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(54) Packaging apparatus.

(57) Packaging apparatus (1) including a top (3) and a base (2) forming a housing, evacuating means (4), control means (14) and sealing means (9), said housing being positionable in a first open position and a second closed position, with one end of the housing being provided with means (8,12) to retain a package (15) and to position relative thereto, when said housing is in said second closed position, said evacuating means (4), said evacuating means (4) including openings through which gas may flow, said evacuating means (4) being located substantially within said housing when in a first retracted position and extending at least partially outwardly of said end of said housing when in a second extended position, said evacuating means (4) when in said second extended position being able to evacuate from or emit gas to said package (15) located thereabout and retained in a position by said housing, said sealing means (9) being located adjacent said portion of said package (15) retained by said end of said housing to seal said portion of said package (15) and said control means (14) controlling operation of said apparatus (1).

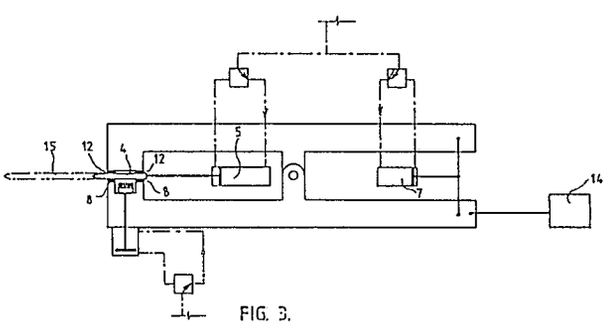

FIG. 3.

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Description

PACKAGING APPARATUS

This invention relates to packaging and to apparatus for packaging of products including perishable goods and the like.

There have previously been available a variety of apparatus adapted for packaging products in suitable containers. Of particular importance in packaging perishable products or products which have a limited shelf life is "controlled atmosphere" packaging, which allows for the product to be packaged in a predetermined environment. This extends the shelf life of the product and preserves the appearance and quality of the product. Examples of such products include all types of meat, fish, poultry, fruit, plants (including flora, vegetables, foliage and herbs), dairy produce, bakery products and the like. The term "controlled atmosphere" packaging includes particularly, but not exclusively, controlled, exchanged and/or modified atmosphere packaging using semi-rigid or flexible packaging. Previously available arrangement have, however, had a number of disadvantages associated therewith. Some previously available arrangements have been manually operated, and have required a considerable input from the operator, insofar as determination of various parameters for the operation of the apparatus is concerned. For example, previously available apparatus have include a number of selection controls which are altered by the operator, in order to achieve the particular type of packaging required. This has, of course, meant that considerable error can be introduced, by mis-selection by the operator of the various controls, and thus the packaging parameters. Another disadvantage has been that previously available apparatus has been relatively slow to package products in an appropriate manner, thus adding to the packaging time and expense.

It is an object therefore of one aspect of the present invention to provide packaging apparatus which goes someway toward overcoming, or at least minimising, the above-mentioned problems, or which at least provides a useful alternative.

Further objects of the invention will become apparent from the following description.

According to one aspect of the present invention there is provided packaging apparatus including a top and a base forming a housing, evacuating means, control means and sealing means, said housing being positionable in a first open position and a second closed position, with one end of the housing being provided with means to retain a package and to position relative thereto, when said housing is in said second closed position, said evacuating means, said evacuating means including openings through which gas may flow, said evacuating means being located substantially within said housing when in a first retracted position and extending at least partially outwardly of said end of said housing when in a second extended position, said evacuating means when in said second extended position being able to evacuate from or emit gas to said package located thereabout and retained in a position by said housing, said sealing means being located adjacent said portion of said package retained by said end of said housing to seal said portion of said package, and said control means controlling operation of said apparatus.

According to a still further aspect of the present invention there is provided a method of packaging which includes the steps of:

a) locating at least a portion of a package adjacent packaging apparatus;

b) at least partially evacuating said package by means of evacuating means of said apparatus;

c) sealing at least said portion of said package adjacent said apparatus by means of sealing means of said apparatus; and

d) controlling operation of said apparatus by control means of said apparatus.

Further aspects of the present invention will become apparent from the following description, which is given by way of example only, and with reference to the accompanying drawings, in which:

Figure 1: shows a schematic side view of apparatus according to the present invention, prior to the commencement of the operating cycle.

Figure 2: shows the apparatus shown in Figure 1, in the initial stage of the operating cycle.

Figure 3: shows apparatus shown in Figure 1, in the second step of the operating cycle.

Figure 4: shows apparatus shown in Figure 1, in the third step of the operating cycle.

Figure 5: shows apparatus shown in Figure 1, in the fourth step of the operating cycle.

Referring firstly to Figure 1 of the accompanying drawings, there is provided in one form of the invention apparatus 1. The apparatus 1 includes a housing comprising a base 2 and a top 3. There is also provided at least one gas vacuum nozzle or "snorkel" 4, and appropriate cylinder or cylinders 5.

In one preferred form of the invention there is provided two snorkels 4, and the corresponding cylinders 5 are pneumatically operated. This is by way of example only, however.

The cylinders 5 are attached or connected to an appropriate air or gas supply 6. In the form of the invention shown in the accompanying drawings, the gas supply 6 also supplies gas to a further cylinder 7. The cylinders 5 facilitate movement of the snorkels to extended and retracted positions, as will be further described hereinafter. The cyliner 7 facilitates movement of the top 3 and base 2 to an open or closed position, as will be further described hereinafter.

Although the cylinder 7 is located to the rear of the cylinders 5, in the schematic view of the apparatus shown in the accompanying drawings, in another form of the invention the cylinder 7 that may be located alongside the cylinders 5.

The front portion of the base 2 includes two

extending lips 8, separated by a recess. A seal bar 9 is located in the recess. The seal bar 9 is preferably connected to means 10 which allow the seal bar 9 to be raised or lowered, in the directions as indicated by the arrow A, as shown in Figure 1. In one preferred form of the invention, the means 10 is in the form of a number of pneumatically operated cylinders. Thus, the seal bar 9 is raised and lowered pneumatically, with a gas or air supply 11 to drive the means 10, and thus the seal bar 9. It should be appreciated, however, that this is by way of example only and that other suitable arrangements may also be employed.

The front portion of the top 3 of the apparatus 1 is also provided with lips 12, which are position so as to abut the lip 8 provided on the base 2, when the apparatus 1 is in the closed position (as shown in Figure 3 of the accompanying drawings).

A further feature of the apparatus 1 is a timing device 13, shown schematically in Figure 1, in the "off" position.

There is also provided a control unit, schematically shown in the accompanying drawings, and indicated by the numeral 14. In one form of the invention, the control unit is a programme logic controller, hereinafter referred to as a "PLC". The PLC may be programmed to operate the apparatus 1, as will be further described hereinafter.

The operating of packaging apparatus according to the present invention will now be described, with reference being made to the accompanying drawings. The configuration of the apparatus 1 as shown in Figure 1 exists for a predetermined period of time between operating cycles. In this configuration, the snorkels 4 are withdrawn, and are located within the space provided between the top 3 and the base 2 of the apparatus 1.

During this phase, between operating cycles, the apparatus is in the open position, with the top 3 being positioned away from the base 2, such that the lips 8 and 12 are separated. The bar 9 is in the retracted position. During the predetermined time within which the apparatus is in this configuration, an operator is able to remove the one or more packages or bags which have just been sealed during the last operating cycle of the apparatus. Once the package(s) or bag(s) have been removed, further package(s) 15 may be located in an appropriate position, between the lips 8 and 12. This is shown in Figure 2.

The operator is then able to initiate the operating cycle by way of a start button, which in one form of the invention is located on the upper surface of the top 3 of the apparatus 1. This activates the cylinder 7, causing the top 3 to close, thus, moving the apparatus into a closed position, as shown in Figure 3. In the closed position, the lips 8 and 12 are moved together. When the closed position, the lips 8 and 12 also come into contact with the protruding snorkel(s) 4. This provides for a near perfect seal for the next phase of the operating cycle.

Referring again to Figure 3 of the accompanying drawing, during this phase of the operating cycle the cylinder 7 is extended, in order to move the apparatus 1 into the closed position. The cylinders 5 are also extended, so as to move the snorkels into the extended position.

Once the snorkel(s) are located within the package(s), and the apparatus is in the closed position, any air within the package(s) is able to be evacuated out through openings provided substantially in the end of each snorkel, thus creating an at least partial vacuum.

If required, a back-flush of a predetermined gas or gas mixture may then be pumped into the package(s) by way of the snorkels 4.

If a back-flush of gas is used, the gas or gas mixture used is generally determined by the product being packaged. The gas is generally predominantly formed of carbon dioxide, although nitrogen gas and sometimes oxygen gas may also be included. Oxygen is particularly important when packaging meat, vegetables, fruit and the like, as the oxygen assists in maintaining appropriate appearance of the product.

It should be appreciated that if a vacuum is required, the back-flush of gas is not included. Similarly, a multiple cycle, such as a double or treble cycle, may also be used, if so desired, in order to achieve the desired or required atmosphere or vacuum within the package(s).

Reference is now made to Figure 4 of the accompanying drawings. In this configuration, the snorkels 4 are moved back into the retracted position. The apparatus remains in the closed position. Thus, the lips 8 and 12 substantially abut one against the other with end of the bag 15 being located therebetween. In one preferred form of the invention, there is provided a magnetic switch, preferably located at the back of the cylinders 5, which is activated as the snorkel(s) 4 move back, thus activating the means 10, so as to move the seal bar 9 in the direction indicated by the arrow B.

The seal bar moves in the direction indicated by the arrow B, until it comes into contact with the outer edges 16 of the package(s) 15. At this stage, the seal bar is still cold.

This operation is generally controlled by the PLC, which activates an appropriate valve, letting air or gas into the cylinders or other appropriate means 10, spaced apart across the width of the apparatus 1, thus raising the seal bar 9.

Reference is now made to Figure 5 of the accompanying drawings. In this configuration, the snorkels remain in the retracted position, with the gas vacuum supply off. The seal bar 9 remains in the extended position.

Impulse heating is then used to heat the seal bar. The upper portion 17 of the seal bar 9 is heated, for a predetermined period of time. This time generally depends on the material of the package(s).

After the impulse, the seal bar 9 is maintained in the extended position, and the apparatus in the closed position while the material is allowed to cool. Again, this cooling takes place for a predetermined period of time.

Springs, (not shown), or other suitable or appropriate means, then pull the seal bar 9 in the direction indicated by the arrow C, once the pressure has been released from the cylinders, or other means 10.

Thereafter, the apparatus 1 returns to the configuration as shown in Figure 1 of the accompanying drawings.

In one form of the invention, there are provided two start buttons, one on each side of the upper surface of the top 3. This allows for left or right handed operators to operate the machinery easily and efficiently.

Another feature of the invention is that the operator can select a "seal" only cycle, in the even that the seal during the normal cycle is not adequate. This can be due to creases and the like in the package(s), which may cause inadequate sealing of the package.

There is also provided a "clean" mode, which allows for hot water to be passed through all piping and the like, in order to clean the components of the apparatus. Other solutions and gases may also be used during the "clean" mode, as required.

There also may be provided a safety feature, in the form of an emergency stop button. This allows for the cycle to be immediately halted, and the apparatus moved into the open position, in the event of an unexpected event. A further safety feature is that if the apparatus is not correctly in the fully closed position, within the predetermined period of time between operating cycles (as discussed with reference to Figure 1 of the accompanying drawings), then the cycle will abort. This ensures that the cycle does not continue, in the event that an operators hand or other article is lodged between the base 2 and the top 3. This feature differs from previously available arrangements, wherein two handed activation of apparatus has been required, in order to ensure that an operators hand is not located within the apparatus.

As discussed above, the operating cycle of the apparatus 1 is generally controlled by the control unit 14, which is preferably a PLC. As well as there being provided at least one start button on the upper surface of the top 3, there may also be provided a cycle selection control.

In one preferred form of the invention, there are provided eight preprogrammed cycles, and thus the cycle selection control would be provided with eight positions. The selection of one of these eight positions is generally the only control the operator has over the operation of the apparatus. The advantage of such an arrangement is that operator input is reduced, and thus operator error is also reduced. Previously, a number of selections had to be made by the operator, and any one of these could have been incorrectly selected, leading to error and the like.

The programme within the PLC controls the operation of the apparatus. In one preferred form of the invention an Allen Bradley SLC-100 processor may be used. However, this is by way of example only.

The use of a PLC provides a vast amount of flexibility, allowing parameters of the cycle to be changed, without altering the programme itself, in a simple and straightforward manner. The programme controls such parameters as the vacuum flush, seal heat, seal time and the like. All of these parameters may be altered, by mean of a console provided on the apparatus, without having to change the programme.

As discussed above, in one preferred form of the invention there is provided a programme for controller with eight programmes. Functional cycles may be as follows:

1. Gas - vacuum - gas - vacuum - sealing - cooling
2. Gas - vacuum - gas - sealing - cooling
3. Gas - vacuum - sealing - cooling
4. Gas - sealing - cooling
5. Sealing - cooling
6. Vacuum - sealing - cooling
7. Vacuum - gas - sealing - cooling
8. Vacuum - gas - vacuum - sealing - cooling
9. Vacuum - gas - vacuum - gas - sealing - cooling

However, other cycles may also be used to advantage.

In a further form of the invention the control means may include a vacuum pressure switch. The vacuum pressure switch is designed to be activated at a pre-set or predetermined level of vacuum, at which time the control of the vacuum lever becomes a function of time. The vacuum pressure switch allows packages of differing volumes to be proceeded without the need for changes in the programme controlling the operation of the apparatus. Varying levels of vacuum may be required for different products. The vacuum pressure switch used in combination with the timer(s) in the PLC allow for varying levels of vacuum to be achieved. When packaging delicate products, or in situations where a relatively low level of vacuum is required, the vacuum switch can be "forced" on in the software and the level of vacuum controlled solely by time.

The apparatus as shown in the accompanying drawings may be operated in a substantially horizontal position (as shown), or in a substantially vertical position.

It is also possible to operate the apparatus over a conveyor, in another form of the invention. This may assist in operating and managing a production line or the like simply and efficiently.

In one preferred form of the invention, a 24 volt operating system may be used. The voltage of the apparatus may be 100-240, operating on 7 or 13 amps. Again, this is by way of example, and apparatus according to the present invention may be operated on any voltage which is compatible with local conditions.

The seal bar may be provided of any suitable or appropriate length. In one preferred form of the invention, 24 inch, 30 inch and 36 inch seal bars may be provided. This is, however, by way of example only, and may be altered to accomodate varying package sizes.

The apparatus according to the present invention may be formed of any suitable or appropriate material, and by any suitable or appropriate technique. In one preferred form of the invention, the apparatus is constructed primarily of stainless steel and aluminium, with specialised components of the apparatus being formed of suitable materials. For

example, the lips 8 and 12 may be formed of rubber.

Although the invention has been described by ways of example only, and with reference to various embodiments thereof, it should be appreciated that variations and modifications may be made thereto, without departing from the scope of the invention.

For example, any suitable or appropriate control means may be used to advantage. Furthermore, an arrangement according to the present invention may be used to over wrap packages in a bulk pack. Any suitable or appropriate number of snorkels and corresponding cylinders may be used, and the apparatus may be of any suitable or appropriate size, depending on the size of the product to be packaged. volume of packages and the like.

The apparatus according to the present invention may be used with a packaging material also developed by the applicant, which allows for the prolonged preservation and moisture retention of perishable products. However, any suitable or appropriate packaging may be used.

Although the present invention has been described by way of example, and with particular reference to various embodiments thereof, it should be appreciated that variations and modifications may be made thereto, without departing from the scope thereof, as defined in the appended claims.

Claims

1. Packaging apparatus including a top and a base forming a housing, evacuating means, control means and sealing means, said housing being positionable in a first open position and a second closed position, with one end of the housing being provided with means to retain a package and to position relative thereto, when said housing is in said second closed position, said evacuating means, said evacuating means including openings through which gas may flow, said evacuating means being located substantially within said housing when in a first retracted position and extending at least partially outwardly of said end of said housing when in a second extended position, said evacuating means when in said second extended position being able to evacuate from or emit gas to said package located thereabout and retained in a position by said housing, said sealing means being located adjacent said portion of said package retained by said end of said housing to seal said portion of said package, and said control means controlling operation of said apparatus.

2. Packaging apparatus as claimed in claim 1, wherein said evacuating means is in the form of one or more nozzles.

3. Packaging apparatus as claimed in claim 1 or claim 2, wherein said sealing means is an extendible sealing bar.

4. Packaging apparatus as claimed in claim 3, wherein said sealing bar is heated by impulse heating.

5. Packaging apparatus as claimed in any one of the preceeding claims, wherein said means to retain said package in position relative to said housing includes one or more lips extending outwarding from each end of said top and base of said housing adjacent said one end thereof, said one or more lips of said top abuting said one more lips of the said base when said housing is in said second closed position.

6. Packaging apparatus as claimed in any one of the any one of the preceeding claims, wherein said control means is a programme logic controller.

7. Packaging apparatus as claimed in preceeding claims, wherein said control means includes a vacuum pressure switch.

8. A method of packaging which includes the steps of:

a) locating at least a portion of a package adjacent packaging apparatus;

b) at least partially evacuating said package by means of evacuating means of said apparatus;

c) sealing at least said portion of said package by means of sealing means of said apparatus; and

d) controlling operation of said apparatus by control means of said apparatus.

9. A method of packaging, including apparatus as claimed in any one of the preceeding claims 1-7, wherein said apparatus is operated through the following steps:

a) a first position between operating cycles, wherein said evacuating means is in said retracted position, said housing is in said open position and said sealing means is in a retracted position;

b) a second position wherein said evacuating means is in said extended position, said housing is in said open position, said sealing means is in said retracted position and at least a portion of a package is located about said evacuating means and between said top and base of said housing;

c) a third position wherein said evacuating means is in said extended position, said sealing means is in said retracted position, and said housing is in said second closed position, such that said evacuating means extends through said end of said housing into said package, with a near perfect seal being provided;

d) a fourth position wherein said evactuating means is in said retracted position, said housing is in said second closed position, with at least a portion of said package extending through said one end thereof, and said sealing means in in an extended position so as to be in contact with at least a portion of said package; and

e) a fifth position being substantially that of said fourth position, but with said sealing means being heated so as to seal at least a portion of said package.

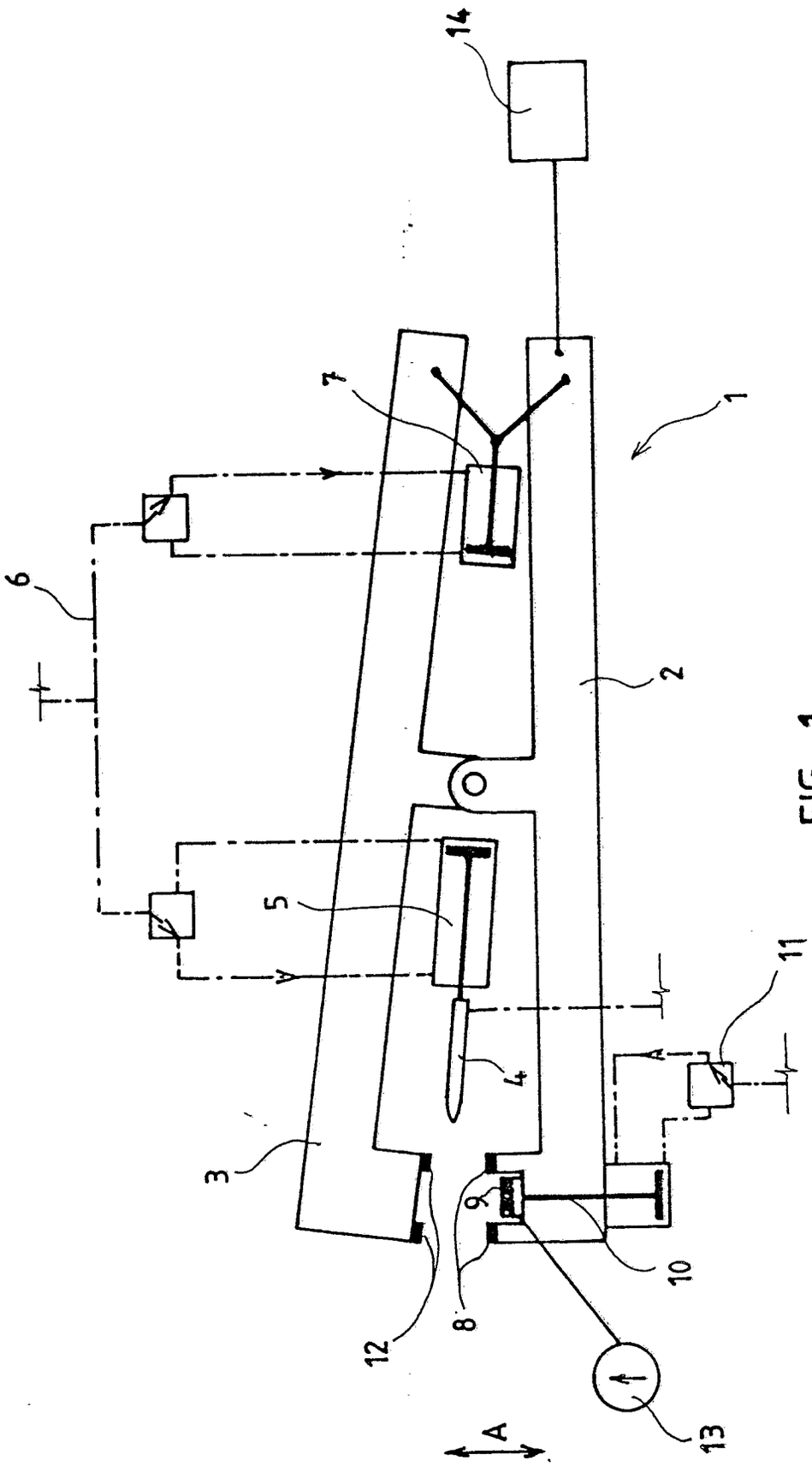

FIG. 1.

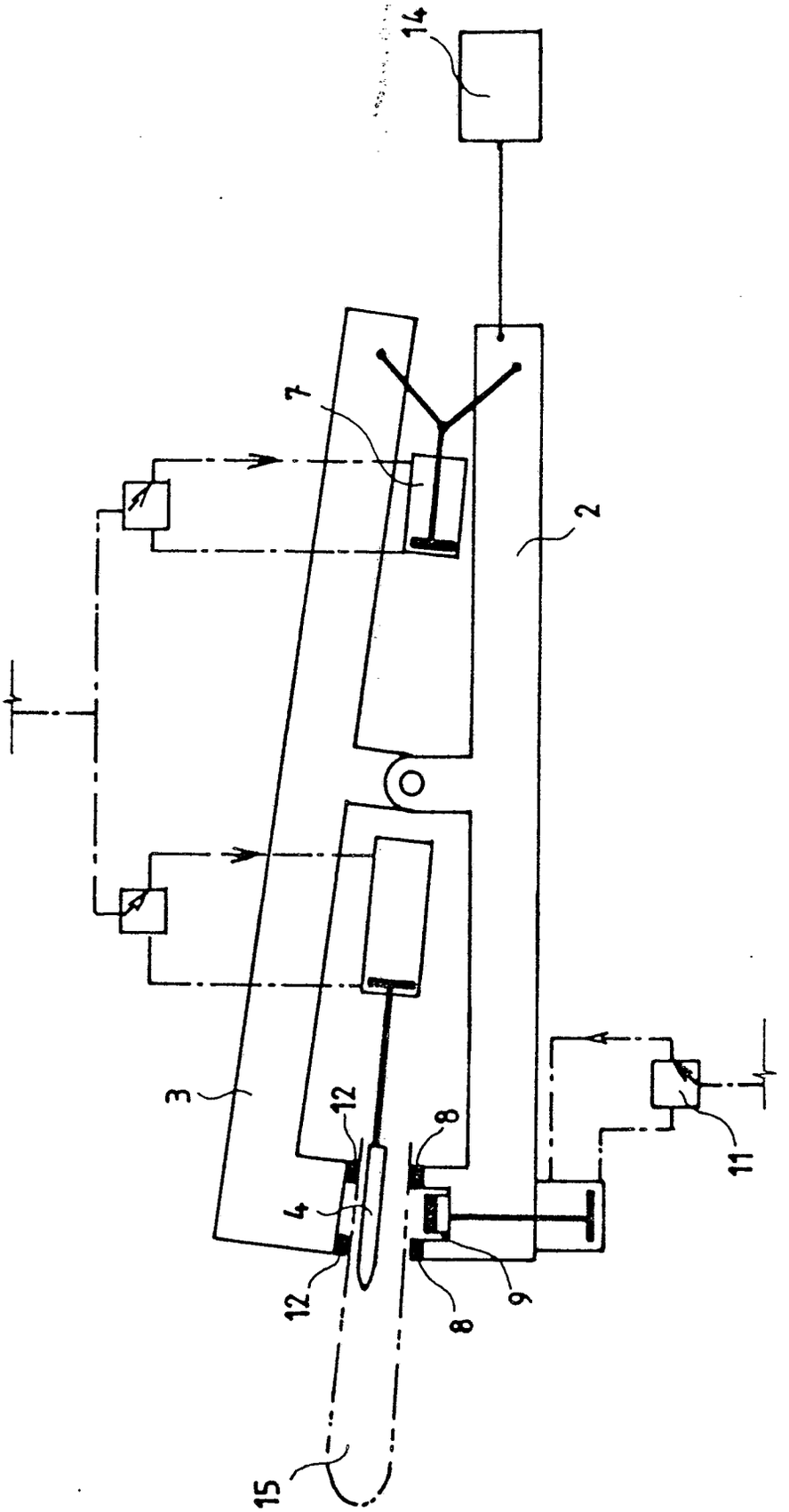

FIG. 2.

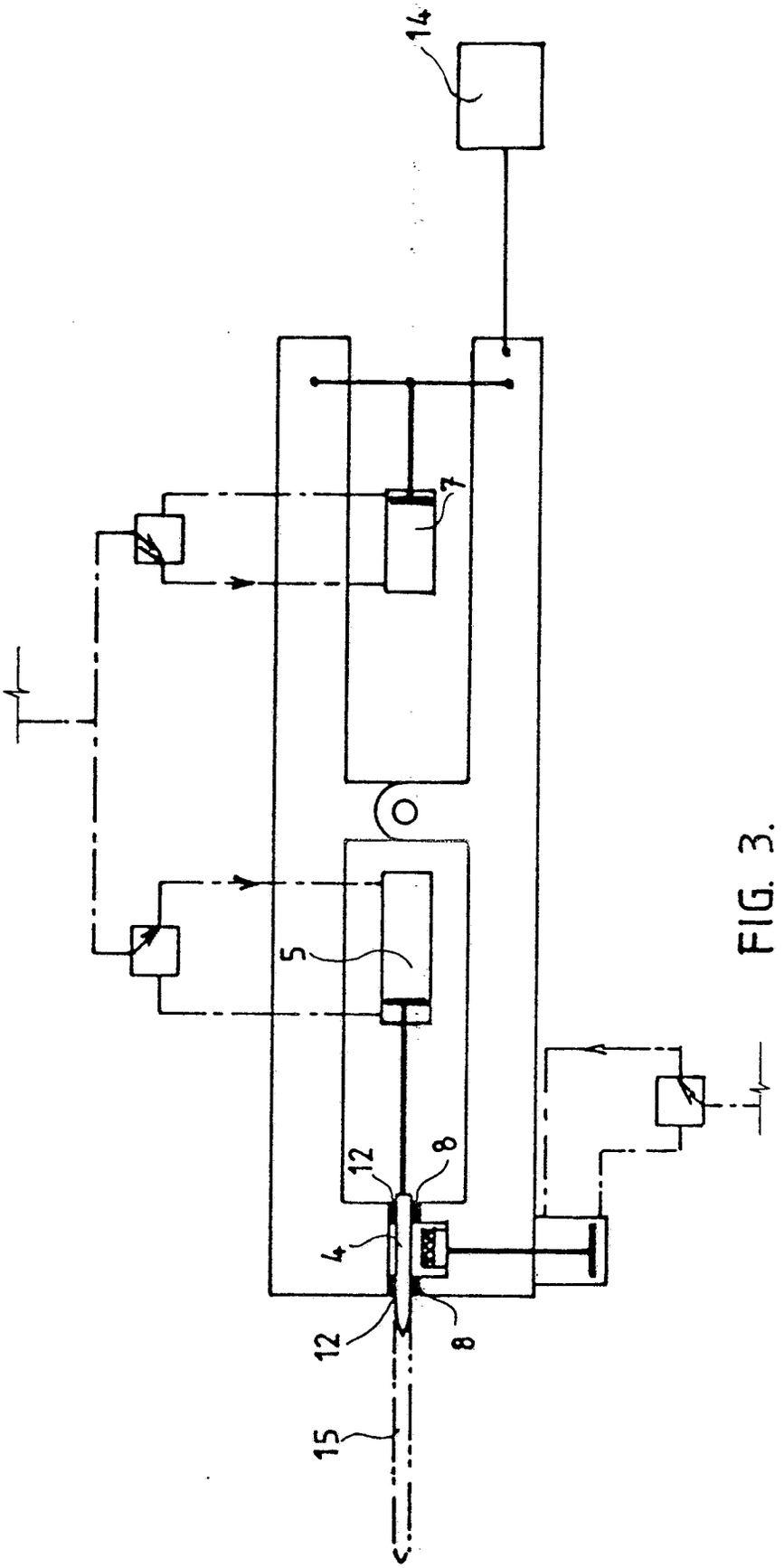

FIG. 3.

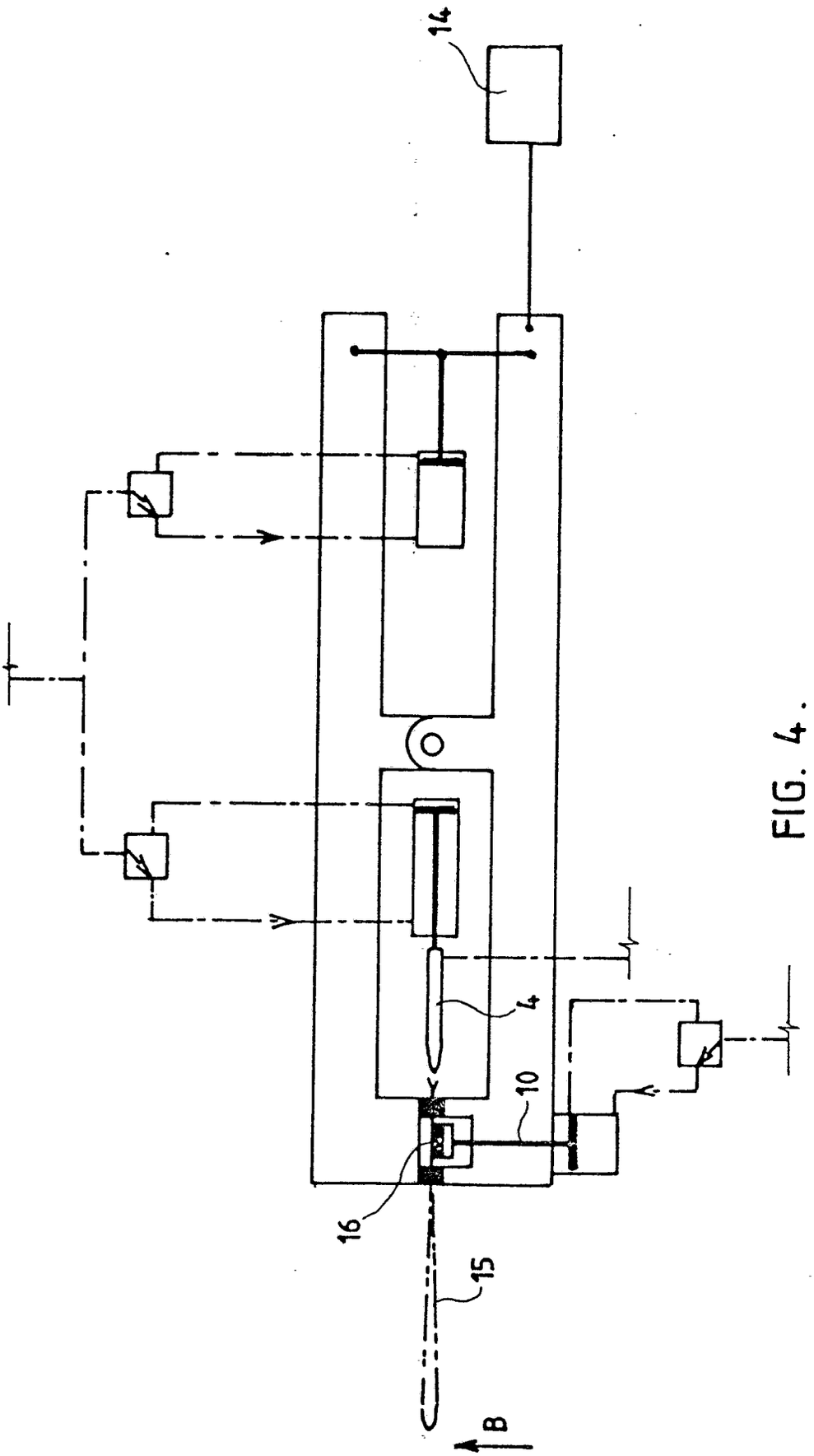

FIG. 4.

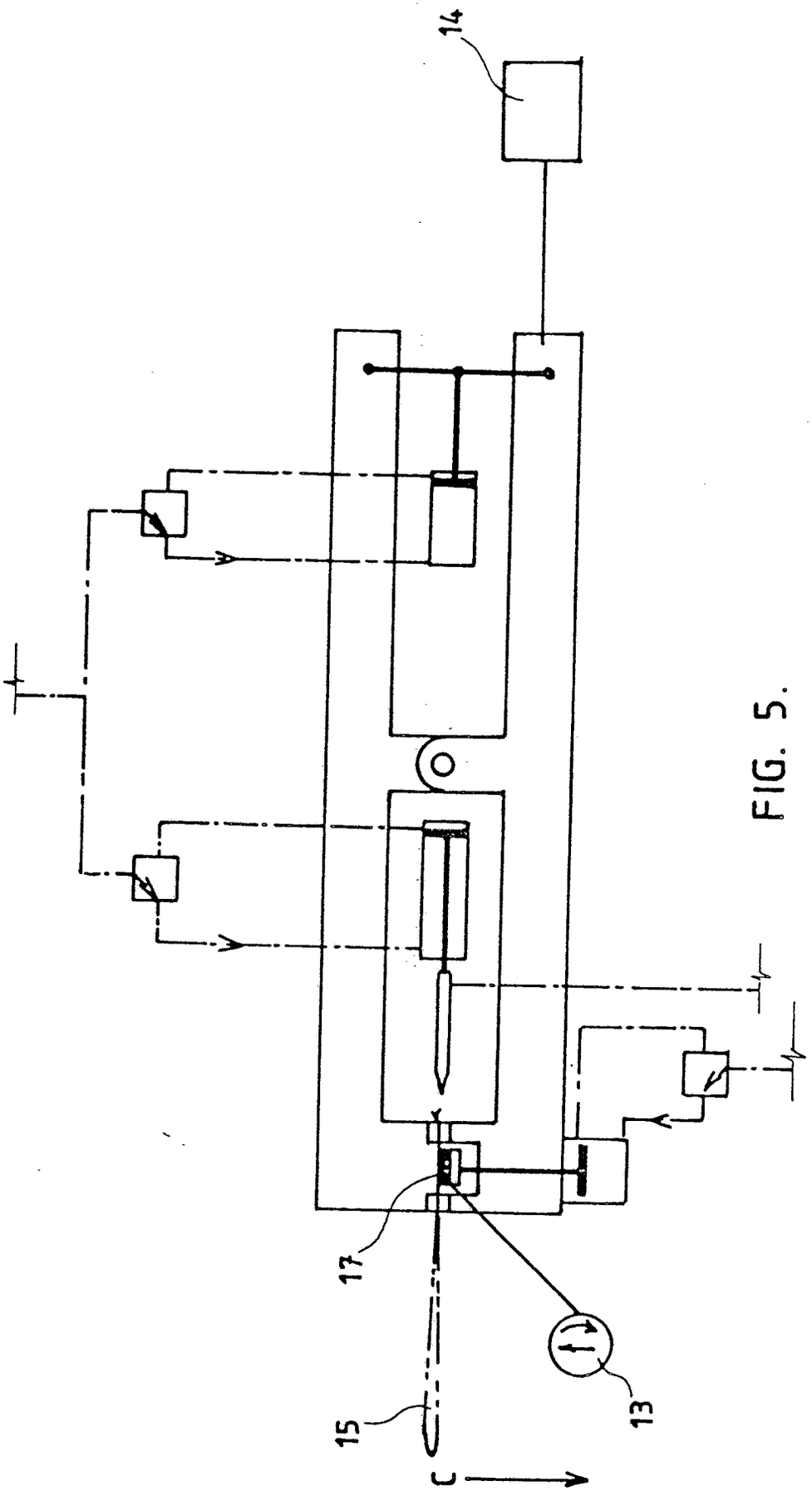

FIG. 5.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 88 31 1873

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.4)
X	DE-A-2 841 017 (I. ATELSEK et al.) * Page 12, lines 1-5; page 13, lines 1-13; figure 1 *	1,2,8	B 65 B 31/06
Y		3-7,9	
Y	US-A-3 968 629 (GIDEWALL et al.) * Column 18, line 67 - column 19, line 2; column 20, line 33 - column 21, line 11; column 22, lines 30-48; figures 21a,26,29 *	3-7,9	
A	US-A-4 241 558 (GIDEWALL et al.) * Column 7, line 52 - column 8, line 11; column 8, lines 28-40; figures 1,6,7 *	1-9	
A	DE-A-2 008 981 (GOEHLFENNEN & SPICKA GmbH) * Page 6; figures 2,4,6 *	1-5,8,9	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

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	10-03-1989	SCHELLE,J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
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