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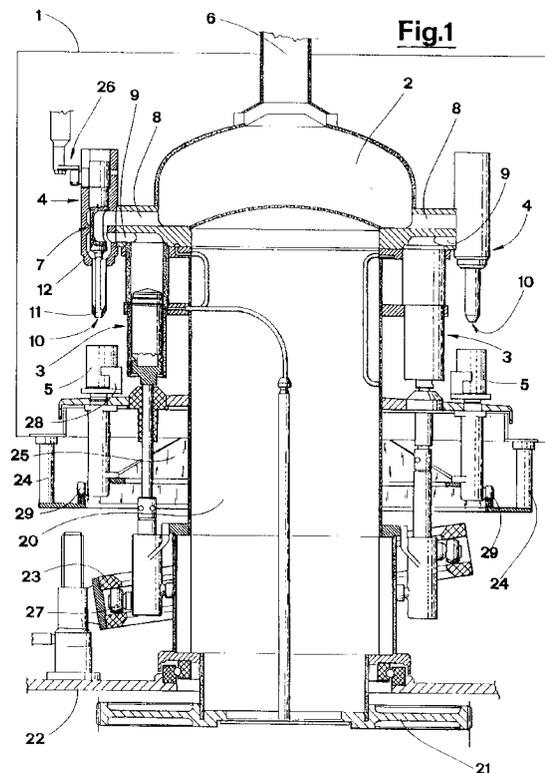
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**An aseptic rotating positive-displacement batcher.**

The invention relates to an aseptic rotating positive-displacement batcher. The batcher is contained within a shell (1), in which an aseptic environment is maintained, and comprises a rotating tank (2) to which positive-displacement pumps (3) and filler heads (4) are solid, through which filler heads (4) the product, aspirated from the rotating tank (2) by the positive-displacement pumps (3), exits from the batcher in order to be introduced into final containers (5); in the said batcher, the internal space comprising all of the zones of the batcher crossed by the product is sealed with respect to the surrounding environment and is defined by walls aimed at withstanding a predetermined high pressure.



The invention relates to an aseptic rotating positive-displacement batcher.

Rotating positive-displacement batchers are used in continuous packing plants characterised by high productivity. These machines comprise a rotating tank from which the product, which arrives through an inlet conduit, is introduced into containers by means of a series of filler heads which are solid in rotation with the tank and which are fed by positive-displacement pumps, also solid in rotation with the tank.

Supports are envisaged below each filler head, which supports are also solid in rotation with the tank, on which the containers are placed during the various filling phases; the machines generally comprises an inlet star, which feeds the batcher with the empty containers and an outlet star which extracts the full containers from the batcher.

In the majority of these machines, mechanical organs such as shutters, agitators and similar are contained internally to the tank.

To permit of functioning in aseptic conditions, the said batchers are closed in a shell internally to which a sterile gas atmosphere, kept at a pressure slightly above that of the atmosphere, is maintained; the higher pressure permits of avoiding contact between the product and the external atmosphere.

A machine of this type is described in European Patent no. 72354 (corresponding to US patent 4489769), of the same Applicant.

Apart from the various problems that these mechanical organs internal to the tank may create, that is, the possibility of product stagnation, wear in moving organs etc in this type of machine the preliminary sterilisation operations of the machine itself are quite long and complex; especially, with the aim of ensuring a perfect sterilisation, it is often necessary to have recourse to sterilising chemical substances, an action which is never popular with producers, in particular when the said chemical substances are utilised in the part crossed by the product itself.

A principal aim of the present invention is that of eliminating the above-mentioned drawbacks by providing an aseptic batcher, continuously functioning, in which the preliminary sterilising operations are extremely easy and secure and do not require the use of sterilising chemical substances in the parts of the machine crossed by the product.

A further aim of the present invention is that of providing a batcher internally to which there is no stagnation of the product.

An advantage of the present invention is that of not envisaging, internally to the batcher tank, fixed mechanical parts or parts in movement among themselves.

A further advantage of the present invention is that of permitting of correct filling of the containers.

These aims and advantages and others besides

are all attained by the batcher, object of the present invention, as it is characterised in the claims, which is closed in a shell in which an aseptic environment is maintained, and which comprises a rotating tank to which positive-displacement pumps and filler heads are solid, through which the product, taken from the tank by the positive-displacement pumps, exits from the batcher to be introduced in final containers; in the said batcher, the internal space comprising all of the zones of the batcher crossed by the product is sealed with respect to the outside atmosphere and is defined by walls aimed at withstanding a predetermined pressure.

Further advantages and characteristics of the present invention will better emerge from the detailed description that follows, made with reference to the accompanying drawings, which represent a preferred embodiment here illustrated in the form of a non-limiting example, and in which:

- Figure 1 shows a vertical elevation section of the batcher;

- Figure 2 shows a schematic view, from above, of the movement of the containers in the batcher.

The batcher comprises a column 20 which is placed in rotation with respect to a fixed base 22, by means of a gear 21 which meshes with a pinion (not illustrated). A rotating tank 2 is solidly connected to the column 20 and rotates with it; the product to be batched enters the rotating tank 2 through an inlet conduit 6. A plurality of positive-displacement pumps 3 and a plurality of filler heads 4 are solid to the column 20 and therefore to the rotating tank 2, each one of the said filler heads 4 being connected to a respective positive-displacement pump 3.

In each filler head 4 a distributing valve 7 is envisaged, connected to the inside of the rotating tank 2 by means of a radially-arranged outlet conduit 8; further envisaged is a transit conduit 9, again relative to each filler head-positive displacement pump group, which transit conduit 9 connect the distributing valve 7 with the chamber of the relative positive-displacement pump 3. Each filler head 4 further comprises an outlet mouth 10 whose opening and closing is activated by means of a shutter 11 which is slidingly solid with the cursor 12 of the relative distributing valve 7; whatever position the said cursor 12 is in, the outlet mouth 10 is always in communication with the relative transit conduit 9.

Following the axial movement of the cursor 12, commanded by command means 26 of known type, each distributing valve 7 can assume a first position, in which the shutter 11 closes the outlet mouth 10 and the outlet conduit 8 is in communication with the transit conduit 9, and a second position in which the shutter 11 opens the outlet mouth 10 and the outlet conduit 8 is not in communication with the transit conduit 9.

The pumping movement of the piston of the pos-

itive-displacement pumps 3 is obtained, as in machines of known type, by means of a fixed inclined annular guide 23 in which run a plurality of wheels 27, each solid in vertical sliding with the stem of a pump; as in machines of known type, the inclination of the guide 23 is variable so that the run, and thus the capacity of the positive-displacement pumps 3 can be varied.

A support 28 is envisaged below each filler head 4, on which support 28, in the inlet zone of the machine, an empty container 5 is inserted by means of an inlet star 30 and from which, in the outlet zone of the machine, the filled container 5 is removed by means of an outlet star 31. Each support 28 can slide axially in such a way as to approach or distance itself from the relative filler head 4; such movement is completed by means of the lifting of a stem, not in the figure, to which a wheel 29 is solid which, during the rotation of the machine, rolls on a cam 25 made on a fixed frame 24.

Stems barriers are envisaged at the zone interested by the positive-displacement pumps 3 run and at the zone interested by the cursors' 12 run, to guarantee the sterility of the packing.

The rotating tank 2 is constructed from thick sheet steel in order to withstand high internal pressures; furthermore, its bottom wall is convexed with its convexity turned inwardly to the rotating tank 2 itself.

All the outlet conduits 8, arranged radially with respect to the rotating tank 2, end in the tank 2 tangentially to its bottom wall; all the transit conduits 9 are bored below the outlet conduits 8 and therefore outside the rotating tank 2; also all of the filler heads 4 and the positive-displacement pumps 3 are machined outside the tank 2.

Further, the internal space comprising all the zones of the batcher crossed by the product, that is to say mouth of the inlet conduit 6, the inside of the rotating tank 2, the outlet conduits 8 and transit conduits 9, the inside of the filler heads 4 and the chambers of the positive-displacement pumps 3, is sealed with respect to the surrounding area, a fact which is particularly relevant with regard to what follows.

All the zone of the batcher interested in the packing of the product is closed, as happens in many other machines of known type, in a shell 1 internally to which the sterile-gas pressure is held slightly above normal.

With the aim of understanding the functioning of the batcher, it is well to remember that the guide 23, the cam 25 and the activating devices of the distributing valve 7 are made in such a way as to cause the movement of the various organs with predetermined phases with respect to the rotation of the column and thus the rotating tank 2.

Following the rotation of the tank 2, the various filler heads 4 reach a circular section A of the machine

in which the positive-displacement pumps 3 effect the delivery and a circular sector B of the machine in which the positive-displacement pumps 3 effect the aspiration. In sector B the outlet mouths 10 of the filler heads 4 are closed by the shutter 11 and the outlet conduits 8 and transit conduits 9 are in mutual communication; in this sector the positive-displacement pumps 3 effect the aspiration run and fill up with the products coming from the tank 2.

When the head enters sector A of the machine, the filling operation is effected; the command means 26 lift the cursor 12 so as to interrupt communication between the 8 and transit conduit 9 and open the outlet mouth 10; contemporaneously the delivery phase of the relative positive-displacement pump 3 is activated, which sends the product through the outlet mouth 10 into the underlying container 5.

One of the advantages of the batcher of the invention is represented by the fact that the container can be lifted up until its bottom is at the level of the outlet mouth 10 of the relative filler heads 4; in these conditions the filling takes place from the bottom so as to avoid any possible gas-bubble trapping internally to the product.

It should be noted that the command means 26 act on the cursor 12 of the distributing valve 7 only in the case in which there is a container 5 present; in the opposite case the shutter 11 is not lifted and the product in the delivery phase re-enters the rotating tank 2 through the outlet conduit 8 and transit conduits 9 which remain in communication.

The fact that the inside of the rotating tank 2 is not occupied by any mechanical organ prevents the creation of any regurgitation or stagnation of product; the very convex conformation of the bottom of the tank, together with the particular arrangement of the outlet conduits 8, prevents any stagnation of the product.

The machine in question makes the initial operations of cleaning and sterilisation, which are necessary before any work cycle of the machine can begin, very simple and safe.

In fact it is impossible to introduce, in the zone of the machine which is crossed by the product, sterilising fluid, that is, steam, at a high temperature (and thus at a high pressure), inasmuch as the said zone is sealed with respect to the surrounding environment and the machine is made to withstand such high pressures. The machine described, for example, is made in such a way as to be able to withstand pressures above 6 bars. The fact that steam at high pressure and temperatures can be used (steam having a temperature of above of 160°C can be used) allows the absolute certainty that the sterilisation will be complete in the zones of the machine which are crossed by the product.

The sterilisation phase is effected in "dynamic" conditions; the machine is made to function, pretend-

ing that the steam that has been introduced into it represents the product. In these conditions all the parts of the machine which, during the filling operations, will come into contact with the product, come also, in this phase of "dynamic" sterilisation, into contact with the high-temperature steam which thus sees to a perfect sterilisation.

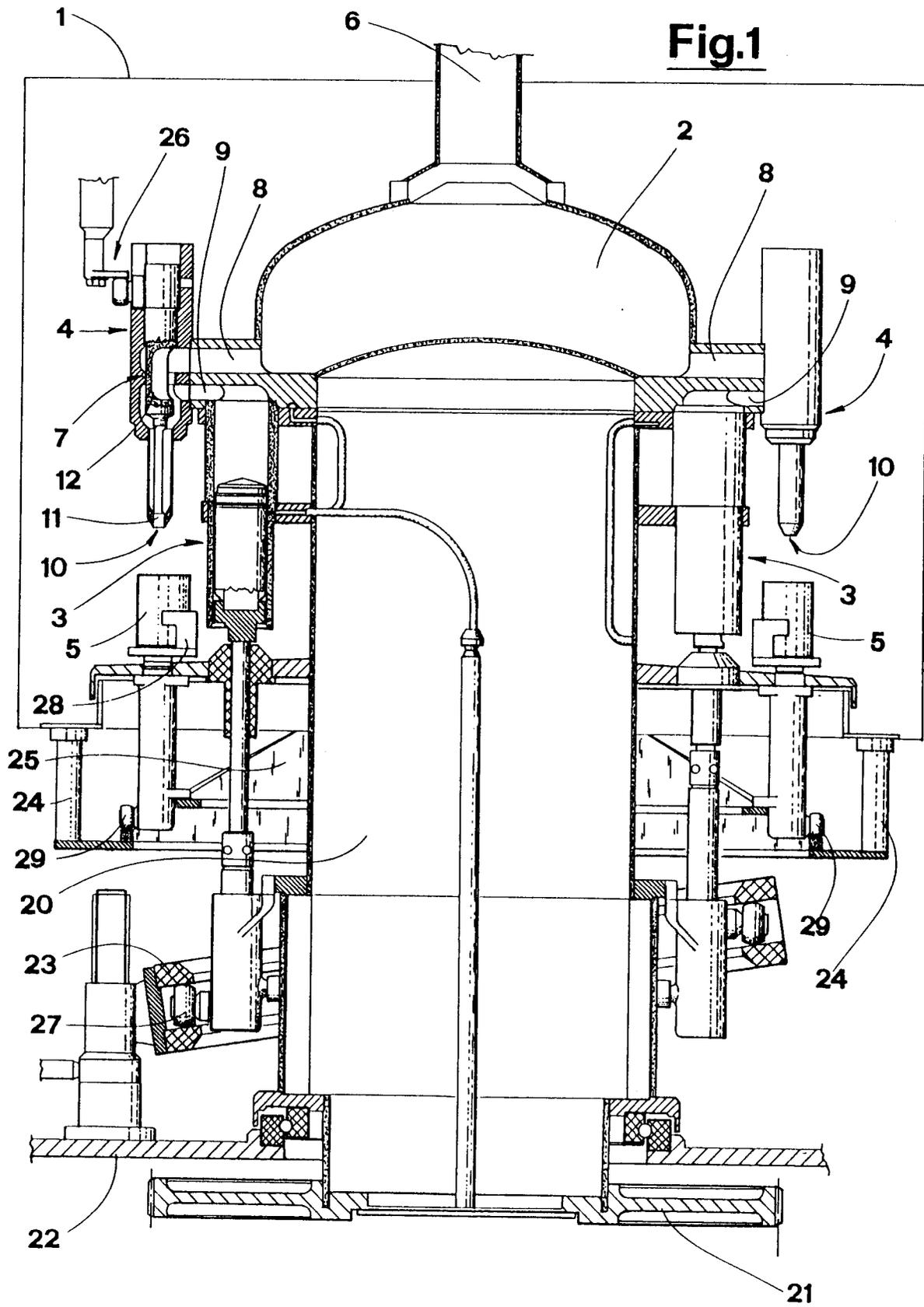
Also the cleaning operations are effected under dynamic conditions; the special conformation of the tank ensures, at the end of the operation, that the cleaning fluid is perfectly drained.

All the external parts of the batcher which do not come into contact with the product and which are enclosed in the shell 1 are, at the beginning of each cycle, sterilised following traditional methods, for example using a hydrogen peroxide solution.

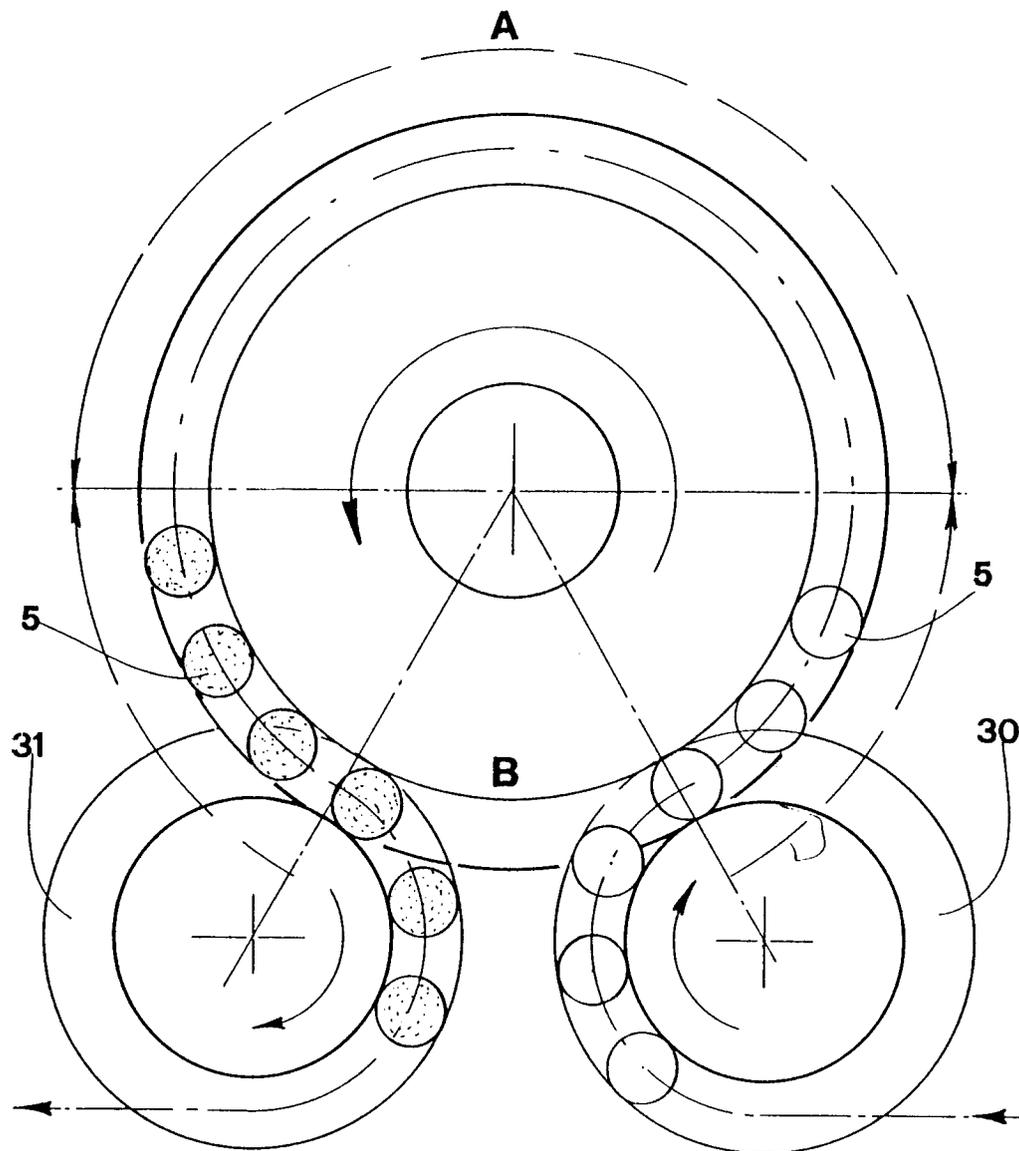
The above-described initial washing and sterilising operations can be performed in an extremely simple and rapid way, in that at the end of a work cycle it is sufficient to connect the inlet conduit 6, by means of a common deviating valve (not illustrated), with sources of, respectively, pressurised steam or cleaning fluid.

## Claims

1. An aseptic rotating positive-displacement batcher, which is closed in a shell (1) in which an aseptic environment is maintained, and which comprises a rotating tank (2) into which the product to be batched enters through an inlet conduit (6), to which rotating tank (2) a plurality of positive-displacement pumps (3) and a plurality of filler heads (4) are solid, through each of which filler heads (4) the product, taken from the rotating tank (2) by means of the said positive-displacement pumps (3), exits from the batcher to be introduced in final containers (5), characterised by the fact that the internal space comprising all of the zones of the batcher crossed by the product is sealed with respect to the outside atmosphere and is defined by walls aimed at withstanding a predetermined pressure.
2. A batcher as in claim 1, characterised by the fact that: it comprises a plurality of distributing valves (7), which distributing valves (7) cursors (12) are each inserted in a filler head (4); it comprises a plurality of outlet conduits (8) each of which connects the rotating tank (2) with one of the said distributing valves (7); it comprises a plurality of transit conduits (9) each of which connects a distributing valve (7) with a relative positive-distribution pump (3); each filler head (4) comprises an outlet mouth (10), which outlet mouth (10) opening and closing is activated by means of a shutter (11) slidingly solid with the cursor (12) of the relative distributing valve (7), which distributing valve (7) is always in communication with the transit conduit (9); each distributing valve (7) can assume, on command, a first position, in which the shutter (11) closes the outlet mouth (10) and the outlet conduit (8) is in communication with the transit conduit (9), and a second position, in which the shutter (11) opens the outlet mouth (10) and the outlet conduit (8) is not in communication with the transit conduit (9).
3. A batcher according to claim 2, characterised by the fact that: the bottom wall of the said rotating tank (2), the inside of which is completely free from obstructions, is convexed with the convexity turned upwards towards the inside of the rotating tank (2) itself; each of the said outlet conduit (8) is arranged radially with respect to the rotating tank (2) and ends in the rotating tank (2) tangentially to its bottom wall.
4. A batcher according to claim 1, characterised by the fact that the wall which define the internal space comprising all of the zones of the batcher which are crossed by the product are conformed in such a way as to withstand an internal pressure of fluid (steam) of above 6 bars.
5. A batcher according to claim 1, of the type comprising a plurality of supports (28) for the said containers (5), each arranged below a respective filler head (4), characterised by the fact that means of known type are envisaged to lift each support (28) up until the bottom of the container (5) resting on the said support (28) is in proximity to the of the relative filler head (4) outlet mouth.



**Fig.2**





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EUROPEAN SEARCH REPORT

Application Number

EP 92 83 0491

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-3 101 752 (MCK. MARTIN) * column 6, line 14 - line 46 *	1	B65B55/02
Y	* column 16, line 24 - column 18, line 57; figures 1-9 *	5	
A	EP-A-0 074 418 (VERCON) * page 4, line 7 - page 6, line 14; figures 1,2 *	2,3	
Y	GB-A-910 839 (VICKERS RUWOLT) * page 2, line 114 - line 120; figures 1,4,5 *	5	
-----			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 08 JANUARY 1993	Examiner CLAEYS H.C.M.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

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