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"Preparation of food products"

Introduction

The invention relates to a method and an apparatus for preparing food products for cooking. The invention also relates to a method and an apparatus for preparing cooked food products.

Cooked food products especially meat pieces such as chicken pieces are important ingredients in the production of a range of food products such as pizza toppings. It is difficult to produce such products on an industrial scale. One of the problems is in ensuring that each individual food product is evenly and completely cooked. There are wide variations in the temperature of the individual food products, especially if they are from a frozen block. There are also significant variations in size. For food safety it is essential to set the cooking parameters in a cooker such that the largest piece at the coldest temperature is fully cooked. This is not only wasteful in terms of energy and cooker residence time but also can lead to inferior organoleptic properties as smaller pieces may be cooked excessively.

There is therefore a need for a method and an apparatus which will address these problems.

Statements of invention

According to the invention there is provided a method for preparing food products for cooking comprising the steps of: -

spreading the food products across a heated bed, the heated bed having an inlet end and an outlet end;

leading the food products along the heated bed from the inlet end to the outlet end;

searing the food products on the heated bed as the food products are led along the heated bed to set a base of the food products prior to cooking.

In one embodiment the food products are in the form of a slurry containing a plurality of food pieces, the slurry being spread across the heated bed at the inlet end thereof.

The food products may be spread across the heated bed by engaging the food products against a spreader.

In one embodiment the food products are led along the heated bed by a conveyor. The conveyor may be located above the heated bed. The spreader may comprise a portion of the conveyor.

In one embodiment the method comprises the step of substantially equalising the temperature of the food products before the food products are spread across the heated bed. The food products may be led through a heat exchanger to substantially equalise the temperature thereof. The food products are pumpable and the food products are pumped through the heat exchanger.

In one arrangement the heat exchanger comprises an annular passageway through which the food products are led. The heated bed may be heated to a surface temperature of at least 130^0C . The residence time of the food products in the heated bed may be at least 1.5 minutes.

In one embodiment the food products are equalised to a temperature of about 25^0C in the heat exchanger. The residence time of the food products in the heat exchanger may be at least 2 minutes.

In one embodiment the food products comprise a plurality of individual food pieces. The individual food pieces have a size of about 25 x16 x 16 mm.

In one embodiment the food products are provided in the form of a frozen block and the method comprises the step of tempering the block for a period of from 24 to 48 hours up to a temperature of about -2^0C.

The food products may be meat pieces such as chicken pieces.

In one embodiment the method comprises the step of marinating the food pieces in a marinade forming slurry.

In one arrangement the heated bed comprises a heated plate. The heated bed may be steam heated.

The invention also provides a method for preparing cooked food products comprising preparing the food products for cooking by a method of the invention. The method may comprise the step of transferring the prepared food products from the heated bed to a transfer conveyor for delivery to a cooker. The food products may be char-grilled on the transfer conveyor.

In one embodiment the food products are delivered by the transfer conveyor to a conveyor of a cooker such as an in-line thermal zone cooker. The cooker conveyor may be of mesh construction.

In one embodiment the food products at the outlet of the cooker are in the form of a mat of cooked food products. The method may comprise the step of breaking up the mat at the outlet of the cooker. The method may also comprise the step of vibrating the food products broken from the mat. The food products broken from the mat may be led along a vibrating conveyor. The method may comprise the step of freezing the food products broken from the mat.

In a further aspect the invention provides apparatus for preparing food products for cooking comprising:

a heated bed having an inlet end and an outlet end; and

means for leading the food products along the heated bed from the inlet end to the outlet end;

the heated bed causing a base of the food products to set or coagulate as the food products are led along the heated bed.

In one embodiment the heated bed comprises a heated plate. The heated plate may be steam heated. The heated bed may be heated to a temperature of at least 130^0C .

In one embodiment the means for leading the food products along the heated bed comprises a conveyor above the heated bed which drags the food products along the heated bed.

The apparatus may comprise spreading means for spreading the food products across the heated bed at the inlet end thereof. The spreading means may comprise a portion of the conveyor.

In one embodiment the apparatus comprises temperature equalising means for substantially equalising the temperature of the food products prior to delivery onto the heated bed. The temperature equalising means may comprise a heat exchanger. The apparatus may comprise means for leading the food products through the heat exchanger. The means for leading the food products through the heat exchanger may comprise a pump.

In one embodiment the heat exchanger comprises an annular passageway through which the food products are led.

In one arrangement a heating fluid is circulated through a central core and/or an outer jacket between which the annular passageway is defined. The heating medium may comprise water at a temperature of from 85 to 95 ^{0}C.

In one embodiment an outlet from the heat exchanger is located adjacent to the inlet end of the heated bed. The outlet may be divided into a number of outlets which are spaced-apart across the width of the heated bed adjacent to an inlet end thereof.

In one embodiment the apparatus comprises a base on which the apparatus is mounted. The base may be a wheeled base.

In one embodiment the conveyor is mounted to a housing in which the heated bed is located. The conveyor may be movable or removable for cleaning.

In one embodiment the conveyor is pivotally movable from a raised cleaning position to a lowered operative position.

In another aspect the invention provides apparatus for preparing cooked food products comprising an apparatus of the invention.

In one embodiment the apparatus comprises a transfer conveyor for transferring the prepared food products to a cooker. The apparatus may comprise a char grilling system for char grilling the food products as they are led along the transfer conveyor. The cooker may comprise a support conveyor of mesh construction. The cooker may be a continuous thermal zone cooker.

In one embodiment the apparatus comprises a breaker for breaking up a cooked mat of food products at an outlet of the cooker.

In another embodiment the apparatus comprises a vibrating conveyor along which the food products are led from an outlet of the cooker.

In a further embodiment the apparatus comprises a freezer to which the food products are led from the cooker outlet.

The invention also provides foods products whenever prepared by a method or an apparatus of the invention.

Brief Description of the Drawings

The invention will be more clearly understood from the following description thereof given by way of example only, in which: -

Fig. 1 is a perspective view of an apparatus according to the invention for preparing food products for cooking;

Fig. 2 is a side elevational view of the apparatus of Fig. 1 and portion of an associated transfer conveyor ;

Figs. 3 is a top plan view of the apparatus of Fig. 2;

Fig. 4 is a perspective view of portion of the apparatus of Figs. 1 to 3 in an open configuration;

Fig. 5 is a perspective view of another portion of the apparatus;

Fig. 6 is a perspective view of a heat exchanger part of the apparatus;

Fig. 7 is a cross sectional view of a tube of the heat exchanger;

Fig. 8 is a schematic side view of various steps in a food product preparation method of the invention;

Fig. 9 is a perspective view of a food product preparation apparatus of the invention;

Fig. 10 is a perspective view of a mat of food products prepared for cooking using the apparatus of the invention; and

Fig. 11 is a diagrammatic side view of other elements of the food product preparation apparatus of the invention;

Detailed Description

Referring to the drawings, there is illustrated a method and an apparatus for preparing food products and for cooking and post cooking processing of the cooked food products. The food products may be of any suitable type such as meat pieces, for example of poultry such as chicken. The meat may, for example

be provided initially in a frozen block which is initially tempered up to a temperature of about –2°C over a 24 to 48 hour period. The block is then diced to form individual chicken pieces of a nominal size of 25 x 16 x 16 mm. The pieces are then tumbled and a marinade comprising water, salt and flavourings/emulsifiers is added, typically in an amount of up to 30% by weight of the meat pieces. The product is a pumpable slurry containing the meat pieces.

As will be described in more detail below, in the invention the slurry of food products is first passed through a heat exchanger 1 to substantially equalise the temperature of all the pieces in the slurry. The slurry is spread across a heated plate 2 through which steam is circulated to sear the base of the slurry of food products which causes the base to set and coagulate forming a lower set region 3. A mat 4 of seared food products with a set lower region 3 is than delivered onto a transfer conveyer 5 for delivering into a continuous thermal zone cooker 11.

Various pre-cooking operations may be performed on the mat 4 of food products as it is led along the transfer conveyor 5. For example, the upper surface of the food products may be char grilled by a char grilling apparatus 6, for example in the form of a plurality of hot rotating discs 7. The mat 4 is then transferred onto a mesh conveyor 10 of the cooker 11. Because the mat 4 has a set base it sits freely on the mesh without losses occurring through liquid run-off through the mesh. The base of the mat of food products is only heated sufficiently to set or coagulate the base. Thus, the mat 4 can be efficiently and thoroughly cooked as it passes through the cooker. After cooking, the mat 4 may be broken up into individual pieces using a breaking apparatus 12. The broken food pieces are then transferred to a vibrating conveyer 15 which has the effect of separating the pieces prior to delivery onto a conveyor 16 of a freezer such as a spiral freezer 17.

In more detail, the marinade of food pieces is delivered through an inlet 30 of a preparation apparatus 31. The apparatus comprises a base housing 32 with

doors 33 and wheels 34 for moving the apparatus into and off-line. The heat exchanger 1 is located in the housing 32 and the heated plate 2 is located on top of the housing 32.

An upper conveyor assembly 35 is mounted to the housing 32. In this case the conveyor assembly 35 is pivotally mounted at 36 to rams 37 which assist the ease of movement of the conveyor assembly between a lowered engaged position (Figs. 1 to 3) and a raised position (Figs. 4, 5) which facilitates cleaning.

Referring in particular to Figs. 1 to 7 the heat exchanger 1 comprises a pair of heat exchange tubes, in this case an inlet tube 40 and an outlet tube 41 which are interconnected by a U-shaped connector 42, which is removable for cleaning. The inlet 30 for food products is connected to the inlet tube 40 and the outlet tube 41 is connected by means of a stream splitter (not shown) to a number of (in this case three) outlets 45 through which food products are discharged for delivery onto the heated bed 2.

Each of the tubes 40,41 comprises an outlet jacket 48 and an inner core 47 with an annular passageway 49 therebetween through which the product flows. Hot water is circulated through the jacket 48 through hot water connectors 50. The same or a different heat exchange fluid (such as steam) is circulated through the inner core 47 through pipework 51. The arrangement of the heat exchange fluid pipework 52 for the heated plate 2 is also visible in Fig. 6.

The conveyor assembly 35 comprises an endless belt 55 of Teflon (TM) or the like which is trained around end shafts 56,57 , one or both of which may be driven by a motor. A plurality of longitudinally spared-apart slats 60 extend outwardly of the belt 55 to engage with and move the food products on the heated bed 2 from an inlet end 61 to an outlet end 62. It will be noted (see especially Fig. 4) that an extension plate 65 is provided adjacent to the inlet end 61 of the heated

plate 2. The outlets 45 through which the slurry is delivered are located in the extension plate 65. Initially, the slurry exits upwardly and impinges against the conveyor belt 55 between adjacent slats 60. This causes the slurry to spread across the plate 65 whilst being confined by the slats 60. As the conveyor moves the slurry is delivered from the extension plate 65 onto the inlet end 61 of the heated bed 2. As described above, the heated bed 2 causes the base of the slurry to coagulate or set forming a mat 4 as the food products are advanced along the heated bed 2 by the conveyor. At the outlet end 62 the mat 4 is delivered onto the transfer conveyor 5.

In use, a frozen block of chicken pieces is first tempered up to about –2 °C over a period of 24 to 48 hours. The tempered block is then diced to form pieces which are typically 25 x 16 x 16 mm. The chicken pieces are mixed with a marinade and the slurry thus formed is pumped through the inlet 30 into the heat exchanger 1. On passage through the heat exchanger tubes 40, 41, the temperature of the chicken pieces is substantially equalised to about 25° C. Hot water is circulated through the tubes 40, 41 at about 90°C and the residence time in the tubes is typically 2 minutes.

The slurry of the meat pieces whose temperature has been equalised in the heat exchanger 1 is then delivered to the heated bed 2 through which steam is circulated to heat the base of the food pieces to about 55°C. The residence time on the heated plate is about 1.5 minutes.

The invention provides a highly efficient system for preparing food products for cooking. The temperature of the pieces may first be equalised. The base of the pieces are set and coagulated forming a mat which is easily handled during subsequent processing as described above. The system maximises throughput and energy usage as the cooking process can be optimised in view of the substantially uniform temperature of the food products at the inlet end. Yield is also increased

as the mat ensures that substantially no losses occur due to product overflow or through a mesh belt of the cooker system.

The invention is not limited to the embodiments hereinbefore described which may be varied in detail.

Claims

1. Apparatus for preparing food products for cooking comprising:

a heated bed having an inlet end and an outlet end; and

means for leading the food products along the heated bed from the inlet end to the outlet end;

the heated bed causing a base of the food products to set or coagulate as the food products are led along the heated bed.

2. Apparatus as claimed in claim 1 wherein the heated bed comprises a heated plate which may be steam heated, the heated bed may be heated to a temperature of at least 130^0C.

3. Apparatus as claimed in claim 1 or 2 wherein the means for leading the food products along the heated bed comprises a conveyor above the heated bed which drags the food products along the heated bed, and wherein the apparatus comprises spreading means for spreading the food products across the heated bed at the inlet end thereof, and wherein the spreading means comprises a portion of the conveyor.

4. Apparatus as claimed in any of claims 1 to 3 comprising temperature equalising means for substantially equalising the temperature of the food products prior to delivery onto the heated bed, and wherein the temperature equalising means comprises a heat exchanger, and wherein the apparatus comprises means for leading the food products through the heat exchanger, and wherein the means for leading the food products through the heat exchanger comprises a pump, and

wherein the heat exchanger comprises an annular passageway through which the food products are led, and wherein a heating fluid is circulated through a central core and/or an outer jacket between which the annular passageway is defined, and wherein the heating medium comprises water at a temperature of from 85 to 95 ^{0}C, and wherein the apparatus comprises an outlet from the heat exchanger located adjacent to the inlet end of the heated bed, and wherein the outlet is divided into a number of outlets which are spaced-apart across the width of the heated bed adjacent to an inlet end thereof.

5. Apparatus for preparing cooked food products comprising and apparatus as claimed in any of claims 1 to 4, the apparatus comprising a transfer conveyor for transferring the prepared food products to a cooker, and wherein the apparatus comprises a char grilling system for char grilling the food products as they are led along the transfer conveyor, and wherein the cooker comprises a support conveyor of mesh construction, and wherein the cooker is a continuous thermal zone cooker, and wherein the apparatus comprises a breaker for breaking up a cooked mat of food products at an outlet of the cooker, and wherein the apparatus comprises a vibrating conveyor along which the food products are led from an outlet of the cooker, and wherein the apparatus comprises a freezer to which the food products are led from the cooker outlet.

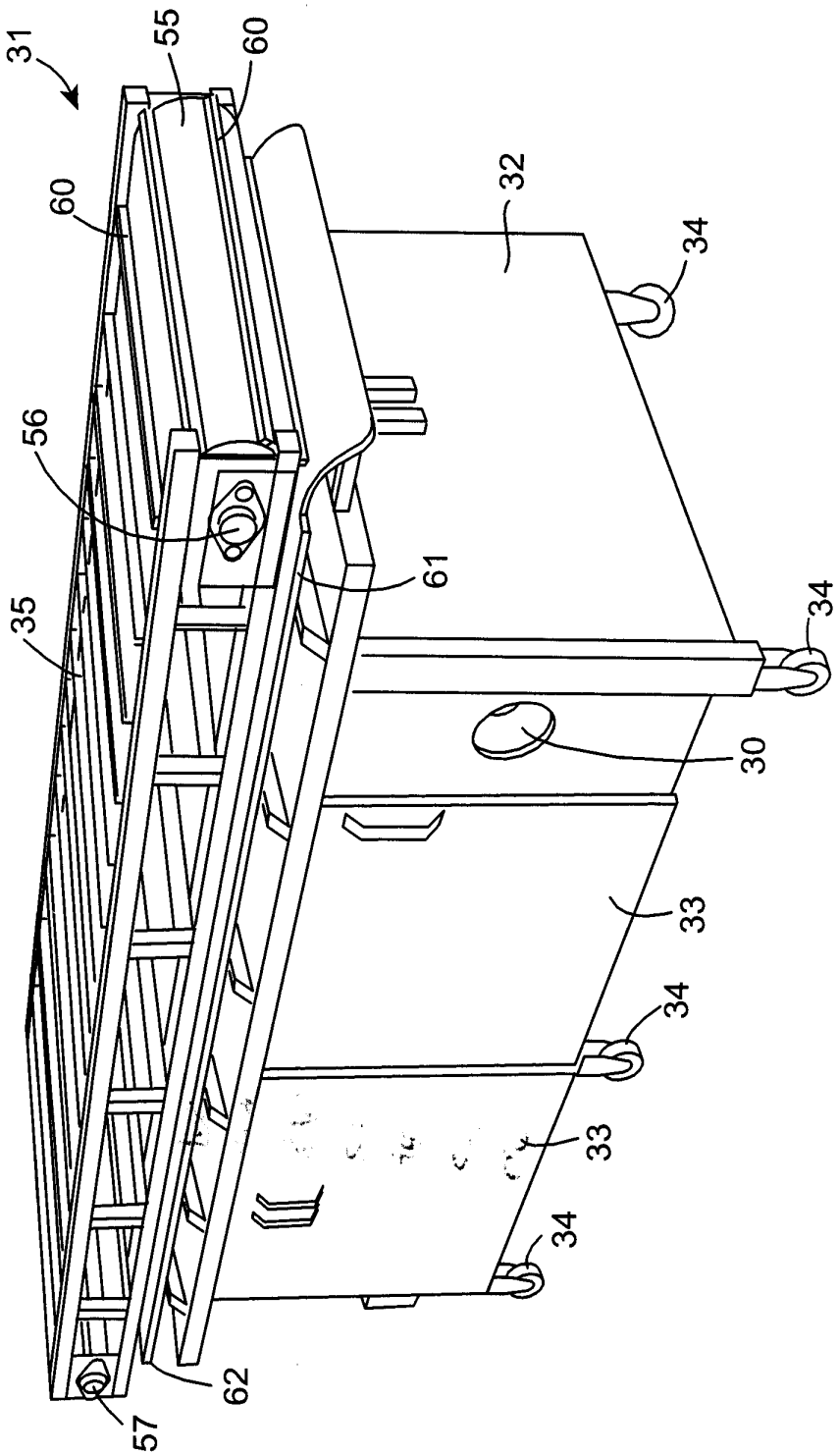


Fig. 1

Fig. 2

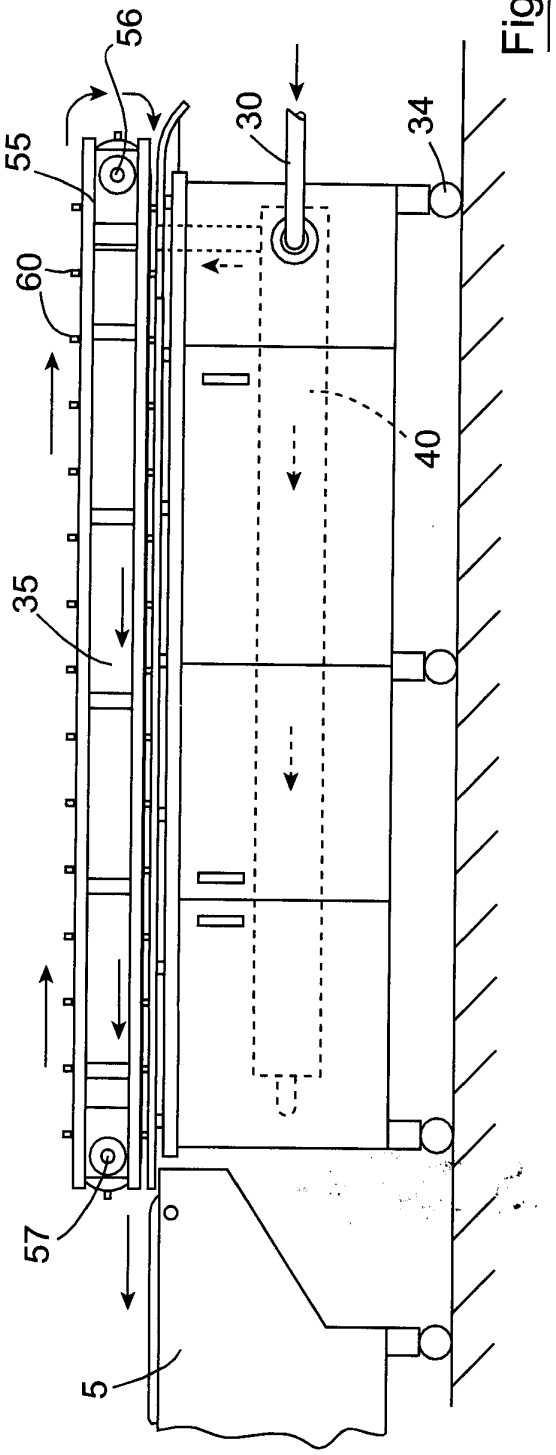
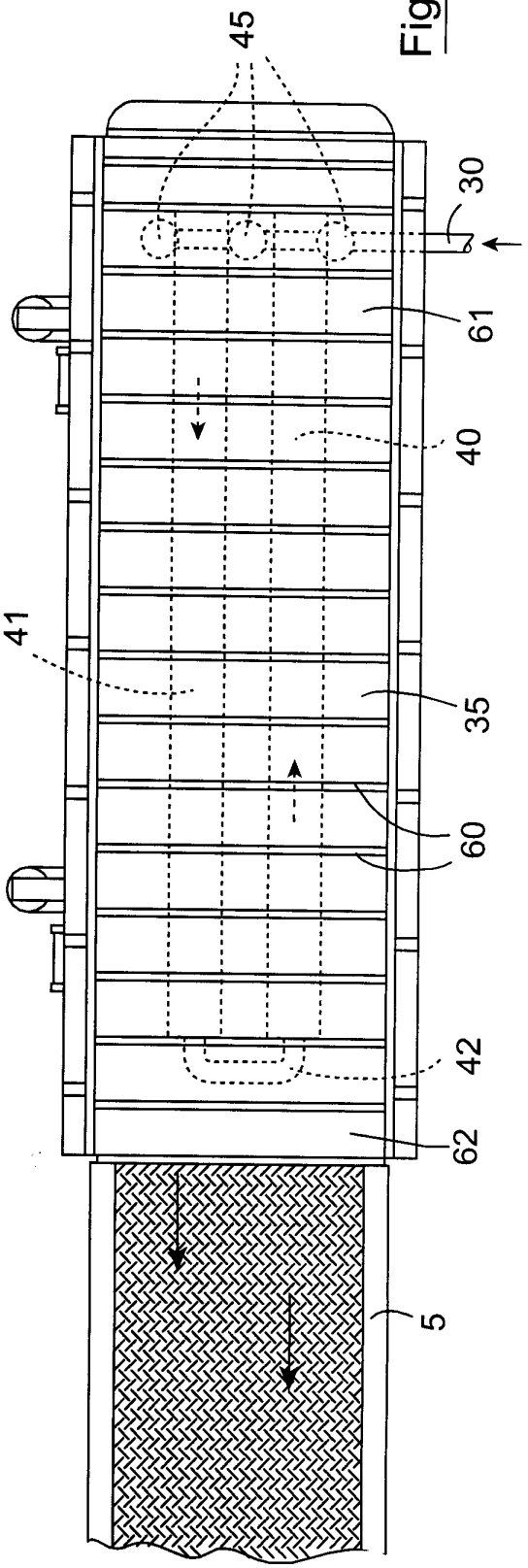


Fig. 3



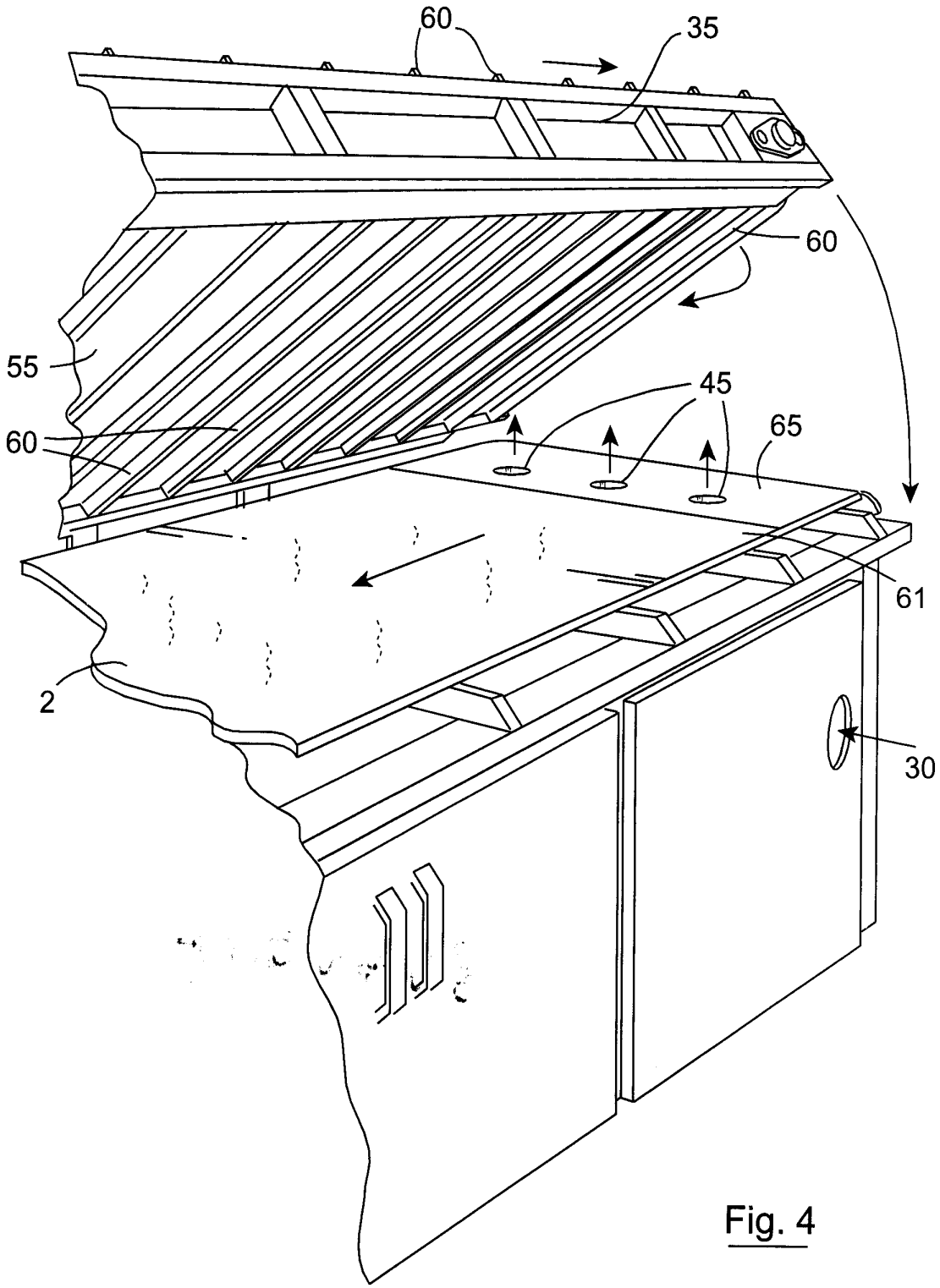


Fig. 4

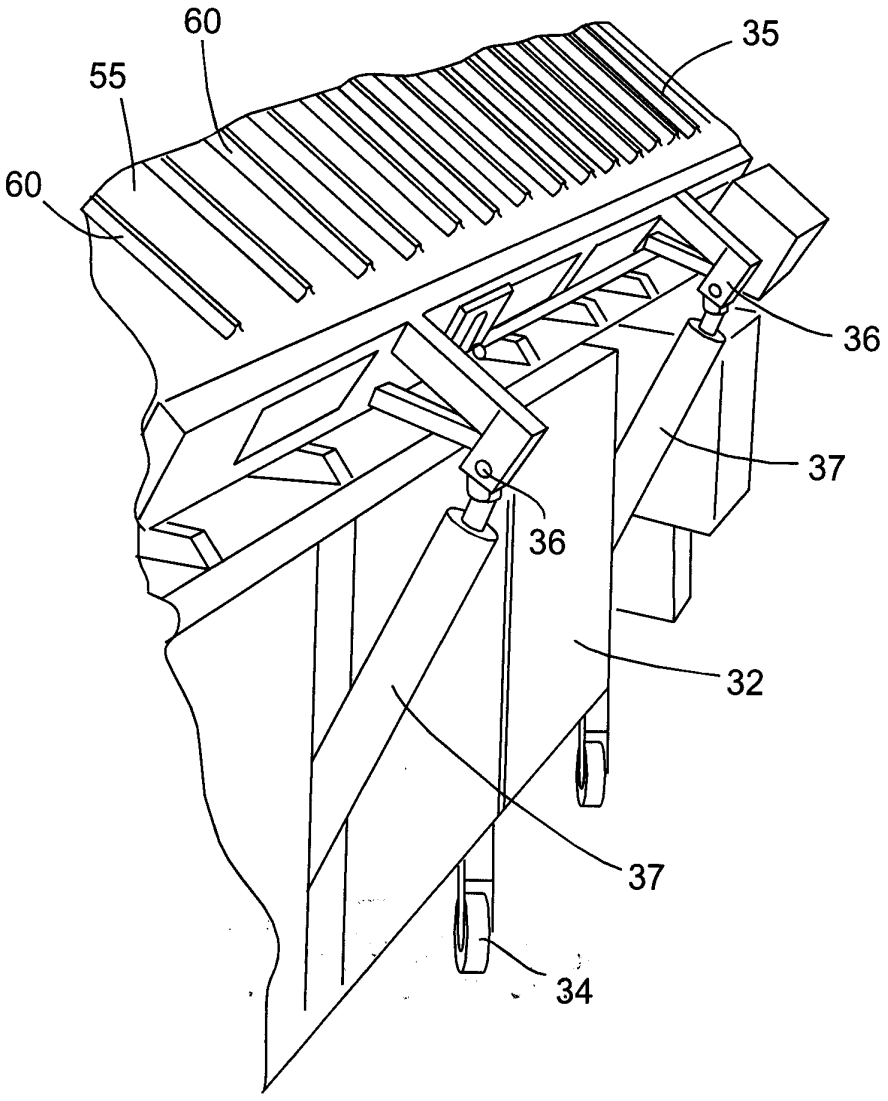


Fig. 5

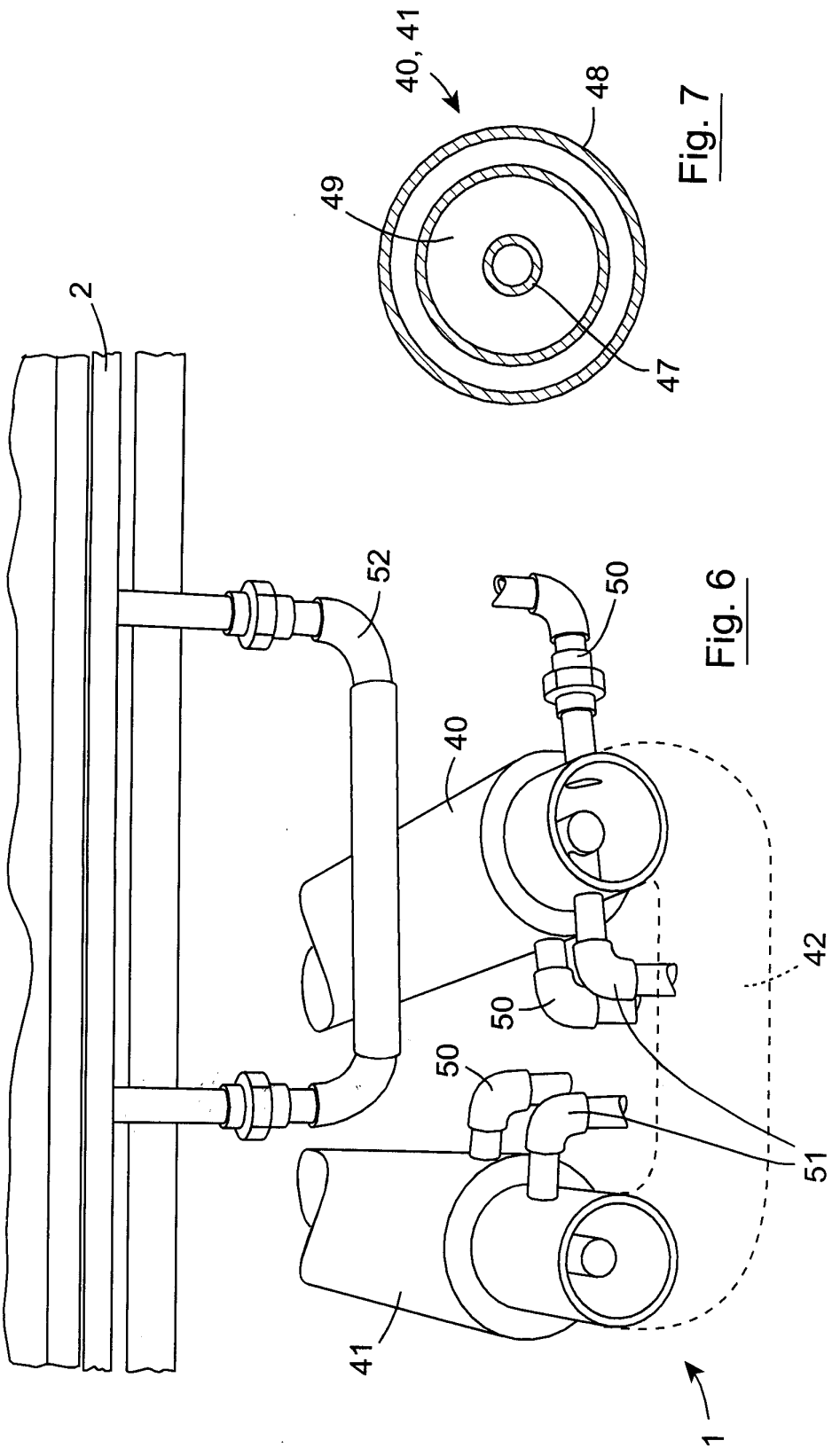


Fig. 7

Fig. 6

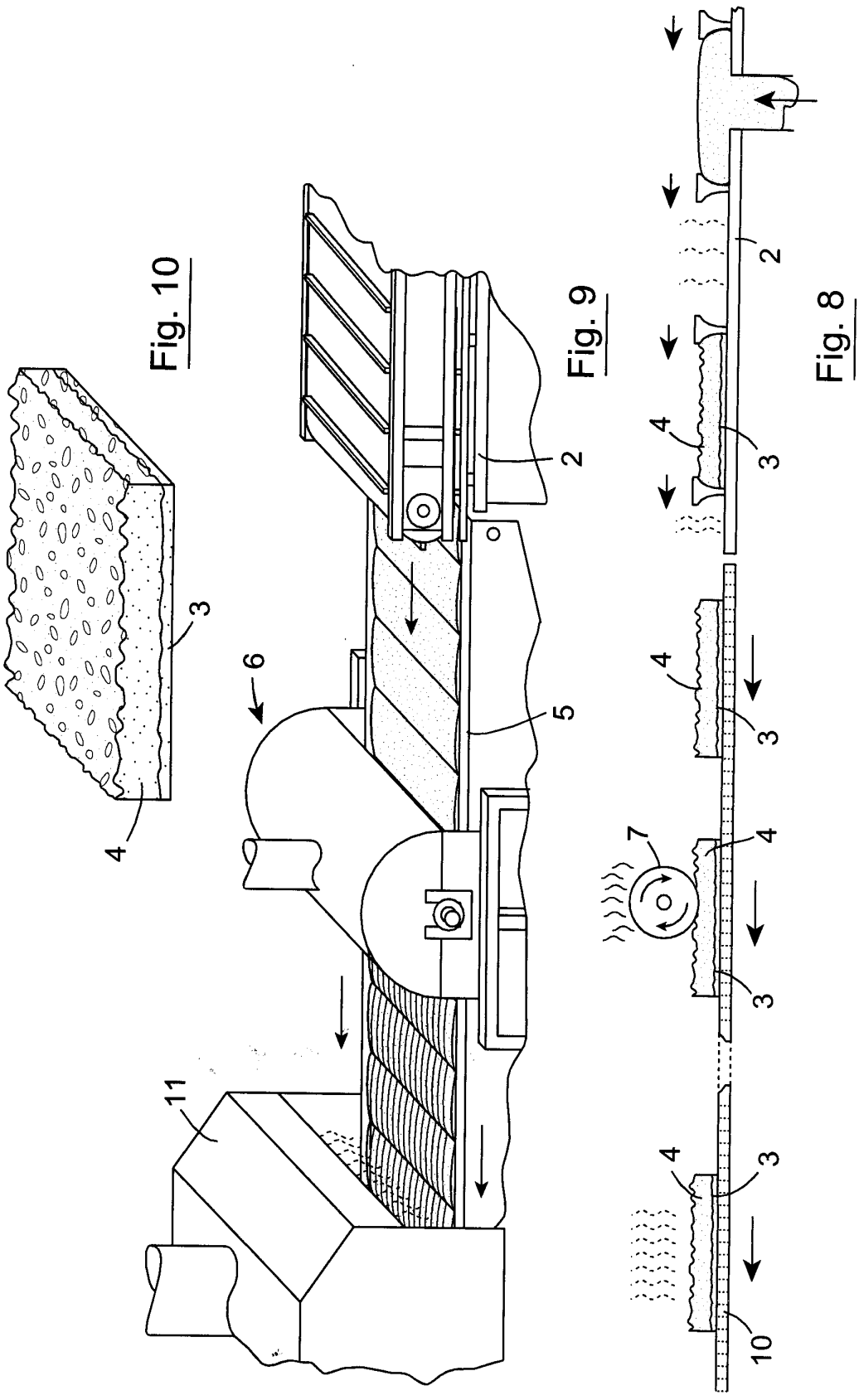


Fig. 10

Fig. 9

Fig. 8

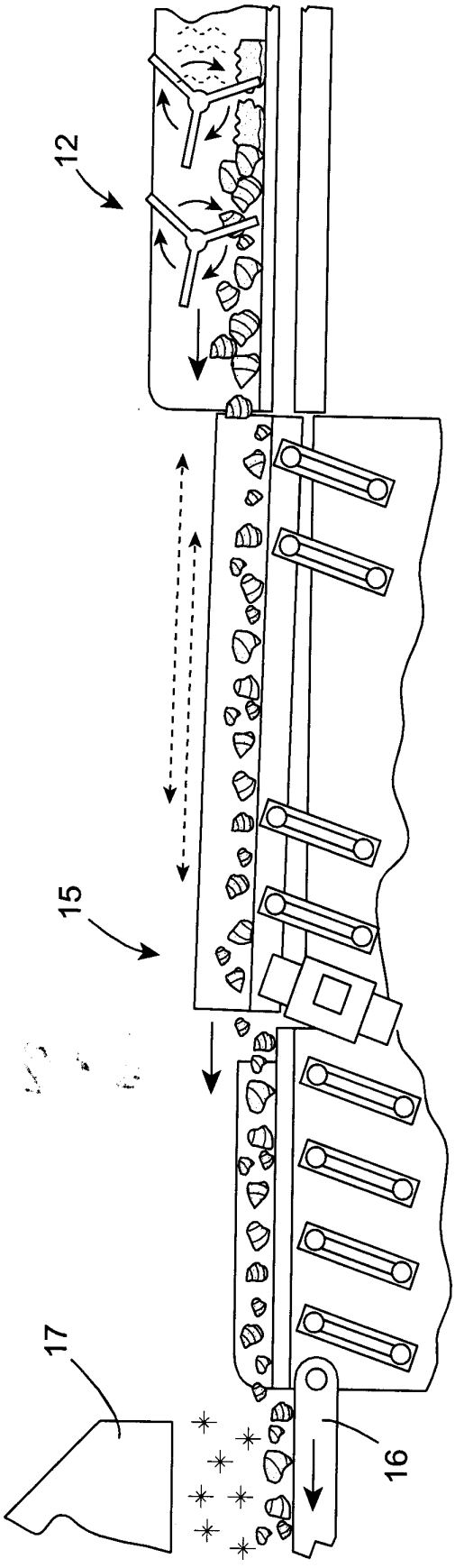


Fig. 11