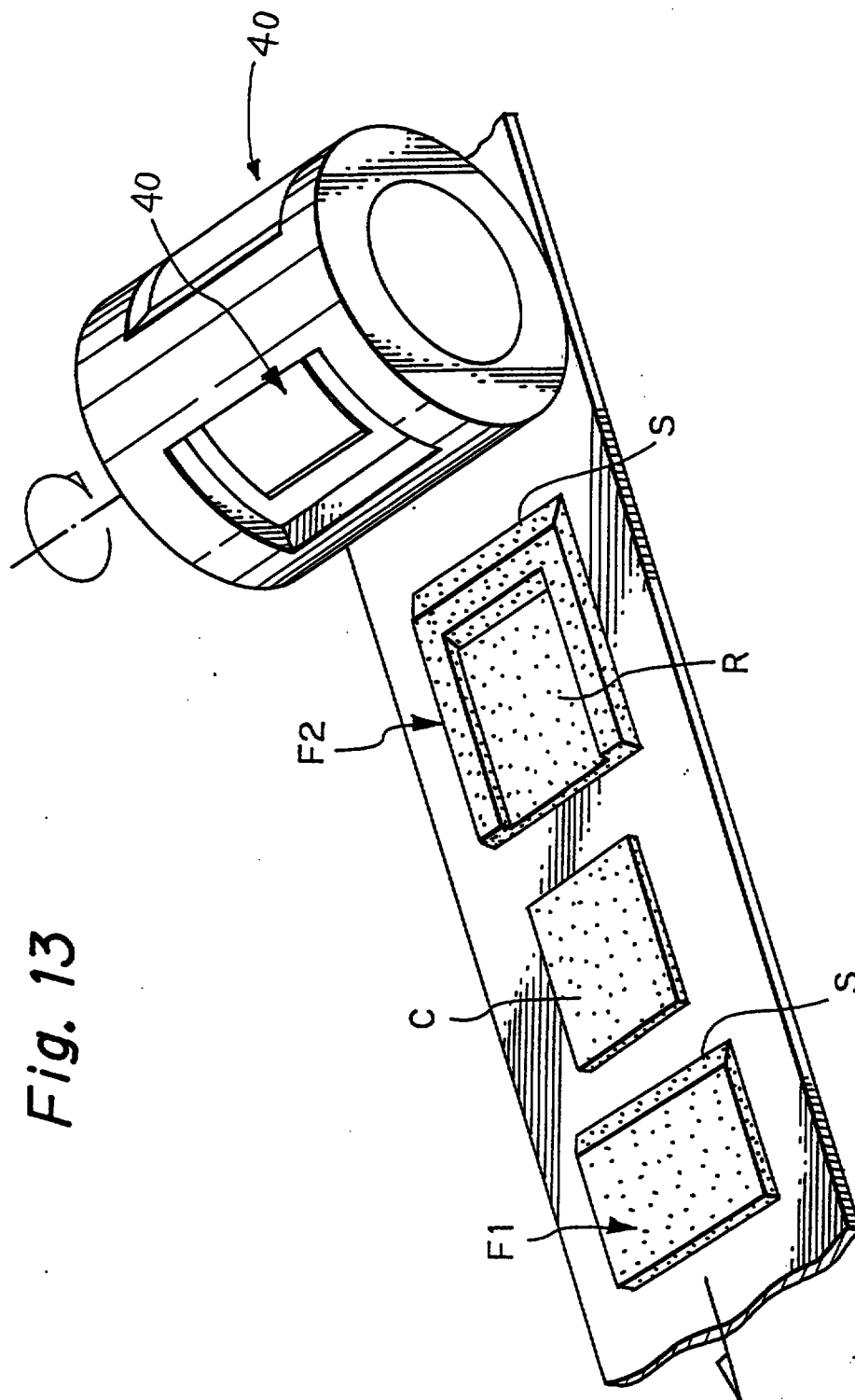
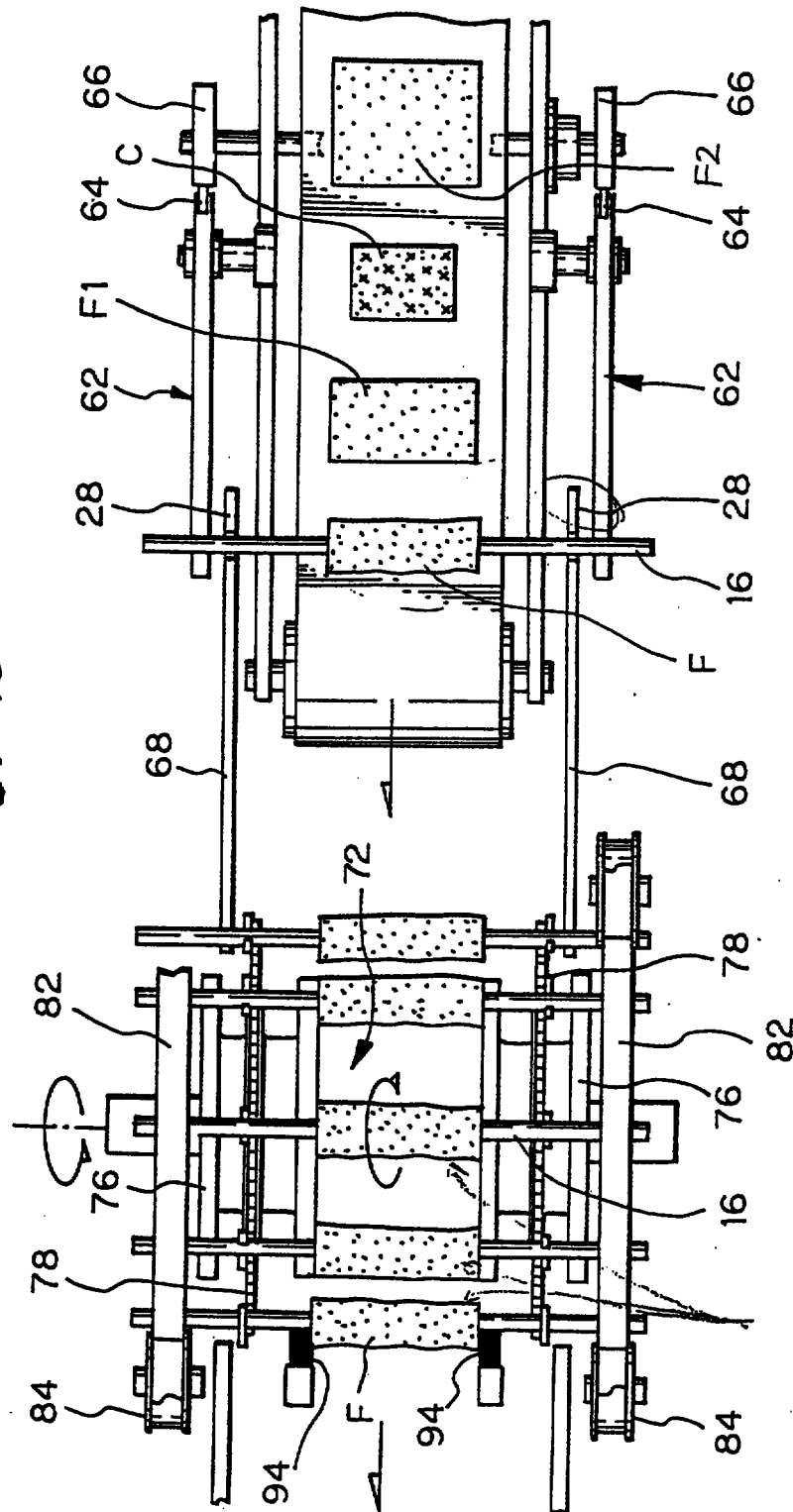


Fig. 13

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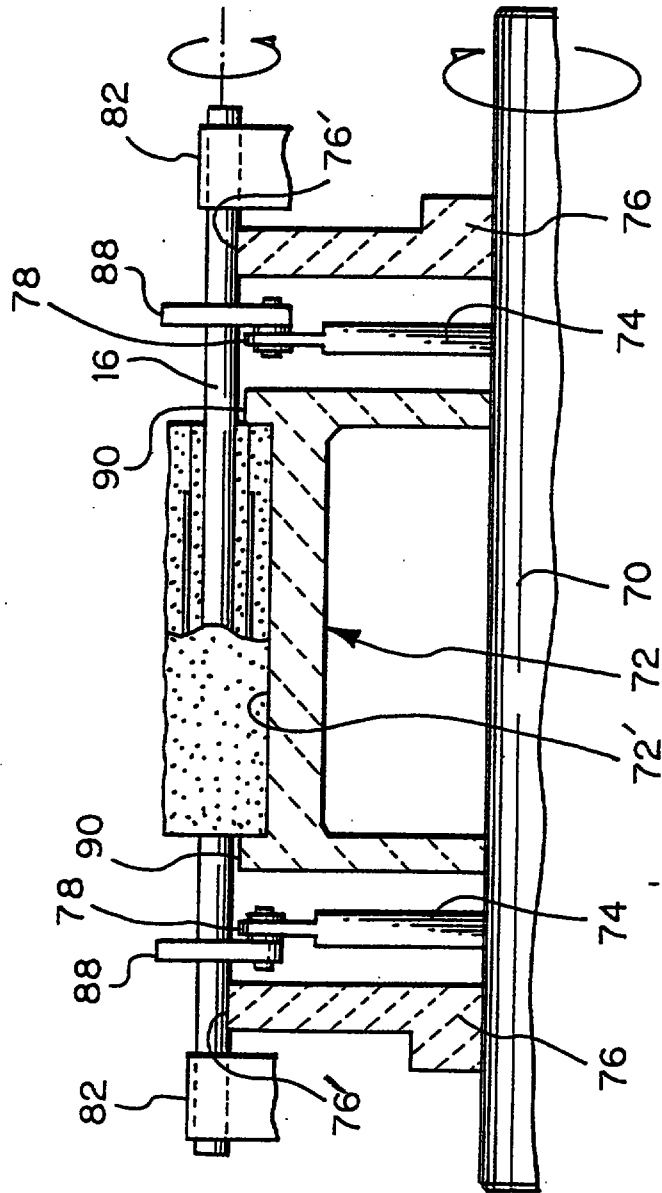
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Fig. 15



16

Fig. 16



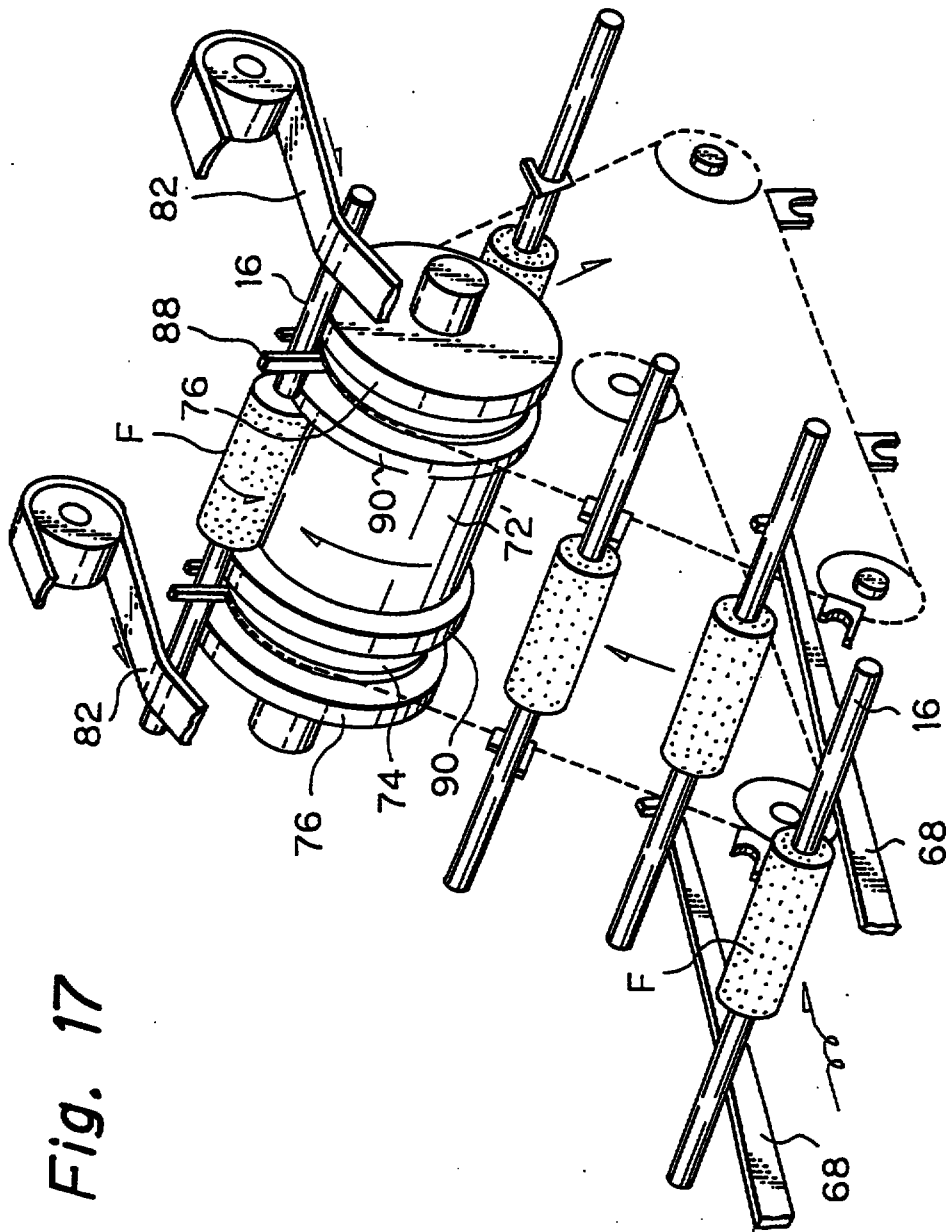
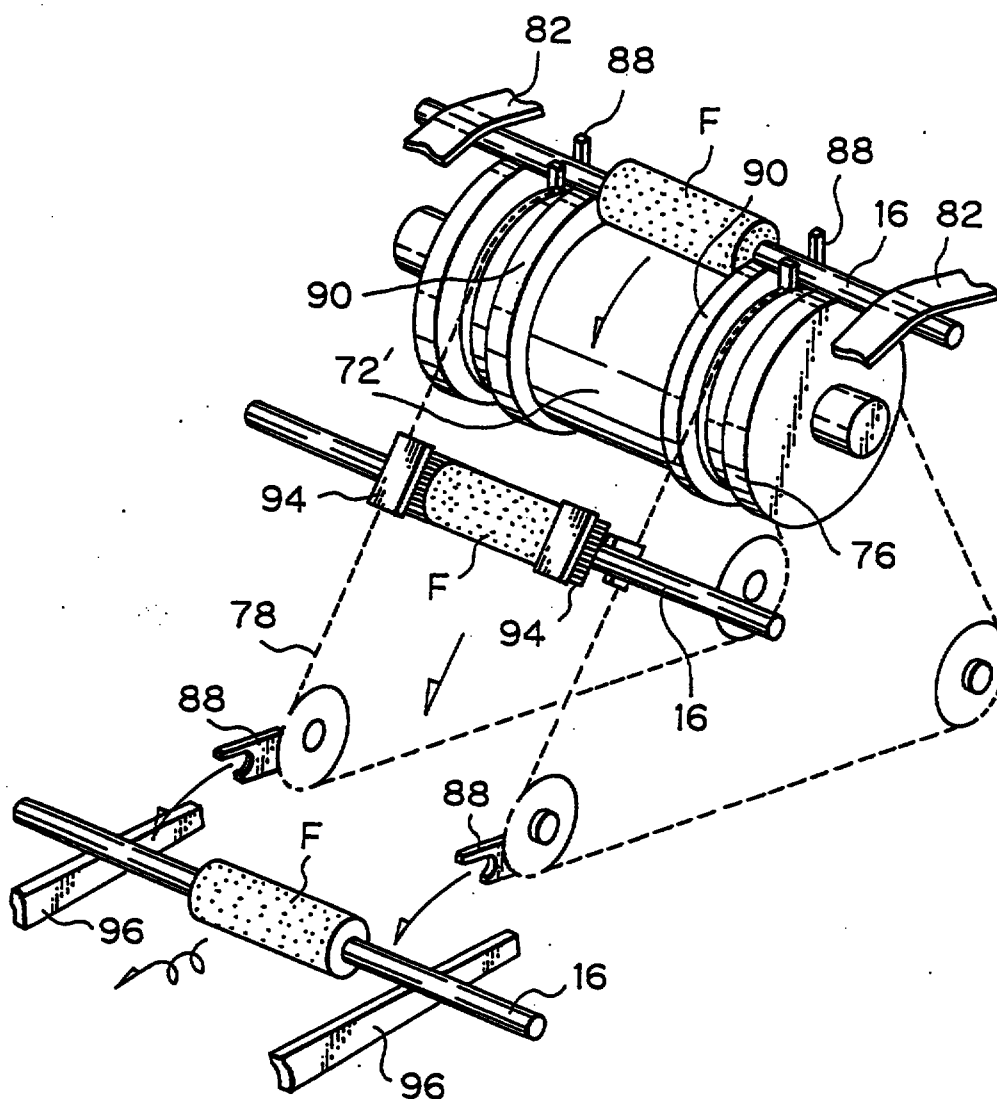


Fig. 17

22 APR 1997

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Fig. 18





TEXT OF THE ABSTRACT

CYLINDRICAL FOOD CONSISTING OF PLURALITY OF CONCENTRIC
CYLINDRICAL LAYERS OF FOOD MATERIAL AND METHOD AND APPARATUS
FOR MAKING THE SAME

A hollow cylindrical food consisting of a plurality of concentrically wound rectangular sheets is characterized in that the leading and tailing edges of the wound sheets abut against each other. Such a food is produced by conveying at least one set of a plurality of the paste sheets which are spaced from each other in the conveying direction at predetermined distances along a predetermined path in such a manner that the leading edge and the tailing edge of each rectangular paste sheet are substantially normal to the conveying direction, and, providing a bar (16) in such a manner that the bar extends transversely of, in parallel with and adjacent to said path and is rotatable about its axis and movable vertically relative to said path. The rectangular paste sheets (F1) of the above-noted set conveyed to the bar are engaged with and wound up around the bar in sequence. The lengths of the rectangular paste sheets of the set are increased successively from the leading sheet in the conveying direction so that the leading and tailing edges of the sheets wound up about against each other. The rectangular sheets are spaced from each other so that winding of one of the sheets is started after the preceding sheet has been completely wound up. The rectangular paste sheet has an inclined tailing end surface to make the tailing end surface engage with the leading end surface as a whole.

Fig.: 5a.

