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(54) Packaging apparatus.

(57) The packaging apparatus according to the present invention is suitable for packaging any non-liquid material including both edible and non-edible materials in granular and powder form as well as preformed shapes of material such as confectionery. In more details the packaging apparatus includes a transit storage device for receiving material to be packaged, a first sensor for sensing the quantity of material received by the storage device, means for terminating flow of material into the storage device when a measured amount of material has been received by the storage device, means permitting discharge of the said measured amount of material from the transit storage device into a non-horizontally disposed flow path to a packaging station at which the said measured amount of material is packaged.

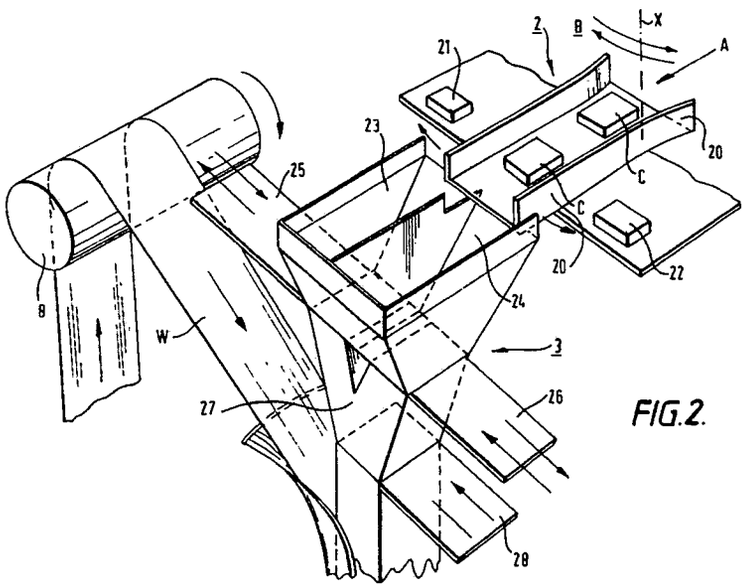

FIG.2.

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PACKAGING APPARATUS

This invention relates to a packaging apparatus. The packaging apparatus according to the present invention is suitable for packaging any non-liquid material including both edible and non-edible materials in granular and powder form as well as preformed shapes of material such as confectionery. Such materials, will throughout this specification and claims simply be referred to as "materials of the kind specified".

In our prior co-pending European Patent Applications Nos.88310649.4 and 88310702.1, the disclosures of which are herein imported in their entirety by reference, packaging apparatus, packaging processes and packaging systems are respectively described and claimed. In European Patent Application No.88310649.4 there is disclosed an apparatus for providing lines of products at preselected times across the path of flow of products in a packaging systems, the apparatus comprising barrier means across the path of oncoming products to provide a line of products across the path, and pusher means to move lines of products past the barrier means at selected times. The barrier means comprises a stationary, elongate member, perpendicular to the direction of flow (a) to form a straight line of products and disposed sequentially between a pair of infeed conveyors. Also disclosed is a series of parallel endless belt conveyors followed by further upstanding conveyor means disposed in the path of flow to admit thereto products from each oncoming line across the path of flow in sequence across the path of flow and to convey the products in said sequence across the patch of flow such that one or more lines of products are formed in or generally in the direction of flow. Another feature is computer-controlled gate and counting means for dividing the one or more lines of products in or generally in the direction of flow into a plurality of lines of products in or generally in the direction of flow.

In European Patent Application No.88310702.1 there is disclosed a carton-packaging system, process and apparatus, the apparatus comprising carton-forming means and product-loading means and means to synchronise the carton forming and product loading such that each carton is formed and loaded before each successive carton is formed and loaded. There is preferably a common station for the carton-forming means and the product-loading means. The former is a hollow member having a first opening in one wall for admitting articles to the interior and a second opening in another wall for permitting the escape of the content. The exterior of the hollow member cooperates with a forming passage of geometrically similar cross section, disposed beneath a product-loading position.

Reference is also made to U.S. Patent Application No. 945712 in which there is described and claimed a horizontal form-fill-seal packaging machine including a series of mechanically separate modules, each said module including a stepper motor, conveyor means having an inlet and an outlet, which conveyor means is operatively connected to said stepper motor, and electrically plug and socket input means operatively connected to said stepper motor,

said modules being arranged together in abutting relation in order to define a product travel path along which products to be packaged are conveyed, said product travel path being defined by said conveyor means with the outlet of the conveyor means of one module abutting the inlet of said conveyor means of the adjacent module,

said machine including:

an infeed conveyor defined by at least two said modules,

a web tube former including an inlet for packaging web, means operative to form said web into an inverted U-shaped tube with two spaced free edge portions, and an outlet for supplying said tube,

a said module for web infeed, said conveyor means of said web infeed module being operatively associated with said tube outlet from said web tube former such that the products on said conveyor means are entubed,

a first sealing module downstream of said web infeed module, and including means for bringing said two spaced free edge portions of the tube together into a fin beneath each said entubed product and for sealing said edge portions together,

a second sealing module downstream of said first sealing module including a seal head for producing a transverse seal across said tube between products, and

a control unit having an electrical output means operative to provide a respective control signal for input to said plug and socket input means or each said module to control a respective said stepper motor of said module.

The apparatus of the present invention is directed to packaging materials of the kind specified and which are packaged when following a non-horizontally disposed flow-path. The apparatus according to the present invention may be used in conjunction not only with the packaging apparatus and packaging systems mentioned above in my copending applications, but may also be adapted for use in conjunction with conventional packaging machines.

According to one aspect of the present invention there is provided apparatus for packaging material of the kind specified including a transit storage device for receiving material to be packaged, a first sensor for sensing the quantity of material received by the storage device, means for terminating flow of material into the storage device when a measured amount of material has been received by the storage device, means permitting discharge of the said measured amount of material from the transit storage device into a non-horizontally disposed flow path to a packaging station at which the said measured amount of material is packaged.

According to a further aspect of the present invention there is provided apparatus for packaging material of the kind specified including a transit storage device having at least two storage compartments for sequentially receiving material to be packaged, means for sequentially feeding a measured quantity of material to each storage compartment in turn, a sensor for sensing when a compartment has received a measured quantity of material and serving, when one compartment has received the measured quantity of material, to cause further material to be fed into another compartment, means permitting discharge of the measured quantity of material from sequentially filled compartments along a non-horizontally disposed flow path to a packaging station at which the measured quantities of material are individually packaged from one or more compartments.

One form of packaging apparatus in accordance with the present invention will now be described by way of example with reference to the accompanying drawings in which:-

Figure 1 is a diagrammatic elevation of the packaging apparatus of modular construction, and

Figure 2 is a perspective of part of Figure 1.

Referring to Figure 1, a number of individual and readily replaceable modules constituting the packaging apparatus are mounted on a vertically disposed chassis plate 1. Material to be packaged, for example, bars of confectionery are fed from an external source to an in-feed station module 2. Bars of confectionery are vertically fed from the in-feed station 2 to a hopper module 3 where a predetermined number of bars of confectionery is received prior to discharge to a wrapping station module 4 and from whence the so-wrapped bars of confectionery are fed away from the packaging apparatus on a conveyor C to storage and ultimate distribution.

Wrapping material W from a roller dispensing module 5 supported by a support plate 6 is fed to the wrapping station module 4 via a series of tension pulleys 8 and an indexing module 7 which is electronically, pneumatically or otherwise linked with the hopper module 3 so that feed of the wrapping material is governed by discharge of the bars of confectionery from the hopper module 4.

The in-feed station module 2 and the hopper module 2 are shown in perspective in Figure 2 together with wrapping material W being fed to the wrapping module station 4.

Incoming bars of confectionery C arrive in the direction of arrow A and are fed into an inlet trough 20. The inlet trough 20 is angularly displaceable in the direction of arrows B about a vertical axis X between sensing stops 21 and 22. When the trough 20 is disposed against either of the sensing stops 21 or 22, a predetermined number of incoming bars of confectionery C is fed into either storage compartment 23 or storage compartment 24, where they are held by either gate 25 or gate 26 depending upon the compartment into which the bars C are fed. When compartment 23 or 24 has received the predetermined number of bars of confectionery, the trough 20 is automatically switched to feed a predetermined number of bars C into the other compartment whereupon the appropriate gate 25/26 is opened and the bars C from compartment 23 or 24 are fed into hopper 27 and retained therein by a gate 28. Operation of the gate 28 of hopper 27 is programmed in accordance with both the feed of wrapping material W, feed of bars C into compartment 23, 24, operation of gates 25, 26, and a seal/cut module 4A so that, when the predetermined number of bars reaches the seal cut module 4A, the wrapping material W has been formed into a tube at station 4B with the tube having its lowermost end sealed in readiness for receiving the predetermined number of bars of confectionery. At this stage, the programme is such that the predetermined number of bars C is released from hopper 27 by opening the gate 28. Thereafter, the gate 28 is automatically closed and the cut/seal unit operated to seal and cut the uppermost end of the so formed tube of wrapping material when the predetermined number of bars have been received at stations 4/4A. The package of so-wrapped bars is then led away to storage on the conveyor C.

The wrapping material station module 5 includes a roll support arm 50 supported from chassis plate 1 and upon which a roll of wrapping material W is carried. That end of the support arm 50 remote from the chassis plate 1 is supported by two rollers 52 carried in a "V" block 53 which, in turn, is supported on an angularly displaceable and vertically adjustable arm 54. Vertical displacement of the arm 54 is accomplished by a pneumatic piston/cylinder 55 for the purpose of replacing rolls of wrapping material W on the support arm 50.

Operation of the various sensing, indexing and sensing stops are pneumatically controlled but, if desired, they may be entirely or partially electron-

ically controlled.

Although reference has been made to feeding bars of confectionery C into the trough 20, if desired, the bars or any other dry granular or particulate material may be selectively fed vertically in measured quantities into the compartments 23 or 24.

The modular structure of the present invention is particularly advantageous when considered from a servicing point of view since each module can in the event of failure be readily replaced from any face of the chassis 1, thereby reducing down time.

If desired, the storage compartments 23/24 may be disposed in an arcuate array around axis X, namely, that axis about which the trough 20 is angularly movable. Such an arcuate array may, if required, constitute a full circular array mounted for indexed arcuate movement about the axis X. In such a case the gates 25, 26 are preferably movable radially relative to the axis X, that is approximately at right angles to the direction shown in Figure 2.

Claims

1. Apparatus for packaging material of the kind specified including a transit storage device for receiving material to be packaged, a first sensor for sensing the quantity of material received by the storage device, means for terminating flow of material into the storage device when a measured amount of material has been received by the storage device, means permitting discharge of the said measured amount of material from the transit storage device into a non-horizontally disposed flow path to a packaging station at which the said measured amount of material is packaged.

2. Apparatus for packaging material of the kind specified including a transit storage device having at least two storage compartments for sequentially receiving material to be packaged, means for sequentially feeding a measured quantity of material to each storage compartment in turn, a sensor for sensing when a compartment has received a measured quantity of material and serving, when one compartment has received a measured quantity of material, to cause further material to be fed into another compartment, means permitting discharge of the measured quantity of material from sequentially filled compartments along a non-horizontally disposed flow path to a packaging station at which the measured quantities of material are individually packaged from one or more compartments.

3. Apparatus according to claim 2 wherein each storage compartment is in the form of a hopper having an inlet and an outlet, a gate associated with each compartment and movable between first and second positions to open and close the outlet under control of the sensor which senses when the compartment has received a measured quantity of the said material.

4. Apparatus according to claim 2 or claim 3 including an inlet trough movable for selectively feeding material to individual hopper compartments.

5. Apparatus according to claim 4 wherein the hopper/compartments are disposed in a linear or arcuate array and the inlet trough is angularly movable to selectively traverse the inlets of the hopper compartments.

6. Apparatus according to claim 5 wherein the trough is angularly movable in a horizontal plane.

7. Apparatus according to claim 5 and claim 6 wherein the arcuate array of hopper compartments are angularly disposed about the axis of angular movement of the trough.

8. Apparatus according to any one of claims 2 to 7 wherein the gate associated with each compartment constitutes an inlet gate for at least one further compartment disposed between the said storage compartments and the packaging station.

9. Apparatus according to claim 8 wherein the packaging station includes a tubular former through which material to be packaged is fed, guide means for leading wrapping material around said former to form a tube of wrapping material, longitudinal sealing means for producing a longitudinal seal along the so formed tube, transverse sealing means for forming transverse and longitudinally separated seals across the tube to package the said measured quantity of material and cutting means for successively separating package material.

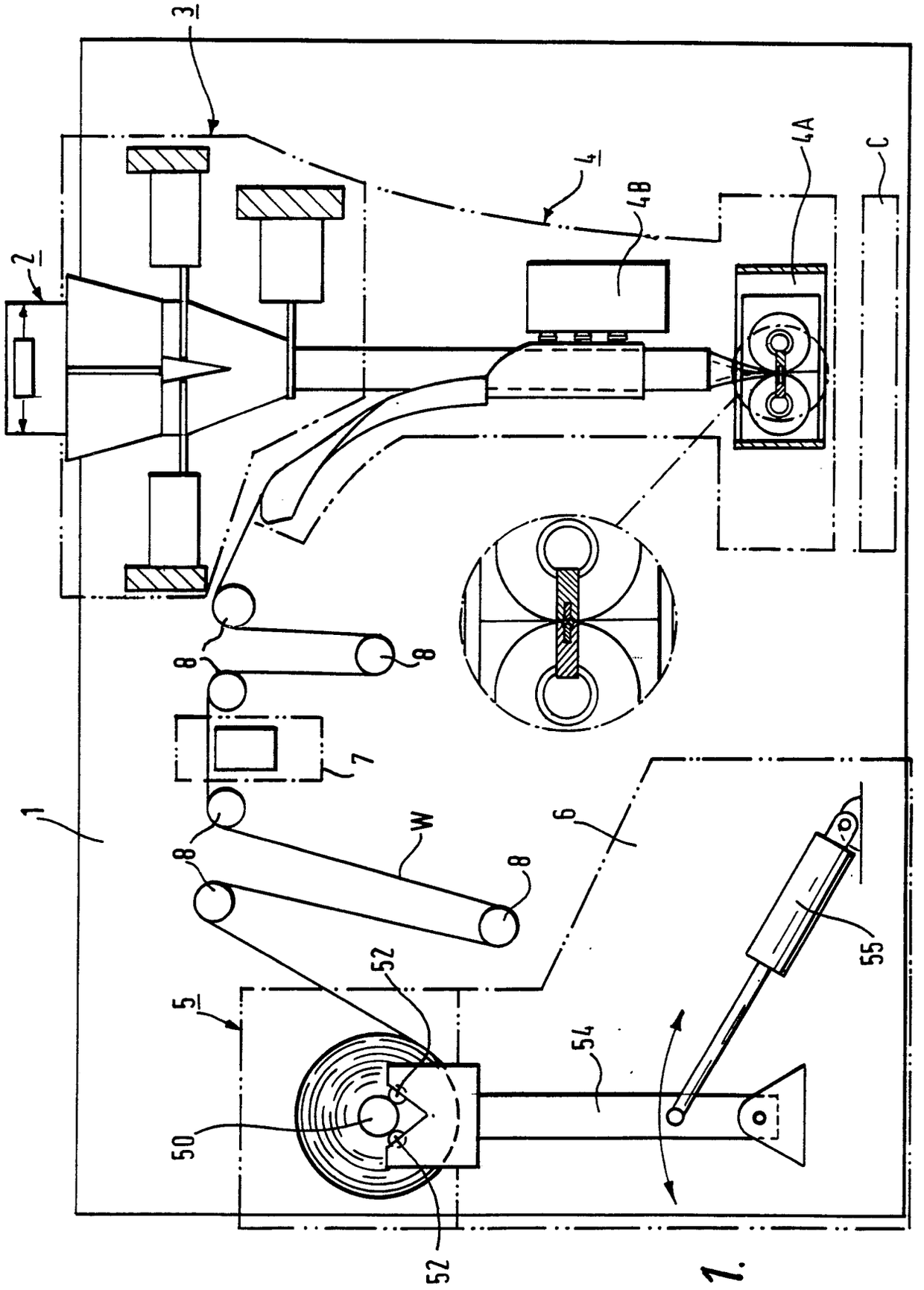

FIG.1.

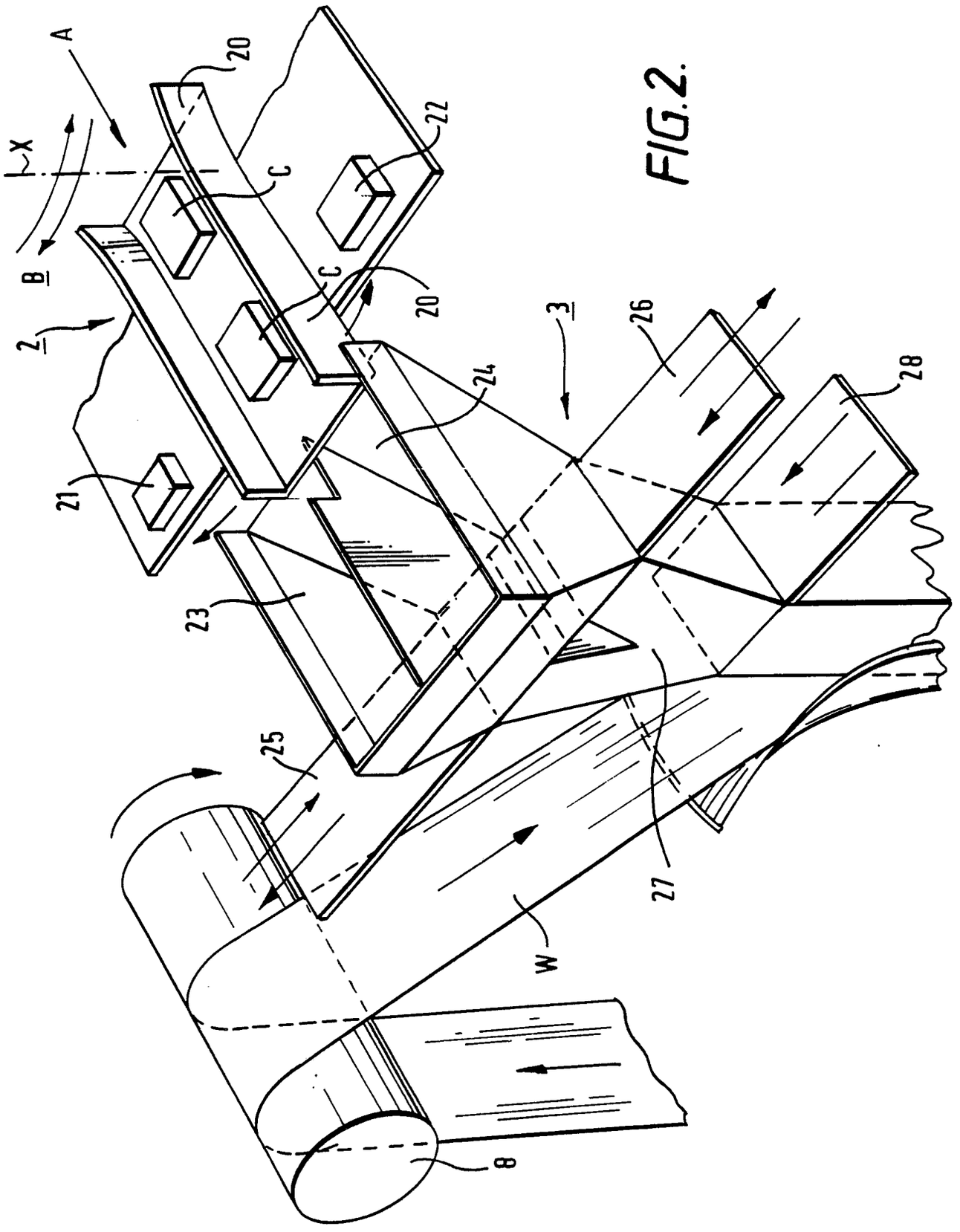

FIG.2.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 30 2609

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	WO-A-8 304 401 (SMITH) * Abstract; figures 1,3,4 *	1	B 65 B 57/14
X	US-A-3 996 723 (GREENWELL) * Abstract; column 2, lines 33-43; column 3, lines 19-24,50-56; figures 1-4 *	2,4,5,6	
Y		3,8,9	
X	US-A-3 732 665 (PITTS) * Column 1, lines 29-55; figures 1-3 *	2	
Y	US-A-3 221 903 (VAN GEEN) * Column 2, lines 20-34,59-64; column 5, lines 67-75; figure 2 *	3	
Y	GB-A-2 027 412 (GRAHAM) * Abstract; figures 1-2 *	8	
A		7	
Y	US-A-4 800 707 (RABUS) * Abstract; figure 1 *	9	TECHNICAL FIELDS SEARCHED (Int. Cl.5) B 65 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17-05-1990	CLAEYS H.C.M.

CATEGORY OF CITED DOCUMENTS

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
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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
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