(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 161 083**
A1

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: 85302725.8

(22) Date of filing: 18.04.85

(51) Int. Cl.⁴: **B 65 B 43/60**
B 67 C 3/20, B 65 B 3/30

(30) Priority: 19.04.84 GB 8410209

(43) Date of publication of application:
13.11.85 Bulletin 85/46

(84) Designated Contracting States:
CH DE FR GB IT LI NL SE

(71) Applicant: C.E. King Limited
41 London Street
Chertsey Surrey(GB)

(72) Inventor: King, Robert Edward Stanley
14 Sunning Avenue Sunningdale
Surrey(GB)

(72) Inventor: Nicholls, Frederick William
c/o C.E. King Limited 41 London Street
Chertsey Surrey(GB)

(72) Inventor: Brossy, John
c/o C.E. King Limited 41 London Street
Chertsey Surrey(GB)

(74) Representative: Lynd, Michael Arthur et al,
Marks & Clerk 57 Lincoln's Inn Fields
London WC2A 3LS(GB)

(54) **Container filling apparatus.**

(57) Apparatus for filling containers with metered doses of liquids, which apparatus (1) includes a rotatable liquid-dispensing container-transporting carousel (2) having a plurality of circumferentially spaced container stations (3) and a dispensing head (14) rotatable with the carousel and including a plurality of positive displacement rotary pumps (5) adapted respectively to dispense liquid into containers located at said stations, and counting means (14) associated with each pump arranged to control the starting and/or stopping of each pump.

The apparatus may be microprocessor controlled and is capable of very high container-filling rates.

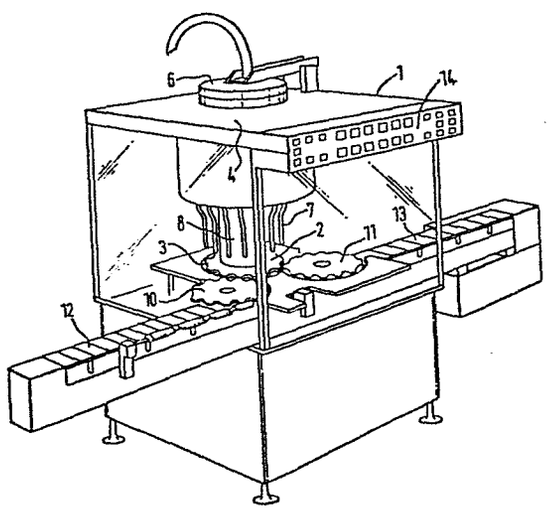

FIG.1.

CONTAINER FILLING APPARATUS

This invention relates to a container filling apparatus for filling containers with metered doses of liquids. A known apparatus for filling containers with precise quantities of liquids is of the in-line type in which one or more dispensing nozzles are fed with metered quantities of liquid either by means of a metering piston and cylinder arrangement or, of more recent introduction, by means of a positive displacement pump driven by a DC motor. Such apparatus has gained wide acceptance but the major disadvantage of this type of apparatus has been the relatively slow rate at which containers can be filled, at up to a maximum of eg 100 containers/minute. A further disadvantage is that it has generally hitherto been necessary to stop the line in order to adjust the quantity of liquid being dispensed.

According to the present invention there is provided an apparatus for filling containers with metered doses of liquids, which apparatus includes a rotatable liquid-dispensing container-transporting carousel having a plurality of circumferentially spaced container stations and a dispensing head rotatable with the carousel and including a plurality of positive displacement rotary pumps adapted respectively to dispense liquid into containers located at said stations, and counting means associated with each pump arranged to control the starting and/or stopping of each pump.

Preferably the same number of pumps are employed as there are stations.

By providing a plurality of stations and a corresponding number of dispensing pumps in the dispensing head and by appropriate control of the speed of rotation of the carousel and rate of pumping it is possible to increase significantly the rate of container filling by comparison with an in-line machine of the type discussed hereinbefore. For example, with a twelve station carousel and a dispensing head having twelve dispensing pumps, with the carousel rotating at 15 rpm, it is easily possible to fill 180 containers/minute. When it is considered that a considerably greater number than twelve stations and pumps may be employed, e.g. twenty four of each, it will be appreciated that the rate of container filling may be greatly increased.

Generally, containers will be fed to and removed from the carousel by employing rotating turrets synchronised with the rotation of the carousel. Preferably the turrets and the carousel are connected by a common gear train and preferably the carousel and dispensing head, as well as the turrets, are driven in rotation from a power source such as an electric motor. Drive for each pump is preferably via a plurality of clutch/brakes driven by a common chain drive from a further power source. Electric current to operate the

clutch brakes is preferably supplied to the rotatable dispensing head by way of slip rings.

Preferably sensing means is provided to activate or deactivate the clutch and brake to stop the pump when a predetermined signal is received. According to a preferred feature of the present invention, each pump is associated with a stream of electrical, magnetic or electromagnetic pulses, which pulses are fed to a pulse counter for each pump. Under the control of a microprocessor the clutch brakes can be respectively activated or deactivated to ensure that each pump is stopped after it has operated for a predetermined number of pulses.

By controlling the number of pulses for which each pump operates, the volume of liquid dispensed by each pump can be controlled.

It is also possible to control the rate of filling of containers upon the carousel by modifying the speed of the motor which is used to drive the pump.

The throughput of containers through the apparatus is controlled by modifying the rate of rotation of carousel/head and turrets.

It is to be noted that each of the controllable parameters may be adjusted whilst the apparatus is in use, in contrast to the prior art apparatus discussed hereinbefore. By suitable calibration the rate of rotation and hence rate of dispense for each pump may

be visually displayed or may be otherwise monitored or recorded.

As alternatives to the preferred arrangement outlined above, each pump may be provided with its own electric motor, each obtaining its electric current via slip rings. Alternatively each pump may be driven by an electrical stepping motor each acting as a slave motor to a control motor. Once again current for these stepping motors may be supplied by way of slip rings.

Although it is preferred that each pump be associated with a single station of the carousel a single pump may be arranged to supply two or more container filling nozzles which are preferably supplied serially with liquid. In the case of where two nozzles are supplied by a single pump these may be arranged diametrically opposite each other on the carousel/dispensing head.

In order to prevent loss of liquid by spillage, foaming etc. each station may be movable vertically relative to a container-filling nozzle associated with the said station.

Although pulse counting is preferred for use to drive the pump controls, any suitable means may be employed such as detecting the weight of a container and its contents, optically detecting contents level or using low pressure air sensing.

In addition to the control means already discussed there may be provided means for shutting off a pump in

the event that a container is not present at its associated station of the carousel. Additionally of course means will generally be provided for resetting the control parameter.

Preferably the apparatus is made largely of sterilizable materials such as stainless steel and is arranged so that handling of the liquid and containers may be effected under closed, sterile conditions.

An embodiment of apparatus according to the present invention will now be described, by way of example only, by reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of an embodiment of apparatus according to the present invention;

Fig. 2 is a side elevation of the apparatus of Fig. 1;

Fig. 3 is a front elevation of the apparatus of Fig. 1; and

Fig. 4 is a plan of the apparatus of Fig. 1.

Referring to the drawings there is shown a container-filling apparatus 1 comprising a carousel 2 provided about its circumference with 12 circumferentially spaced part annular recesses 3 for receiving and supporting containers and each acting as a station.

Mounted above the carousel 2 is a dispensing

head 4 comprising 12 positive displacement twin gear impeller pumps 5 each for supplying liquid from a central reservoir 6 to one of twelve filling nozzles 7 located respectively above each recess 3.

The dispensing head 4 is mounted for rotation with the carousel 2 upon a central shaft 8 arranged to be driven via gearing and a drive belt (not shown) from an electric motor 9.

Each pump 5 is arranged to be driven via its own electromagnetic clutch and brake (rotating with the dispensing head 4) from a separate electric motor via a common chain drive.

Each electromagnetic clutch and brake is supplied with electric current by means of slip rings surrounding the shaft 8, 25 such slip rings being provided, twelve supplying current to the clutches, twelve supplying current to the brakes and one being a common return. Turrets 10 and 11 are arranged respectively for supplying empty containers to and receiving filled containers from the carousel 2 and are driven in rotation via gearing electric motor 9. Conveyor belts 12 and 13 transport containers to and from the turrets 10 and 11.

Associated with the drive for the pumps is an electromagnetic pulse generator and detecting means for detecting said pulse and passing them to a

control unit 13, shown in Fig. 5 of the accompanying drawings.

Control unit 13 comprises a microprocessor and associated interfaces (not shown) and twelve pulse counter displays 14. A numeric key pad 15 is provided so that each counter display may be programmed with a predetermined number of pulses. As a particular pump 5 reaches a predetermined position the pulse count is set to zero, and if no countermanding override is in force, the pulse counting commences as does pumping. When the pulse count received by the microprocessor equals the preset number of pulses the clutch and brake associated with that pump 5 are energized to disengage drive to the pump and to brake the pump, until such time as pump 5 once again arrives at said predetermined position.

Means are provided for sensing the presence or absence of a container from each station and for causing the microprocessor to issue an override command to prevent operation of the pump if no container is present at its filling station.

Means 16 are provided on the control unit for adjusting the preset pulse counts for each pump as necessary.

The apparatus of the present invention allows the rapid and accurate filling of large numbers of containers in a hygienic and sterile manner, as well as allowing sophisticated on line adjustments to be made of filling rates, filling quantities and container handling quantities.

The present invention includes within its scope all modifications and variations which would be apparent to one skilled in the art.

CLAIMS:

1. Apparatus for filling containers with metered doses of liquids, which apparatus includes a rotatable liquid-dispensing container-transporting carousel having a plurality of circumferentially spaced container stations and a dispensing head rotatable with the carousel and including a plurality of positive displacement rotary pumps adapted respectively to dispense liquid into containers located at said stations, and counting means associated with each pump arranged to control the starting and/or stopping of each pump.

2. Apparatus according to claim 1, characterized in that there are provided the same number of pumps as there are stations, each said pump being associated with a respective said station.

3. Apparatus according to claim 1 or 2, wherein each pump includes a clutch/brake arranged to be driven by a common drive from a further power source.

4. Apparatus according to any preceding claim, characterized in that each pump is associated with a source of electrical, magnetic or electro-magnetic pulses indicative of the rotation of a said pump, a pulse counter being provided for each pump and microprocessor means for respectively activating or deactivating a said pump to ensure that a said pump is stopped after it has operated for a predetermined number of pulses.

5. Apparatus according to claim 1 or 2, characterized in that each pump is associated with its own electric motor.

6. Apparatus according to claim 5, characterized in that each said motor associated with each said pump derives its current by

way of slip rings located about an axis of rotation of the carousel and container head.

7. Apparatus according to claim 5 or 6, characterized in that each said motor is a slipper motor arranged to aet as a slave motor to a control motor.

8. Apparatus according to claim 1, characterized in that a said pump is associated with two or more container filling stations.

9. Apparatus according to any preceding claims, characterized in that it further comprises means for detecting the presence or absence of a container at its associated station of the carousel and for stopping a said pump in the event of a said absence.

0161083

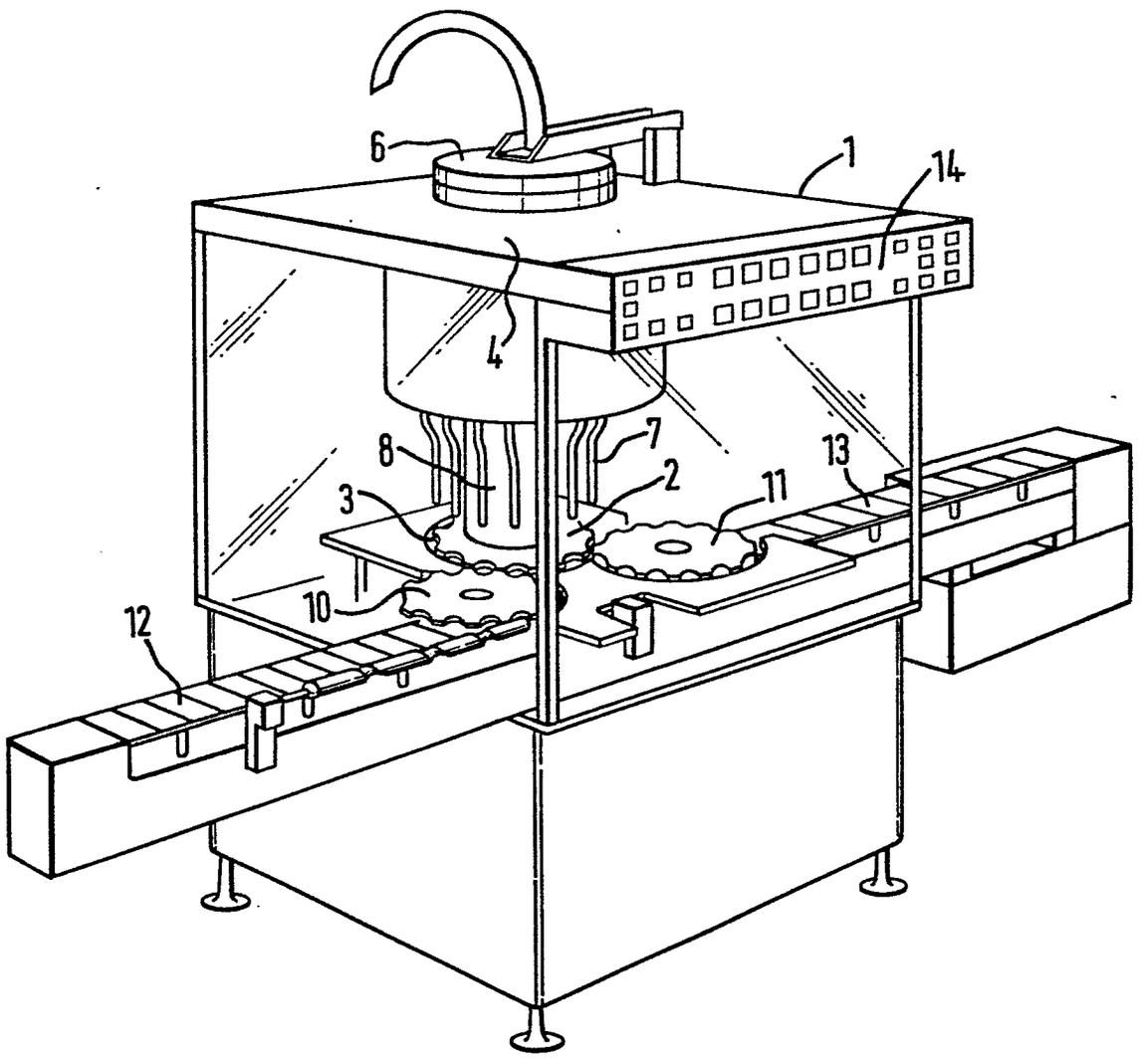

FIG.1.

0161083

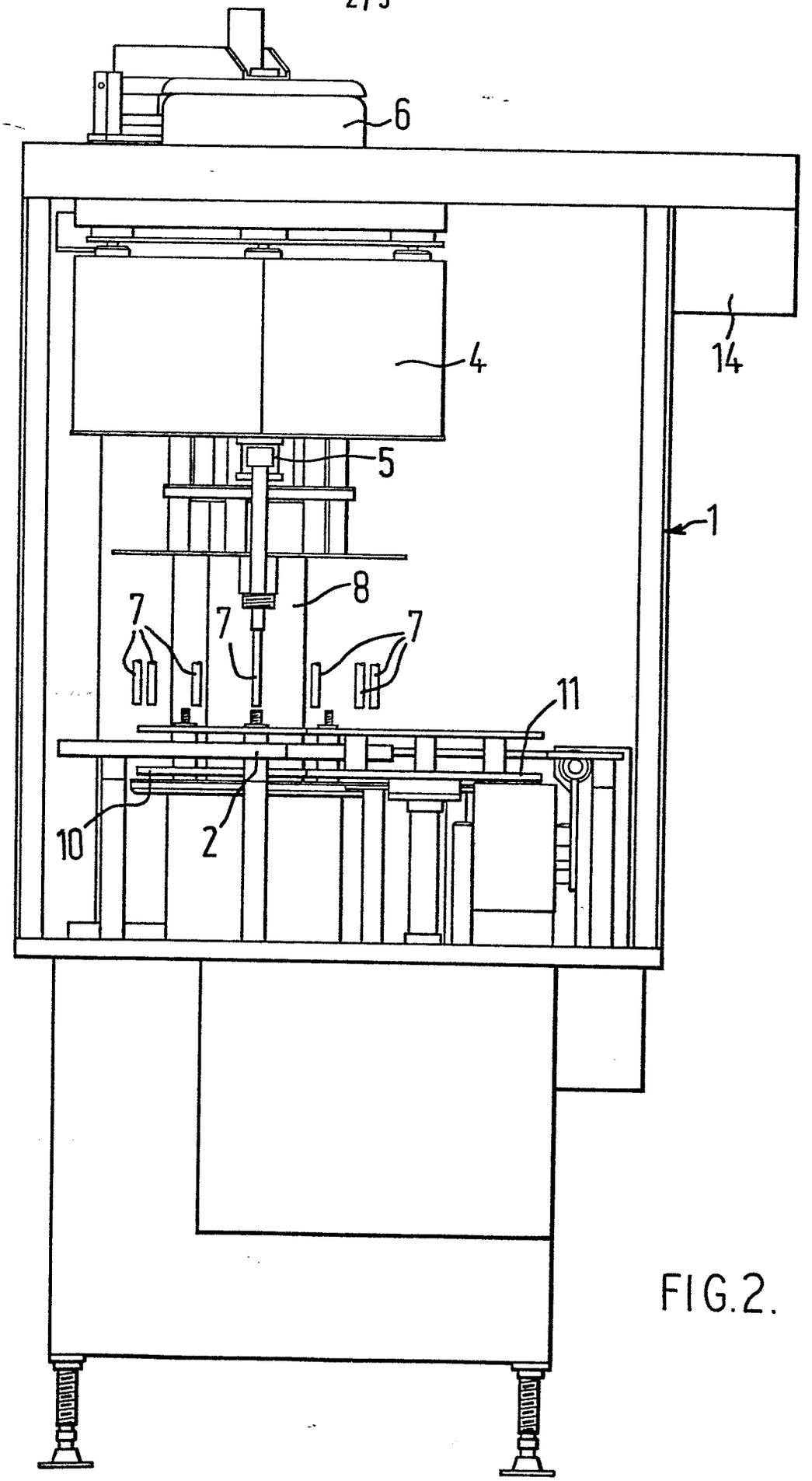

FIG.2.

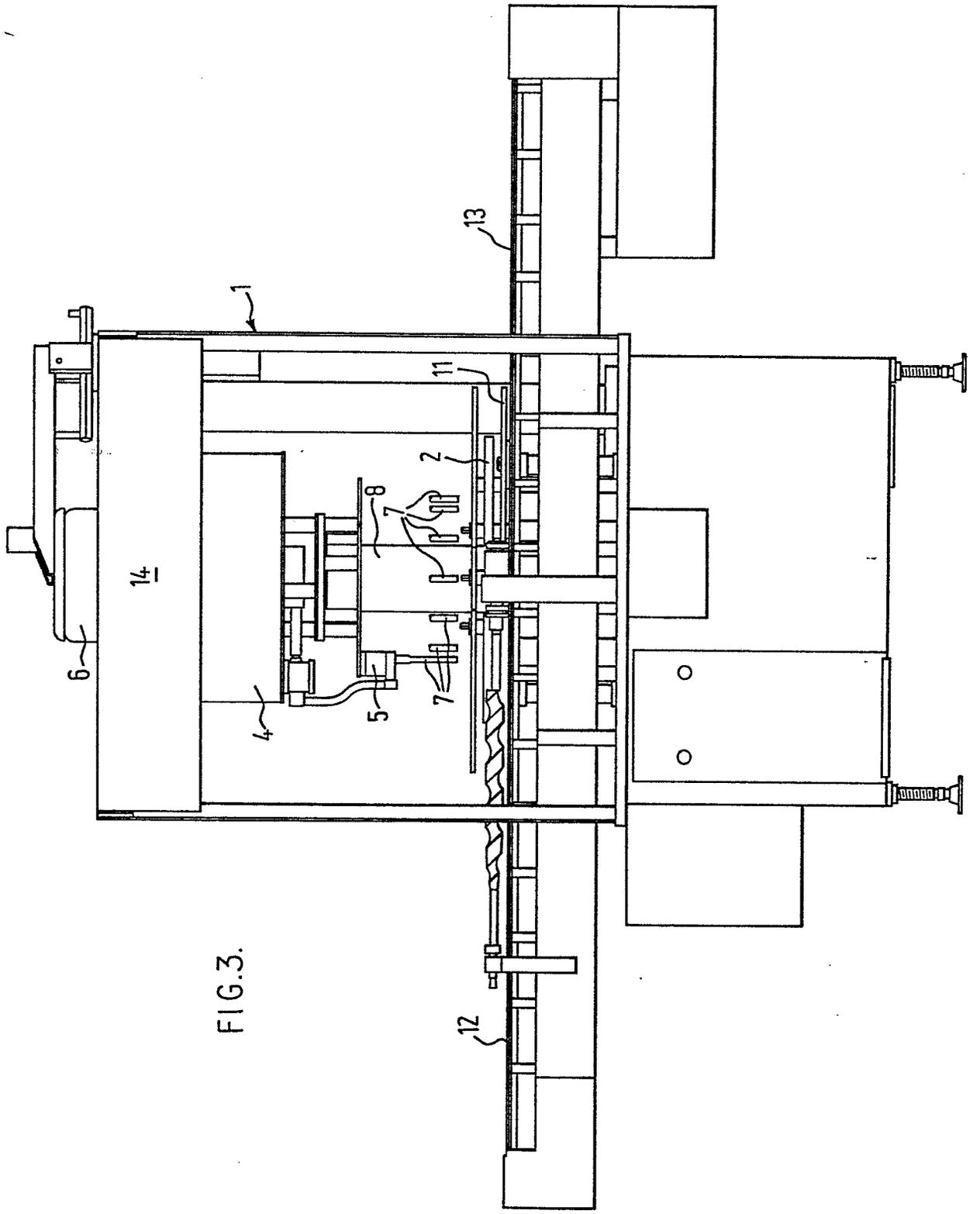

FIG.3.

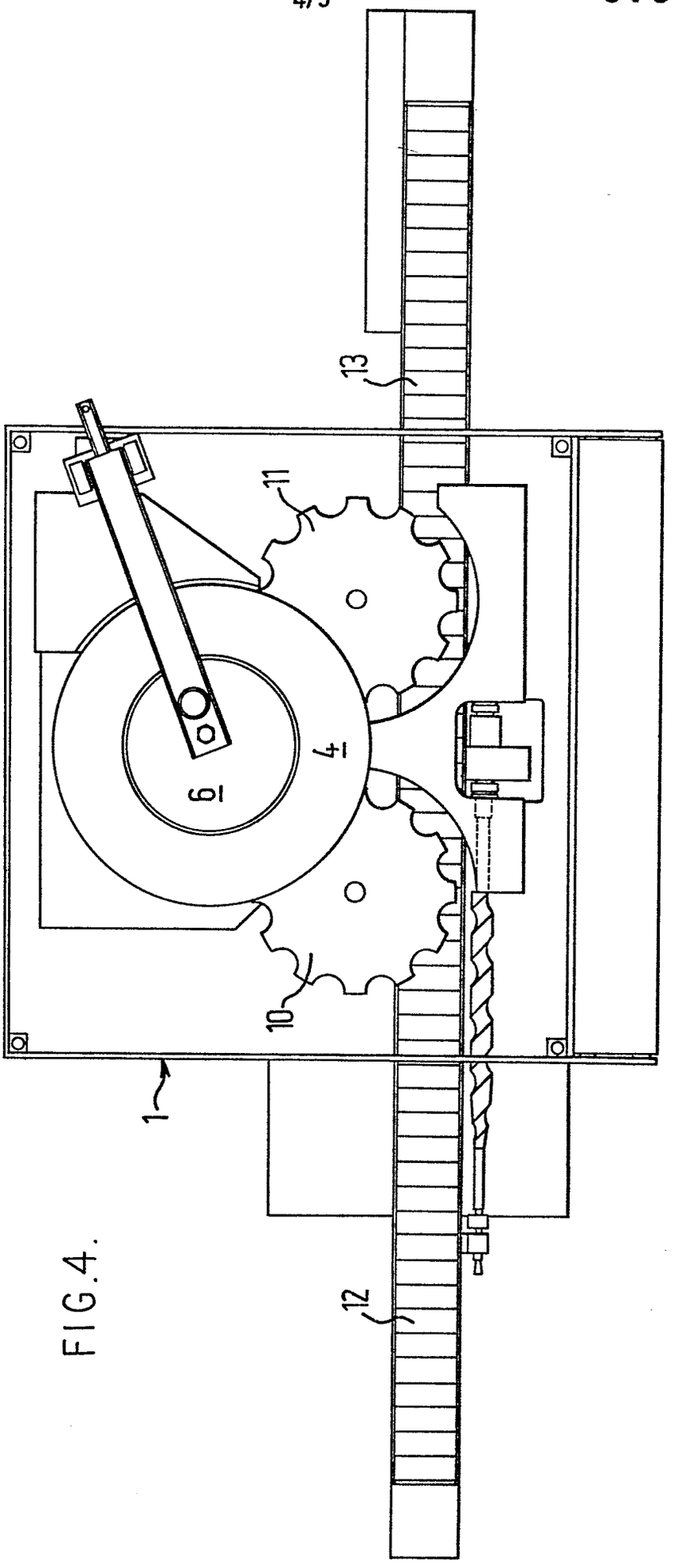

FIG.4.

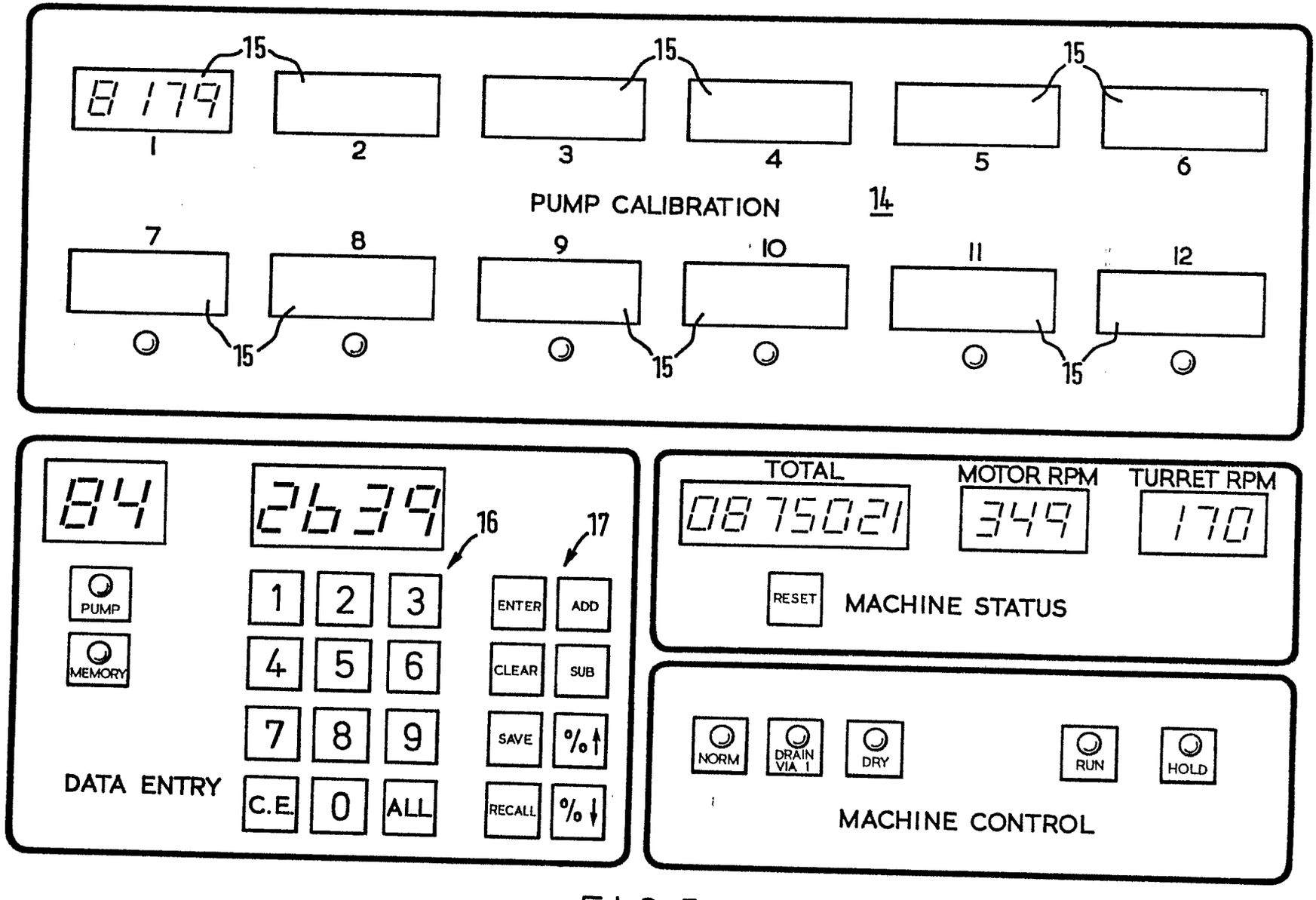

FIG.5.

0161083

European Patent Office

EUROPEAN SEARCH REPORT

0161083
Application number

EP 85 30 2725

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)
Y	EP-A-0 100 969 (TETRA PAK INTERNATIONAL) * Page 2, lines 1-7; page 3, lines 19-28; claim 7; figure 1 *	1-5,7-9	B 65 B 43/60 B 67 C 3/20 B 65 B 3/30
Y	US-A-3 887 110 (PORTER) * Figures 2-5; column 1, line 45 - column 2, line 16; column 3, line 58 - column 5, line 35; column 7, lines 7-47; column 8, lines 5-25; column 2, lines 56-68 *	1-5,7-9	
Y	US-A-4 415 011 (GRANT) * Figure 6; column 6, lines 5-9 *	4	
A	US-A-3 335 767 (MANAS)		TECHNICAL FIELDS SEARCHED (Int. Cl.4) B 67 C 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	12-07-1985	DEUTSCH J.P.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
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

EPO Form 1503. 03.82