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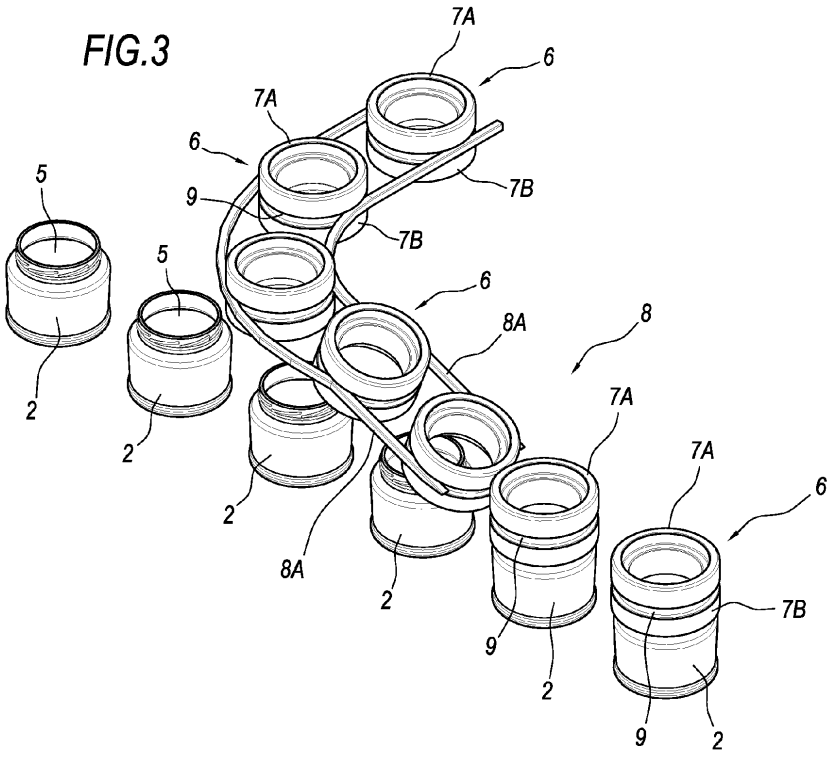
(54) An apparatus and a process for filling a container with a food product comprising solid pieces

(57) An apparatus (1) for filling a container (2) with a food product comprising solid pieces comprises: a tank (3) filled with said product and having a filler outlet (4) designed to release the product into the container (2) through an opening (5) in the container; an element (6) forming a passage for the product and having a first end (7A) designed to receive the product from the filler outlet (4) and a second end (7B) that can be connected to the opening (5) of the container to extend the latter's capacity upwards; coupling means (8), operating on the element (6) to couple the latter to the container (2).

FIG.3



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Description

[0001] This invention relates to an apparatus and a process for filling a container with a food product comprising solid pieces.

[0002] Generally speaking, the invention addresses the industry of filling of containers such as bottles, jars or cans.

[0003] The machinery used in this industry allows a food product (whether liquid or solid) to be filled into a container through suitable filling nozzles.

[0004] The machinery varies widely according to the type of container and food product but generally comprises metering systems for measuring the product filled into the container. It also involves coupling the mouth of the container (that is to say, the open part of the container) with the filling nozzle.

This poses two types of problem.

[0005] Firstly, there are products which are subject to volumetric variations. In these cases, although the product reaches the required level in the container when initially filled (thanks to the metering system), there is the risk of this level changing. This constitutes a limitation of prior art filling systems.

[0006] Secondly, the prior art solutions do not have a simple and effecting method of adapting the filling machinery to containers with mouths of different shapes and sizes.

[0007] More specifically, the invention addresses the industry of filling of containers (such as, for example, glass jars) with products (foods) having at least one solid part in pieces or grains (for example, chopped vegetables).

[0008] In this context, since the product is not uniform and granular, there is the further problem of distributing the product pieces uniformly within the container in order to maximize the amount of product filled into the container.

[0009] In light of this, the prior art solutions include equipment comprising a hopper filled with the product and having a filler outlet which is coupled to the opening of the container in such a way that the product can be gravity fed into the container through the opening.

[0010] Usually, the equipment is also equipped with a vibrating structure that is placed in contact with the container during filling.

[0011] Thus, the prior art processes involve placing the container on a vibrating support and then releasing the product by gravity into the container through the opening (of the container itself) which is connected to the filler outlet of the hopper.

[0012] The vibrations transmitted to the container during filling helps the product to settle relatively evenly inside the container.

[0013] After filling, the filler outlet is moved to a position of non-interference to allow the full container to be closed.

[0014] In order to maximize the amount of product filled into the container, more product is released than the container can hold.

[0015] After that, the product at the top of the container opening is pressed by hand into the container by a person, applying a manual compacting action in such a way that the container is made ready for closure.

[0016] These solutions are not free of disadvantages, however.

[0017] A first disadvantage is product wastage. In effect, releasing more product than the container can hold, despite the vibrations, means that the excess product spills from the container when the filler outlet is moved away. Moreover, when the hopper outlet is lifted, it creates a dragging effect on the product at the top of the container opening and thus increases the product spill. Product spills also lead to problems of machine hygiene.

[0018] Another disadvantage is due to wear on the parts of the hopper that come into contact with the containers. Since the containers are subjected to vibrations and the hopper parts are moved rapidly up and down, friction is created between the mouth of the container and the parts of the hopper coupled to it.

[0019] A further disadvantage is due to the need for personnel to compact the product into the containers before closing the containers.

[0020] Yet another disadvantage is due to being unable to fill all the containers with exactly the same amount of product. Indeed, even if the quantity released by the product is constant thanks to a metering system, the subsequent product spills vary considerably and in unforeseeable manner from one container to another.

[0021] A further disadvantage is the noise made by the vibrating containers (which rattle against the hopper outlets). In effect, to limit the problems of product spill and irregular weight of the full containers, the tendency is to increase the intensity of the vibrations, which obviously worsens the problems of noise and part wear.

[0022] This invention has for an aim to provide an apparatus and a process for filling a container with a food product comprising solid pieces and which can overcome the above mentioned disadvantages of the prior art.

[0023] More specifically, the aim of this invention is to provide an apparatus and a process for filling a container with a food product comprising solid pieces and which allow for variations in product density and where changeover to containers with mouths of different size and shape is simple. More specifically, the aim of this invention is to provide an apparatus and a process for filling a container with a food product comprising solid pieces and which can reduce product wastage and maximize the amount of product filled into the container.

[0024] A further aim of the invention is to provide an apparatus and a process for filling a container with a food product comprising solid pieces and which can guarantee a constant quantity of product in the container at the end of the process.

[0025] A further aim of the invention is to provide an

apparatus and a process for filling a container with a food product comprising solid pieces and which has a particularly low noise level.

[0026] A further aim of the invention is to provide an apparatus and a process for filling a container with a food product comprising solid pieces and which is particularly robust and reliable.

[0027] A further aim of the invention is to provide an apparatus and a process for filling a container with a food product comprising solid pieces and which is particularly efficient (in terms of hourly production) and economical.

[0028] These aims are fully achieved by the apparatus according to this invention, as characterized in the appended claims and, more specifically, in that it comprises:

- an element forming a passage for the product and having a first end designed to receive the product from the filler outlet and a second end that can be connected to the opening of the container to extend the latter's capacity upwards;
- coupling means operating on the element to couple the latter to the container.

[0029] The process according to this invention is characterized in that it comprises the following steps, which precede the step of releasing the product:

- preparing an element forming a passage for the product and having a first end designed to receive the product from the filler outlet and a second end that can be connected to the opening of the container to extend the latter's capacity upwards;
- coupling the element to the opening of the container, before the step of releasing the product, in such a way as to extend the container's capacity upwards during the step of releasing the product.

[0030] These and other features are more apparent from the detailed description, set out below, of a preferred non-limiting example embodiment of the invention, with reference to the accompanying drawings, in which:

- Figure 1 is a plan view of the apparatus according to the invention;
- Figure 2 is a perspective view of the apparatus of Figure 1;
- Figure 3 is a perspective view of the detail labelled A in Figure 1;
- Figure 4 is a perspective view of a detail of the apparatus of Figure 1, in a first operating position;
- Figure 5 shows the detail of Figure 4 in a second operating position;
- Figure 6 shows the detail of Figure 4 in a third operating position;
- Figure 7 is a side view of the detail of Figure 4;
- Figure 8 shows the detail of Figure 7 in the second operating position;
- Figure 9 shows the detail of Figure 4 in the third operating position.

[0031] The numeral 1 in the accompanying drawings denotes an apparatus according to this invention. The apparatus 1 is an apparatus for filling a container 2 (for example a glass bottle or jar) with a food product.

[0032] More specifically, the apparatus 1 is an apparatus for filling a container 2 (more specifically, a jar) with a food product comprising solid pieces (for example, chopped vegetables).

[0033] It should be noted that the food product may also comprise a liquid (for example, chopped vegetables in oil, the latter being added before or together with the vegetable pieces.

[0034] The apparatus 1 is equipped with a tank 3 which holds the product to be filled into the containers 2.

[0035] The tank 3 has a filler outlet 4 designed to release the product into the container 2 through an opening 5 in the container 2, that is to say, through the mouth of the container 2.

[0036] In the example illustrated, the tank 3 comprises a hopper. In effect, in the example illustrated, the food product comprises solid pieces or is a granular product.

[0037] It should be noted, however, that the tank 3 might be any receptacle suitable for holding food products having solid pieces and, if necessary, liquids or semi-liquids.

[0038] According to the invention, the apparatus 1 comprises at least one element 6 forming a passage for the product and having a first end 7A designed to receive the product from the filler outlet 4 and a second end 7B that can be connected to the opening 5 of the container 2 to extend the latter's capacity upwards;

[0039] It should be noted that the element 6 defines a tube having an inlet and an outlet corresponding to the ends 7A and 7B.

[0040] The apparatus 1 further comprises a feeder 8 for the elements 6, configured to couple the element 6 to the container 2 and, more specifically, to the opening (or mouth) 5 of the container 2. Thus, the feeder 8 constitutes coupling means operating on the element 6 to couple the latter to the container 2.

[0041] It should be noted that the first end 7A of the element 6 is configured to allow the element to be connected to the filler outlet 4.

[0042] Thus, when the element 6 is associated with the container 2 and connected to the filler outlet 4, it defines a tube for transferring the food product from the tank 3 to the container 2; that is to say, the element 6 is designed to receive the food product from the tank 3 through the filler outlet 4 and to transfer it to the container 2.

[0043] It should be noted that the element 6 is coupled to the container 2 removably. Further, the element 6 is preferably removably connectable to the filler outlet 4.

[0044] Preferably, the element 6 is annular or ring-shaped; that is to say, it is preferably substantially cylindrical in shape (although other shapes are also contem-

plated for the element 6).

[0045] Preferably, the element 6 is made of a material having elastic properties, preferably a plastic material, so as to protect the container 2 and the filler outlet 4 from shocks due to relative movements or vibrations. For example the element 6 is made preferably of PE.

[0046] Preferably, both the first end 7A and the second end 7B of the element 6 can be removably coupled to the opening 5 of the container 2.

[0047] Also, preferably, both the first end 7A and the second end 7B of the element 6 can be removably coupled to the filling outlet 4.

[0048] Thus, the first end 7A and the second end 7B of the element 6 are shaped in the same way.

[0049] That way, the element 6 can be coupled to the container 2 either in a first position or in a second position which is upside down (that is, turned by 180 degrees) relative to the first position, without distinction.

[0050] That means, advantageously, that the apparatus 1 is particularly easy to make.

[0051] Preferably, the element 6 has a groove 9 on the outside of its lateral surface.

[0052] The groove 9 is preferably an annular groove.

[0053] The groove 9 advantageously facilitates handling of the element 6, for example by the coupling means.

[0054] Thus, in the example illustrated, the feeder 8 comprises two guide members 8A which are operatively engaged in the groove 9 of the element 6.

[0055] Preferably, the guide members 8A defining the feeder 8 are downwardly inclined.

[0056] Also, preferably, the free ends of the guide members 8A defining the feeder 8 are spaced from each other by a distance that is smaller than the outside diameter defined by the element 6 at the groove 9. Thus, the element 6 located at the free end of the feeder 8 is held back by the latter, which overcomes the force of gravity applied to the element as a result of the downward inclination of the guide members 8A.

[0057] Also, the guide members 8A defining the feeder 8 are elastically deformable between a rest position, where they hold back the element 6 and a spread apart position where the spacing between their free ends is greater than the outside diameter defined by the element 6 at the groove 9, so as to release the element 6.

[0058] It should be noted that the coupling means might alternatively comprise, instead of the feeder 8, other feed systems such as robotized manipulators or arms.

[0059] Thus, the invention allows the container 2 to be filled with a quantity of product greater than or equal to the capacity of the container 2 without the risk of product spilling from the container 2, thanks to the presence of the element 6 which, before it is removed from the container 2, temporarily extends the capacity of the container 2.

[0060] Operatively, during filling, the element 6 is interposed between the opening 5 of the container 2 and the filler outlet 4.

[0061] That means the filling apparatus 1 can be adapted to the type of container 2 without operating on the filler outlet 4 but by simply substituting the element 6 with an equivalent element whose second end 7B is shaped so it can be suitably coupled to the container 2.

[0062] That is particularly advantageous because the element 6 is simple and inexpensive to make.

[0063] Preferably, the apparatus 1 also comprises a presser 10 which is movable between a raised position of non interference with the element 6 associated with the container 2, and a lowered position where it is inserted into the element 6 in order to press the product into the container 2, the food product comprising solid pieces.

[0064] The presser 10 preferably comprises a pad (for example made of PE) shaped in such a way as to fit precisely into the element 6.

[0065] More preferably, the pad is shaped in such a way that it fits precisely into and fully occupies the space inside the element 6.

[0066] Preferably, the apparatus 1 is equipped with a vibrating structure 11 which is operatively in contact with the container 2 during filling. Also, the filler outlet 4 is preferably configured to release the product into the container 2 by gravity.

[0067] The apparatus 1 also comprises a carousel 12 designed to move a plurality of containers 2 coupled to a peripheral portion of it.

[0068] The apparatus 1 comprises a plurality of elements 6 and the second end 7B of each element 6 is operatively coupled to the opening of the corresponding container 2.

[0069] The tank 3 is (for example) a hopper having a plurality of filler outlets 4 associated with the carousel 12 and movable between a raised position of non-interference with the elements 6, and a lowered position where the first ends 7A of the elements 6 are coupled to the respective containers 2.

[0070] A guide 13 is associated with the peripheral portion of the carousel 12 in such a way that the bottom of each container 2 associated with the carousel 12 rests on the guide 13.

[0071] Preferably, at least one portion of the guide is connected to movement means (of per se known type and not illustrated) which are configured to move it vertically in alternating fashion.

[0072] Thus, the guide 13 and the movement means constitute the vibrating structure 11. The structure 11 operates on at least one portion of the containers 2 associated with the carousel 12. It should be noted that the filler outlets 4 are also movable vertically in order to follow the vertical movements imparted to the containers 2 (and thus also to the filler outlets 4 connected to the containers 2) by the vibrating structure 11.

[0073] The apparatus 1 preferably also comprises a compacting unit 14. The compacting unit 14 is equipped with at least one of the pressers 10 movable between a raised position of non interference with the element 6 coupled to the corresponding container 2 and a lowered

position where the presser 10 is inserted into the element 6 in order to press the product into the container 2.

[0074] Preferably, the compacting unit 14 is equipped with a plurality of pressers 10.

[0075] More in detail, according to the embodiment illustrated, the apparatus 1 contemplates the following.

[0076] The apparatus 1 comprises a feed starwheel 15 which supplies the containers 2 (empty) and the elements 6 coupled thereto to the carousel 12.

[0077] The apparatus 1 comprises an outfeed starwheel 16 designed to transfer the containers 2 filled with product and the elements 6 coupled to them as they leave the carousel 12.

[0078] The apparatus 1 also comprises a conveyor 17 (for example a belt) for transferring the containers 2, whether or not coupled to the respective elements 6 from an empty container loading station 18 to the feed starwheel 15.

[0079] Preferably, the feeder 8 is located in an intermediate stretch of the conveyor 17 between the loading station 18 and the infeed starwheel 15.

[0080] In practice, the feeder 8 is positioned in such a way that the element 6 held back by the guide members 8A (at the free ends of the selfsame guide members 8A) is located along the path defined by the conveyor 17, above the containers 2 transported by the conveyor 17 and inclined (preferably at an angle of approximately 30 degrees) to the containers 2, so that the container 2, during the movement imparted to it by the conveyor 17, strikes the element 6 (that is, engages a bottom portion of it) and takes it up, applying a pulling force which overcomes the elastic force by which the element 6 is held back by the feeder 8.

[0081] Thus, the feeder 8 holds a plurality of elements 6 placed side by side and with their second ends 7B facing down, so as to place one element 6 (more specifically, the one located at the free end of the feeder 8) in a fixed position relative to the moving containers 2 in such a manner that each movable container 2 interacts with and takes up the annular element positioned at the free end of the feeder 8.

[0082] Thus, the feeder 8 is configured to place the elements 6 one by one at a feed position with the second end 7B of each element 6 facing downwards at a fixed position relative to the moving containers 2 and inclined at an angle to them in such a way that each container 2, as it moves, interacts with and takes up the element 6.

[0083] It should also be noticed that the feeder 8 is positioned above a portion of the carousel 12 (and not above a portion of the conveyor 17) so that the containers 2 moving as one with the carousel 12 interact with and take up the elements 6 as the latter in turn move to the feed position.

[0084] The apparatus 1 also comprises a conveyor (for example a belt) for transferring the containers 2 coupled to the respective elements 6 from the outfeed starwheel 16 to the compacting unit 14. In the example illustrated, the conveyor is the conveyor 17, arranged along a predetermined path in such a way as to make the containers 2 ready to be picked up by the infeed starwheel 15 (upstream of the filling carousel 12) and to receive the containers 2 from the outfeed starwheel 16 (downstream of the filling carousel 12).

[0085] This is advantageous because using a single conveyor 17 makes the apparatus 1 simpler and more efficient. The use of two separate conveyors is also imaginable, however.

[0086] The apparatus 1 also comprises a conveyor unit 19 for transporting the elements 6 and by which the elements 6 are transferred from the compacting unit 14 to the feeder 8.

[0087] The conveyor unit 19 for transporting the elements 6 comprises, for example, the guide members 8A extended in such a way as to define a transfer path from the compacting unit 14 to the feeder 8.

[0088] As regards the compacting unit 14, the apparatus 1 comprises a plurality of turrets 20 associated with a transmission means 21 defining a closed loop movement path (for example, the transmission means 21 comprises a chain or belt mounted around pulleys and driven by a customary electric motor not illustrated in the drawings).

[0089] The transmission means 21 has at least one straight stretch.

[0090] The straight stretch is positioned on a worm screw 22 configured to interact with the containers 2 coupled to the respective elements 6 and transported (by the conveyor 17) out of the outfeed starwheel 16 (downstream of the filling carousel 12).

[0091] The worm screw 22 constitutes spacing means operating on the containers 2 in such a way as to position each container at a predetermined distance from the container 2 preceding it and the one following it (it should be noted that the containers 2 are always transported in a row). Each turret 20 comprises a pick-up element 23 adapted to interact with and take up the element 6. The pick-up element 23 comprises a protrusion that is shaped to fit into a portion of the groove 9 of the element 6.

[0092] Further, each turret 20 has movably associated with it a corresponding presser 10, in such a way that the pressers 10 can be activated on the containers 2, and on the respective elements 6 associated therewith, when the containers 2 are interacting with the spacing means.

[0093] It should be noted that the element 23 is also movable vertically between a position where it interacts with the element 6 associated with the container 2, and a raised position where it holds the element 6 in a raised position of non-interference with the container 2.

[0094] The compacting unit 14 therefore constitutes a means for pressing down the food product in the containers 2 and in the elements 6 coupled thereto.

[0095] It should be noted that the compacting unit 14 is fully automatic, that is to say, it is configured to press the product into the containers 2 automatically and without any manual intervention.

[0096] The compacting unit 14 is also configured to

pick up the elements 6 from the containers 2 they are coupled to and to transfer them to the conveyor unit 19.

[0097] It should be noted that the containers 2 without the elements 6 on them and with the product pressed into them are transported (preferably by the same conveyor 17) out of the compacting unit 14 (and fed, for example, to a lidding machine). Thus, the apparatus 1 comprises a conveyor line for the elements 6 which forms a closed loop.

[0098] In effect, the element 6 conveyor line comprises the conveyor unit 19 (configured to transfer the elements 6 from the compacting unit 14 to the feeder 8), the conveyor 17 (configured to transfer the elements 6 from the feeder 8 to the infeed starwheel 15 and from the outfeed starwheel 16 to the compacting unit 14), the infeed starwheel 15, the carousel 12, the outfeed starwheel 16 and the transmission means 21 (configured to transfer the elements 6 in the compacting unit 14 from the conveyor 17 to the conveyor unit 19).

[0099] According to another aspect of the invention, the apparatus 1 comprises a tub 24 for washing the elements 6, located between the compacting station 14 and the feeder 8.

[0100] Preferably, the tub 24 for washing the elements 6 is located downstream of the compacting station 14, at the start of (or further along) the conveyor unit 19 of the elements 6.

[0101] Preferably, the apparatus 1 also comprises a conveyor belt 25 located downstream of the washing tub 24 to move the elements 6 feeding out of the washing tub 24 to the conveyor unit 19. Thus, as they feed out of the washing tub 24, the elements 6 are taken up by the conveyor belt 25 and transferred to the conveyor unit 19 which transports them to the feeder 8.

[0102] This advantageously creates a closed loop system whereby the apparatus 1 continuously fills jars with a food product comprising solid pieces using a limited number of elements 6 (equal in number to the number of filler outlets 4 associated with the carousel 12) which are cyclically washed and sanitized.

[0103] That way, the apparatus 1 allows the containers 2 to be filled as if the containers 2 were modular containers composed of a primary portion which the apparatus 1 receives empty and feeds out full of the food product, and a secondary portion attachable to the container 2 by applying it to the mouth of the container 2 in order to increase the latter's capacity temporarily (substantially for the duration of the filling and compacting operations).

[0104] The secondary portions of the containers (consisting of the elements 6) remain within the apparatus 1 and are moved continuously round a closed loop conveyor line.

[0105] Operatively, the apparatus 1 works as follows. The empty containers 2 to be filled are loaded onto the conveyor 17 at the loading station. Transported in single file by the conveyor 17, the containers 2 reach the feeder 8 of the elements 6 where each of them picks up a respective element 6. Thus, downstream of the feeder 8, each of the containers 2 has an element 6 applied to the top of it in such a way as to extend the capacity of the container upwards.

[0106] The containers 2 travelling on the conveyor 17 with the respective elements 6 applied to them are taken up by the infeed starwheel 15 and fed to the carousel 12.

[0107] In the carousel 12 the containers 2 with the respective elements 6 applied to them are associated with a perimeter portion of the carousel 12 and receive the food product through respective filler outlets 4.

[0108] Along at least part of their path where they travel as one with the carousel 12, the containers 2 with the respective elements 6 applied to them are in contact with a vibrating structure 11 which moves them vertically together with the vibrating outlets 4 coupled to the respective elements 6.

[0109] After travelling all the way round as one with the carousel 12, the containers 2 with the respective elements 6 applied to them are taken up by the outfeed starwheel 16 which places them on the conveyor 17 (or on another conveyor).

[0110] The conveyor 17 carries them into the compacting unit 14.

[0111] In the compacting unit 14 the containers 2 interact with spacing means 22 which space them at regular intervals under a straight stretch of the transmission means 21.

[0112] Each container 2 with the respective element 6 applied to it (the container 2 being completely full and the element 6 being at least partly filled with product) is aligned with a corresponding presser 10.

[0113] Each presser 10 is associated with a respective turret 20.

[0114] The pick-up elements 23 of the turrets 20 hold the elements 6 while the pressers 10 are being aligned with the respective containers 2.

[0115] The pressers 10 are lowered in order to press the product into the containers 2.

[0116] Next, the pressers 10 are raised to the position of non-interference with the corresponding elements 6 and the pick-up elements 23 then lift the corresponding elements 6 to the position of non-interference with the containers 2.

[0117] The containers 2 filled with compacted product inside them are fed out of the apparatus 1.

[0118] The elements 6, once compacting has been carried out, are transferred to the washing tub 24 where they are cleaned and sanitized.

[0119] After being cleaned, the elements 6 are taken up by a conveyor belt 25 and transferred to the conveyor unit 19 which transports them to the feeder 8.

[0120] This invention also provides a process for filling a container 2 with a food product and comprising a step of releasing the product into the container 2 through an opening 5 in the container.

[0121] According to the invention, the process comprises the following steps:

- preparing at least one element 6 forming a passage for the product and having a first end 7A designed to receive the product from a filler outlet 4 and a second end 7B that can be connected to the opening 5 of the container 2 to extend the latter's capacity upwards;
- coupling the element 6 to the opening 5 of the container 2, before the step of releasing the product, in such a way as to extend the container's capacity upwards during the step of releasing the product.

[0122] More specifically, the process is a process for filling a container 2 with a food product comprising solid pieces.

[0123] In that case, preferably, the product is released into the container 2 by gravity.

[0124] There is also a step of vibrating the container 2 preferably by placing the container 2 on a vibrating support 11 during at least a part of the step of releasing the product.

[0125] Preferably, the step of releasing the product is followed by a step of compacting the product in the container 2 by inserting a presser 10 into the element 6 coupled to the container 2. Preferably, the process also comprises a step of moving the container 2 (or rather, the containers 2) along a predetermined path (for example the path defined by the conveyor 17, the infeed starwheel 15 the carousel 12 and the outfeed starwheel 16).

[0126] Preferably, there is a step of preparing the feeder 8 of the element 6 located at a fixed position relative to the container 2 and inclined at an angle to the vertical in such a way as to interact with the element 6 in order to pick the latter up, the step of releasing the product being performed after the pick-up step.

[0127] The invention thus offers the following advantages.

[0128] First of all, the above described apparatus and process for filling a container with a food product allow for variations in product density and simplify changeover to containers with mouths of different size and shape.

[0129] That is because during the process the capacity of the containers is extended upwards by applying the elements 6. The elements 6 are limited in number, form part of the apparatus 1 and, during a changeover, are particularly easy to substitute in order to adapt the filling outlet 4 to the size of the mouth of the container 2.

[0130] Moreover, the invention provides a particularly advantageous apparatus and process for filling a container with a food product comprising solid pieces.

[0131] In effect, the invention minimizes product wastage and maximizes the amount of product filled into the container 2.

[0132] This is made possible by the fact that the elements 6 applied to the top of the containers 2 prevent the product from spilling not only during filling but also during compacting of the product into container 2.

[0133] Further, the invention guarantees a constant quantity of product in the container at the end of the process thanks to the elimination of product loss (due to spilling) combined with the use of a volumetric metering device of a type that is customary in the trade.

[0134] Also, the process and apparatus according to the invention have a particularly low noise level and are extremely robust and reliable.

[0135] These advantages are made possible by the fact that the elements 6 associated with the containers (together with a particularly efficient compacting system) minimize (or even totally eliminate) the need to vibrate the containers 2, which in turn reduces noise and friction.

[0136] Lastly, the process and apparatus according to the invention are particularly efficient (in terms of hourly production) and economical.

[0137] In effect, the presence of a fully automatic compacting station (thanks also to the presence of the elements 6) eliminates the need for personnel for manually compacting the product inside the containers 2.

Claims

1. An apparatus (1) for filling a container (2) with a food product comprising solid pieces, equipped with a tank (3) filled with said product and having a filler outlet (4) designed to release the product into the container (2) through an opening (5) in the container, **characterized in that** it comprises:

   - an element (6) forming a passage for the product and having a first end (7A) designed to receive the product from the filler outlet (4) and a second end (7B) that can be connected to the opening (5) of the container to extend the latter's capacity upwards;
   - coupling means (8), operating on the element (6) to couple the latter to the container (2).

2. The apparatus according to claim 1, wherein the first end (7A) of the element (6) can be connected removably to the filler outlet (4) for receiving the food product.

3. The apparatus according to claim 1 or 2, comprising a presser (10) movable between a raised position of non interference with the element (6) and a lowered position where it is inserted into the element (6) in order to press the product into the container (2), the food product comprising solid pieces.

4. The apparatus according to any of the foregoing claims, comprising a vibrating structure (11) operatively in contact with the container (2) during filling, the filler outlet (4) being designed to release the product into the container (2) by gravity.

5. The apparatus according to any of the foregoing claims, comprising:

- a carousel (12) designed to move a plurality of containers (2) coupled to a peripheral portion of it;
- a plurality of elements (6) the second end (7B) of each of which is operatively coupled to the opening (5) of the corresponding container (2); the tank (3) having a plurality of filler outlets (4) associated with the carousel (12) and movable between a raised position of non-interference with the elements (6), and a lowered position where the first ends (7A) of the elements (6) are coupled to the respective containers (2).

6. The apparatus according to claim 5, comprising:

- a compacting unit (14) comprising at least one presser (10) movable between a raised position of non interference with the element (6) coupled to one of the containers (2) and a lowered position where it is inserted into the element (6) in order to press the product into the container (2);
- an outfeed starwheel (16) designed to transfer the containers (2) filled with product and the elements (6) coupled to them from the carousel (12) to the compacting unit (14).

7. The apparatus according to claim 5 or 6, wherein the coupling means comprise a feeder (8) of the elements (6) designed to place the elements (6) one by one at a feed position with the second end (7B) of each element (6) facing downwards at a fixed position relative to the moving containers (2) and inclined at an angle to them in such a way that the containers (2), as they move, interact with and pick up the element (6).

8. The apparatus according to any of the claims from 5 to 7, comprising a vibrating structure (11) operating on at least one portion of the plurality of containers (2) associated with the carousel (12).

9. The apparatus according to any of the foregoing claims, wherein the element (6) is ringshaped.

10. The apparatus according to any of the foregoing claims, wherein both the first and the second ends of the element (6) can be removably coupled to the opening (5) of the container (2).

11. The apparatus according to any of the foregoing claims, wherein the element (6) has an annular groove (9) on the outside of its lateral surface.

12. A process for filling a container (2) with a food product comprising solid pieces, comprising a step of releasing the product into the container (2) through an opening (5) in the container, and **characterized in that** it comprises the following steps:

- preparing an element (6) forming a passage for the product and having a first end (7A) designed to receive the product from a filler outlet (4) and a second end (7B) that can be connected to the opening (5) of the container (2) to extend the latter's capacity upwards;
- coupling the element (6) to the opening (5) in the container (2), before the step of releasing the product, in such a way as to extend the container's capacity upwards during the step of releasing the product.

13. The process according to claim 12, wherein the product is released into the container (2) by gravity and wherein the container (2) is positioned on a vibrating support (11) during at least a part of the step of releasing the product.

14. The process according to claim 12 or 13, wherein the step of releasing the product is followed by a step of compacting the product in the container (2) by inserting a presser (10) into the element (6) coupled to the container (2).

15. The process according to any of the claims from 12 to 14, comprising the steps of:

- moving the container (2) along a predetermined path;
- preparing a feeder (8) of the element (6) located at a fixed position relative to the container (2) and inclined at an angle to it in such a way that the container (2), as it moves, interacts with the element (6) in order to pick the latter up, the step of releasing the product being performed after the pick-up step.

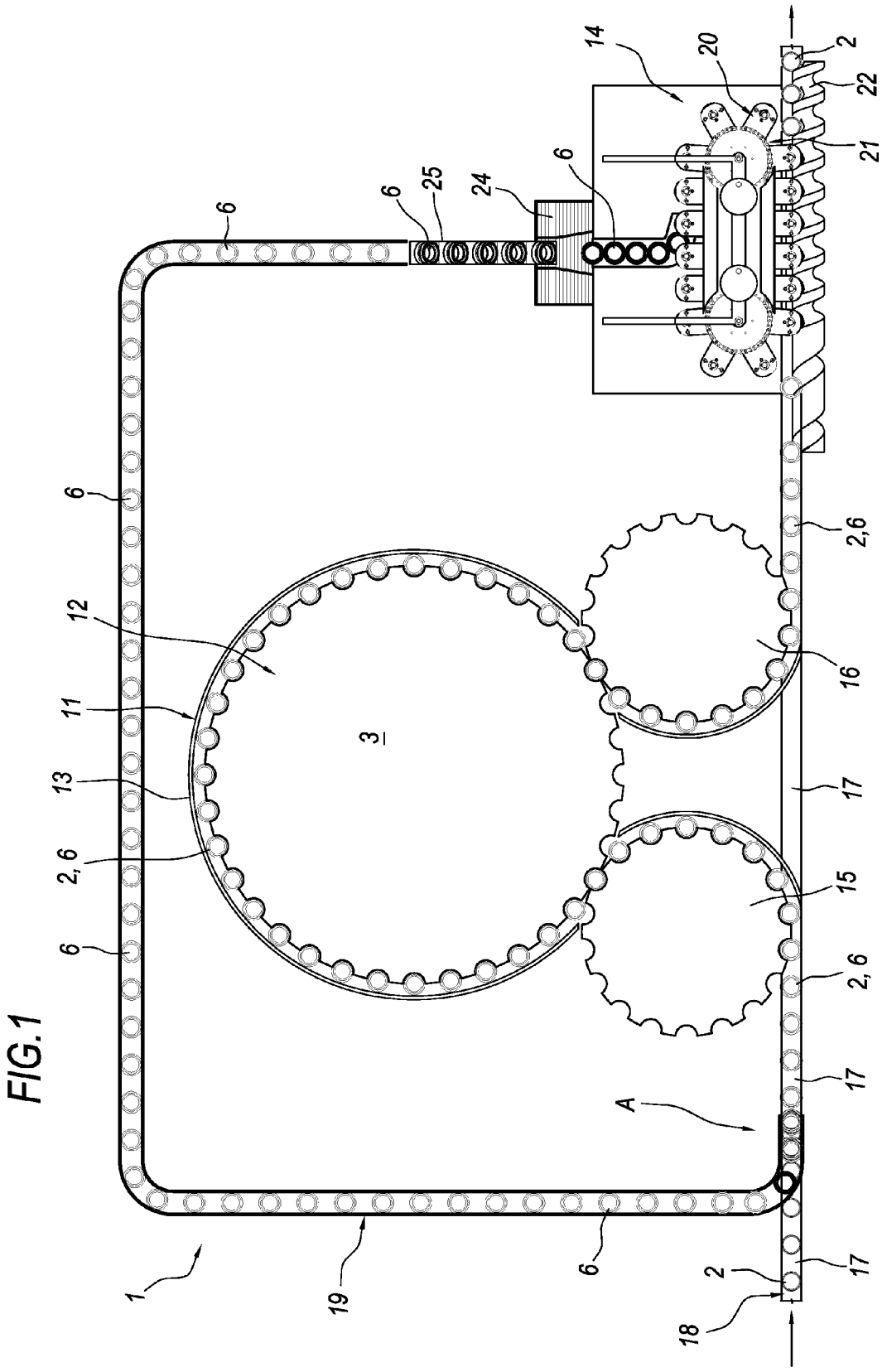
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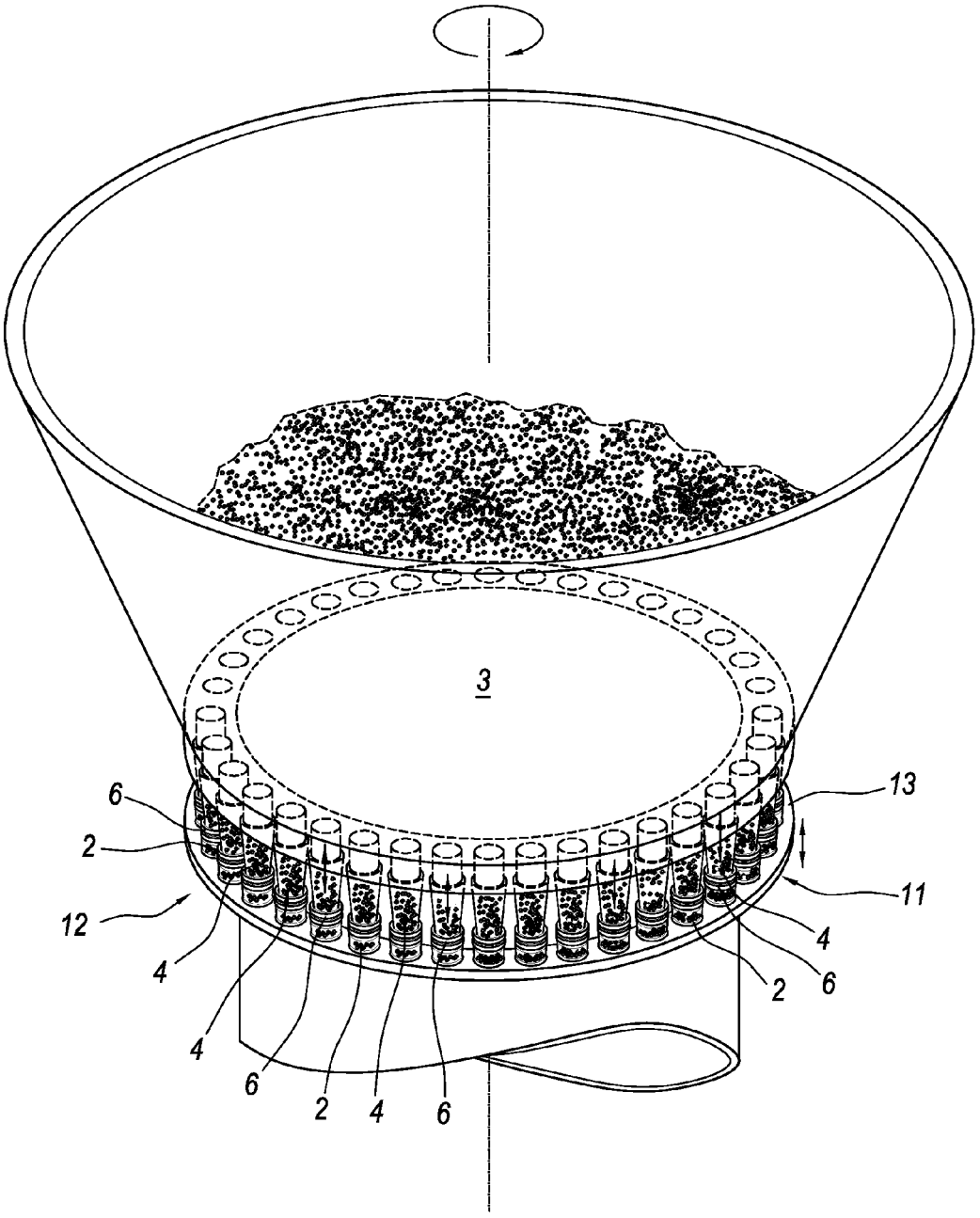
FIG.1

FIG.2



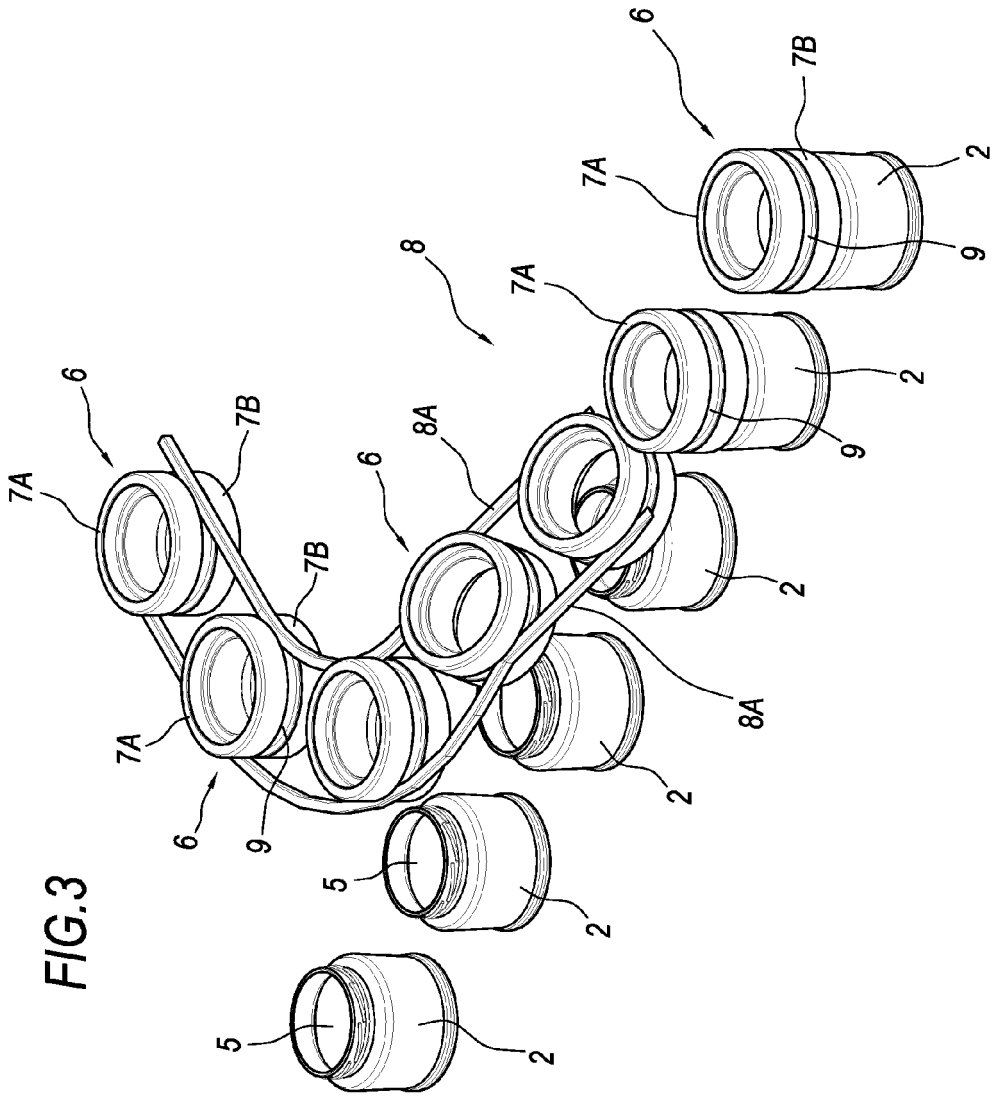


FIG.3

FIG.6

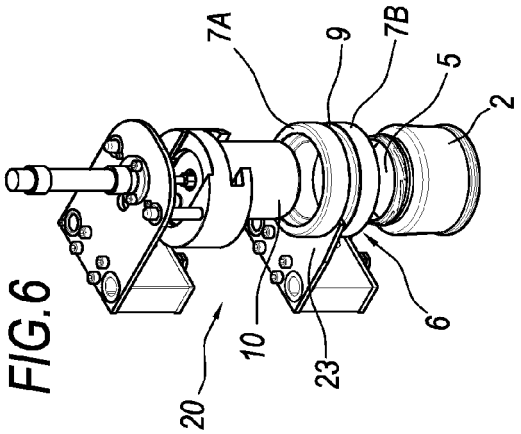


FIG.9

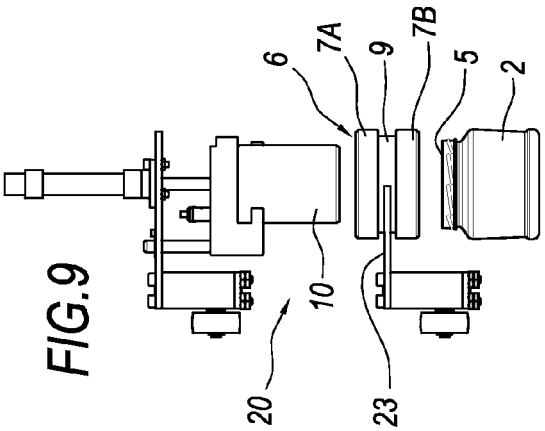


FIG.5

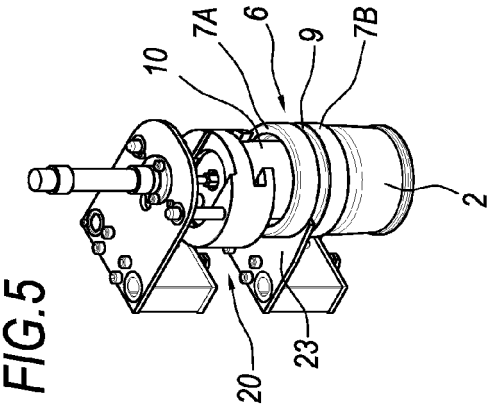


FIG.8

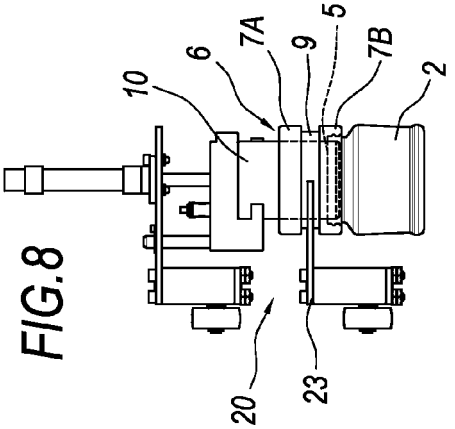


FIG.4

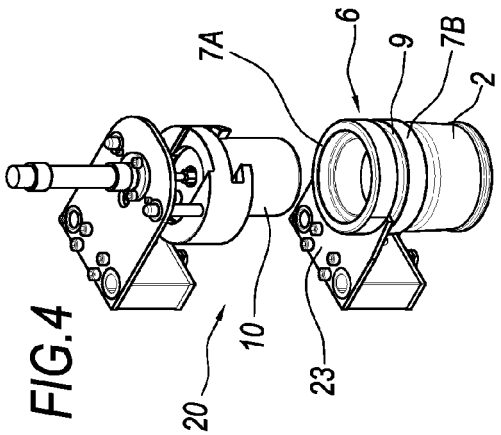
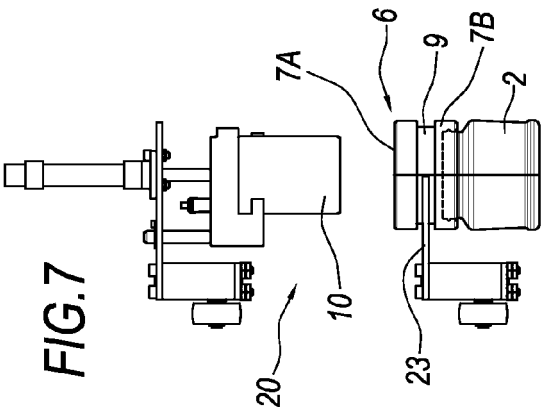


FIG.7



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Application Number
EP 11 16 3531

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