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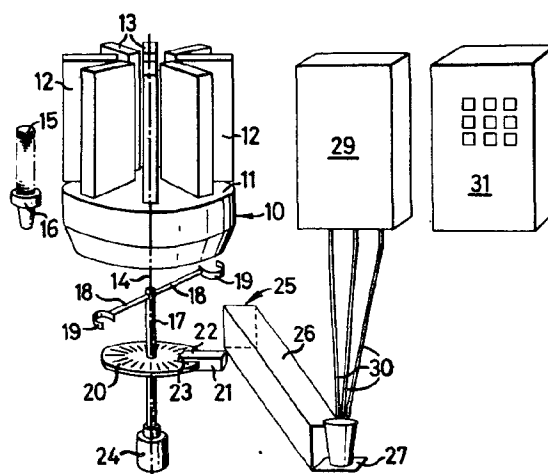
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⑤④ **Improvements in and relating to vending machines.**

⑤⑦ The invention relates to dispensing apparatus comprising receptacle supply means (13), a receptacle dispensing station (25), receptacle transport means including an arm (18) capable of at least limited rotational movement about an axis (14) and arranged to convey a receptacle over a predetermined path between said supply means (13) and said dispensing station (25) one or more ingredient dispense stations (12) disposed along said path, control means (20 to 23 and 31) for indicating the position of said arm, and for controlling movement thereof, and motor means (24) for driving said arm in response to said control means, whereby a receptacle is transported along said path to said dispense station and is stopped at such ingredient dispense stations therealong as may be determined by said control means to receive a charge of ingredient.



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DESCRIPTION

This invention relates to dispensing apparatus and has particular reference to apparatus of the type adapted to dispense inter alia a beverage in response to
5 insertion of a coin or operation of a keyboard.

Machines of this type are generally well known. For example British Patent Specification No. 702,474 describes apparatus
10 suitable for dispensing beverages such as tea, coffee, soft drinks and the like where stored cups or dishes are released one at a time by release means, each released cup or dish being received by a transfer member for
15 transferring the cup or dish under means for introducing the quantity of the beverage or food stuff into the cup or dish into a position whereby the charge cup or dish is accessible to the person operating the apparatus.

20 Apparatus of this type suffer from a number of disadvantages; the principal among them being that where beverages are being dispensed a separate beverage mixing arrangement is necessary and the beverage is then
25 dispensed directly into a receptacle or cup.

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This produces a cleansing and contamination problem whereby it is necessary and desirable to clean the mixing chamber after each dispense cycle otherwise the next dispense of, for example,
5 coffee will be contaminated with the preceding dispense of say tomato soup.

In an attempt to overcome this, the present Applicants have sought to provide a vending machine having at least one container dispensing
10 station for dispensing individual containers from a stack thereof, and a plurality of ingredient dispensing stations, the machine comprising a conveyor having a carriage and associated support means adapted and arranged to receive
15 and support a container at said dispensing station and to present said container sequentially at each ingredient dispensing station, and control means provided for causing or allowing said container to receive a portion of at least
20 one ingredient and a discharge station where the container is discharged from the support means of the conveyor whereby on disengagement of the container from the support means, the conveyor returns the carriage to a datum position.

25 A longitudinal conveyor may be employed whereby an arm is moved along a track by means of

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a reversible motor drive and means may be provided to transmit data to the control circuit of the machine for starting and stopping the machine in accordance with the position of carriage relative to the various ingredients.

Satisfactory as this may be, control of the apparatus in such an arrangement is still dependent largely on microswitches and direct position sensing and driving of the cup or container dispensing carriage, is not easily achieved.

According to the present invention there is provided dispensing apparatus comprising receptacle supply means, a receptacle dispensing station, receptacle transport means including an arm capable of at least limited rotational movement about an axis and arranged to convey a receptacle over a predetermined path between said supply means and said dispensing station and one or more ingredient dispense stations disposed along said path, control means for indicating the position of said arm and for controlling movement thereof, and motor means for driving said arm in response to said control means, whereby a receptacle is transported along

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said path to said dispense station and is stopped at such ingredient dispense stations therealong as may be determined by said control means to receive a charge of ingredients.

5 The arm may include a radially slidable portion adapted to carry said receptacle and a fixed portion secured for rotation about said axis. The path may be defined by a profile or track so that the said receptacle
10 follows said profile or track and relative slidable movement occurs between said fixed portion secured to said axis and said slidable portion. In an alternative embodiment the arm may be substantially fixed and the receptacle
15 path is arcuate.

 The control means may include a manually operable control panel for selecting from a plurality of goods to be dispensed by the apparatus and the control means may operate on
20 said transport means to present a receptacle sequentially at said dispense stations to receive a charge of ingredients therefrom. The control means may also include a coin mechanism.

 In a particular embodiment of the present
25 invention the receptacle may be a cup and the receptacle supply means may be a cup dropper and a magazine therefor.

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The apparatus may further include means for supply of water to said receptacle at or adjacent said receptacle dispensing station for the purpose of forming a beverage with
5 the ingredient dispensed thereinto during operation of the apparatus.

In a preferred embodiment of the invention, the control means may comprise a microprocessor unit adapted to receive input information from
10 a control panel and/or a coin mechanism for control of said motor means for driving said arm and for controlling in sequence:-

the supply of a receptacle to said transport means;

15 the movement of said receptacle along said path and its presentation at ingredient dispense stations selected at said control panel;

the dispensing of a quantity of ingredients thereat;

20 and ~~of~~ the transport of the receptacle to said receptacle dispense station.

The microprocessor may be associated with a statistical display and an analysis for the operation of the apparatus.

25 The receptacle transport means and the arm associated therewith may include indication means for determining the position of said receptacle

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along said path. In a specific embodiment, the control of the movement of the receptacle transport means along this path may be effected by for example a Hall effect sensor and magnetic
5 strip on a disc to indicate the receptacle position, or an optical system using a disc with light and dark strips or transparent strips and an infra red emitter and detector, or a system of magnetic tape and recording head.

10 The apparatus of the present invention may be particularly suitable for the supply of inter alia beverages in response to instructions given by user of the apparatus to a control panel. The same apparatus will dispense any one of a
15 number of drinks formed from any one of a number of combinations of ingredients, e.g. coffee with milk, coffee without milk, coffee with sugar, coffee with milk and sugar. In addition, the strength of the various ingredients may also
20 be predetermined.

To this end, the plurality of dispense stations is employed whereby dry ingredients are dispensed into a cup or like receptacle. In a variation of this arrangement, a receptacle
25 at said receptacle dispense station, may already include a portion of ingredient therein (the so-called "in-cup" arrangement) and additional

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ingredients may or may not be dispensed into the cup so provided during transport between a receptacle supply means and said receptacle dispensing station. The receptacle supply means
5 may in a specific embodiment of the invention comprise a plurality of receptacle supply means such as cup droppers whereby different "in-cup" ingredients may be catered for and subsequent additional ingredients may be
10 provided during the dispense cycle of the apparatus.

Following is a description by way of example only and with reference to the accompanying drawings of methods of carrying the invention
15 into effect.

In the drawings:-

Figure 1 is a diagrammatic representation of a vending machine in accordance with the present invention.

20 Figure 2 is an alternative embodiment of the machine in accordance with the invention

Figure 3 is a further embodiment of the machine in accordance with the present invention.

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Figure 4 is a flow diagram; and

Figure 5 is a system block control diagram,
for use in accordance with the machine of Figure 1.

Referring now to Figure 1, the machine
5 comprises a base 10 of generally circular
configuration having an upper surface 11 with a
plurality of through holes (not shown) each of
which through holes is adapted to support a
dispensing cartridge and nozzle 12. In the
10 embodiment shown, 8 holes are provided and the
machine is arranged to accommodate 6 cartridges 12,
and two cup dispense stations 13.

The cartridges 12 and dispense stations 13
are circumferentially spaced about central axis
15 14 of the apparatus; each cartridge 12 is provided
with an ingredient dispense nozzle and an
associated electro-magnetic activation means is
provided in base 10 for energising the valve
and discharging a measured portion of ingredients
20 through a dispensing opening. Each cup dispense
station 13 comprises means for providing a stack
of cups 15 to a cup dropper 16 of a construction
known per se. The base 10 carries for rotation
with respect thereto a shaft 17 substantially
25 coaxial with axis 14, said shaft 17 carrying towards

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its upper end a pair of radially disposed cup arms 18 each of which is disposed on opposite sides of rod 17 and substantially radially thereof, each cup arm 18 carrying at its outer end a U-shaped cup support 19, the arrangement being such that the support 19 is capable of receiving a cup dispensed by cup dropper mechanism 16. Shaft 17 carries for rotation therewith a disc 20. A sense element 21 is bifurcated at one end 22 to provide to a pair of arms 23, each of which overlays an upper or a lower surface of disc 20. The sense element 21 is provided in fixed relationship with respect to rod 17 such that the arms 23 overlay a segment of an annulus of said disc.

The said annulus of disc 20 may be provided with a magnetic portion containing magnetic code or alternatively may be provided with an optical code, such as a sequence of holes of varying radial dispositions from the axis of shaft 17. The sense member 21 is operatively connected with a control system including a central processing unit in the manner hereinafter described. The lower end of shaft 17 is provided with a motor 24 which serves to rotate the shaft and hence, cup

arm 18 and associated cup support 19 to transport a cup carried thereby from the cup dropper 16 to a cup dispense station indicated generally at 25. Cup dispense station 25 is substantially diametrically opposed to at least one of the cup droppers 13 and comprises an enclosed chute 26 inclined from a dispense station whereby a cup carried by cup support 19 is disengaged therefrom, passed down chute 26 towards the lower dispense platform 27. Juxtaposed platform 27 there is provided means for the supply of water by a tank and associated control unit 29. Tank 29 is provided with associated control means and three outlet pipes 30 for the supply of hot water, cold water or a carbonated water supply depending upon the ingredients which have been dispensed into a cup during passage along the cup path.

20 The control system comprises a control panel 31, associated with a central processing unit, the operational details of which are set out in Figure 5. The control system may comprise a sequential logic or microprocessor circuit 40 which is fed by selection key board 31 in association with an inner key pad 32 or like control system, not accessible to the public.

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Key pad 32 is provided for controlling the relative time period of the dispense cycle thereby controlling for example the amount of ingredient dispensed in response to
5 given combinations of selection buttons depressed in control panel unit 31. The output of sense element 21 is also fed into the microprocessor unit 40. The output of the microprocessor serves to drive the drive
10 motor 24, the ingredient dispense circuits for the particular ingredients selected a control panel 31, the illumination of the system, the water dispense and the various pumps associated therewith.

15 The sequence of operation is generally shown in Figure 4. A beverage or drink is selected on control panel 31. In a situation where the machine is a vending machine including a coin operating mechanism, the money is inserted into
20 the coin mechanism where the money inserted is validated and change given if necessary. Once the money inserted has been validated motor 24 starts movement to move cup arm 18 and U-shaped cup support 19 together with a cup
25 carried thereby. Rotation of the arm continues until a code sensed on disc 20 by means of

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sensor 21 corresponds with a selected ingredient from control panel 31. The motor 24 is stopped and the dispense circuit of the selected ingredient dispenser
5 12 is activated for the period in accordance with the instructions manually given to control panel 31 until the dispense of that particular ingredient has been completed into the cup.

10 At the end of the dispense cycle, motor 24 is again activated and transport of the cup proceeds to the next ingredient selected and the cycle repeated, until all the preselected ingredients indicated on
15 panel 31 have been dispensed.

On completion of the dispense operation, motor 24 is energised to transport support 19 and the cup supported thereby to cup dispense station 25 where the cup together
20 with the dry ingredients passes down chute 26 to dispense platform 27. The central processor unit then activates the water supply 29 to provide the appropriate water for the drink via conduits 30 in an amount
25 sufficient to provide a full cup of beverage.

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At the same time motor 24 is reactivated to continue the rotation of shaft 17 to bring the appropriate cup support 19 at the extremity of cup arm 18 into register
5 with the appropriate cup stack and cup dropper 16 to receive another cup and the arm then returns to its datum position ready for the start of the next vend cycle.

The embodiments shown in Figure 2 is
10 a variation of the embodiment described and illustrated with respect to Figures 1, 4 and 5 whereby shaft 17 carries a semi-circular plate 51 and appropriate sense means (not shown). A cup arm 52 is provided with cup
15 receiving portion 53 adapted to accommodate a cup 54 as shown. In operation the cup is received from the cup stack 50 and associated cup dropper (not shown) and passes ingredient dispensers 60 where it stops in
20 accordance with the directions given by a central processor unit. The cup path is arcuate and passes over a semi-circle from the cup dispense stack 50 to a cup chute 61 where the cup is dispensed in the manner
25 described above for receipt of the water supply. After release of the cup, the drive motor is reversed and the cup arm returned

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to its datum position.

In a further embodiment, as shown in Figure 3, the shaft 17 is provided with a cup arm 18 and an extension 70 having a sliding connection 71 between the extremity of cup arm 18 and extension 70. The extension 70 carries a cup support 72 in the manner described above and also has a depending arm 73 which is constructed and arranged to sense a guide track 74 the arrangement being such that rotation of the arm 17 produces relatively sliding movement of the extension 70 with respect to cup arm 18 so that the cup follows a path defined by guide track 74. The extension 70 is biased towards the axis of rotation of rod 17 so that depending arm 73 follows track 74 and the cup carried by support 72 follows a non-arcuate cup dispense path.

The detail of the sliding arm is shown in Figure 3a. In this embodiment, the sliding connection comprises central channel portion 82 open in its upper surface and provided in its base 83 with a longitudinal slot (not shown). The channel portion 82 is secured to the extremity of cup arm 18 by

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means of a rivet 84 and extension portion
70 is secured by means of rivet 85 to the
said longitudinal slot, the arrangement
being such that extension 70 is capable of
5 a sliding movement longitudinally of channel
section 82.

It will be appreciated that the control
of the shaft 17 and the drive by motor 24
may be effected by a number of methods. For
10 example motor 24 may be a Hall effect motor
to control precisely the indexing of a cup
with a dispense nozzle. In the alternative
an optical system using a disc with light
or dark strips or transparent strips and
15 an infra red emitter and detector. In
another embodiment a system of magnetic tape
and a recording head can be used.

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CLAIMS:-

1. Dispensing apparatus comprising receptacle supply means,
a receptacle dispensing station,
receptacle transport means including an
5 arm capable of at least limited rotational movement about an axis and arranged to convey a receptacle over a predetermined path between said supply means and said dispensing station,
one or more ingredient dispense stations
10 disposed along said path,
control means for indicating the position of said arm, and for controlling movement thereof,
and motor means for driving said arm
15 in response to said control means,
whereby a receptacle is transported along said path to said dispense station and is stopped at such ingredient dispense stations therealong as may be determined by said control means to
20 receive a charge of ingredient.
2. Apparatus as claimed in claim 1 wherein said arm includes a radially slidable portion adapted to carry a receptacle, and wherein said path is defined by a profile or track,

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so that said receptacle follows said profile
or track and relative sliding movement occurs
between said axis and said portion.

3. Apparatus as claimed in claim 1 wherein
5 said arm is substantially fixed and the
said path is arcuate.

4. Apparatus as claimed in any preceding
claim wherein the control means includes a
manually operable control panel for selecting
10 from a plurality of choices and wherein the
control means operates on said transport
means and said selected ingredient dispense
stations to present a receptacle sequentially
at said selected stations to receive a charge
15 of ingredients therein.

5. Apparatus as claimed in any preceding
claim wherein the control means includes
a coin mechanism.

6. Apparatus as claimed in any preceding
20 claim wherein the receptacle is a cup and
wherein the receptacle supply means comprises
a cup dropper and a magazine therefor.

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7. Apparatus as claimed in any preceding claim including means for the supply of water to said receptacle at or adjacent said receptacle dispensing station.

5 8. Apparatus as claimed in any preceding claim wherein the control means comprises a microprocessor adapted to receive input from a control panel and for a coin mechanism for control of said motor means for driving
10 said arm and for controlling in sequence the supply of a receptacle to said transport means, the movement of said receptacle along said path and its presentation at ingredient dispense stations selected at said control
15 panel, the dispensing of a quantity of ingredient thereat, and the transport of said receptacle to said receptacle dispense station.

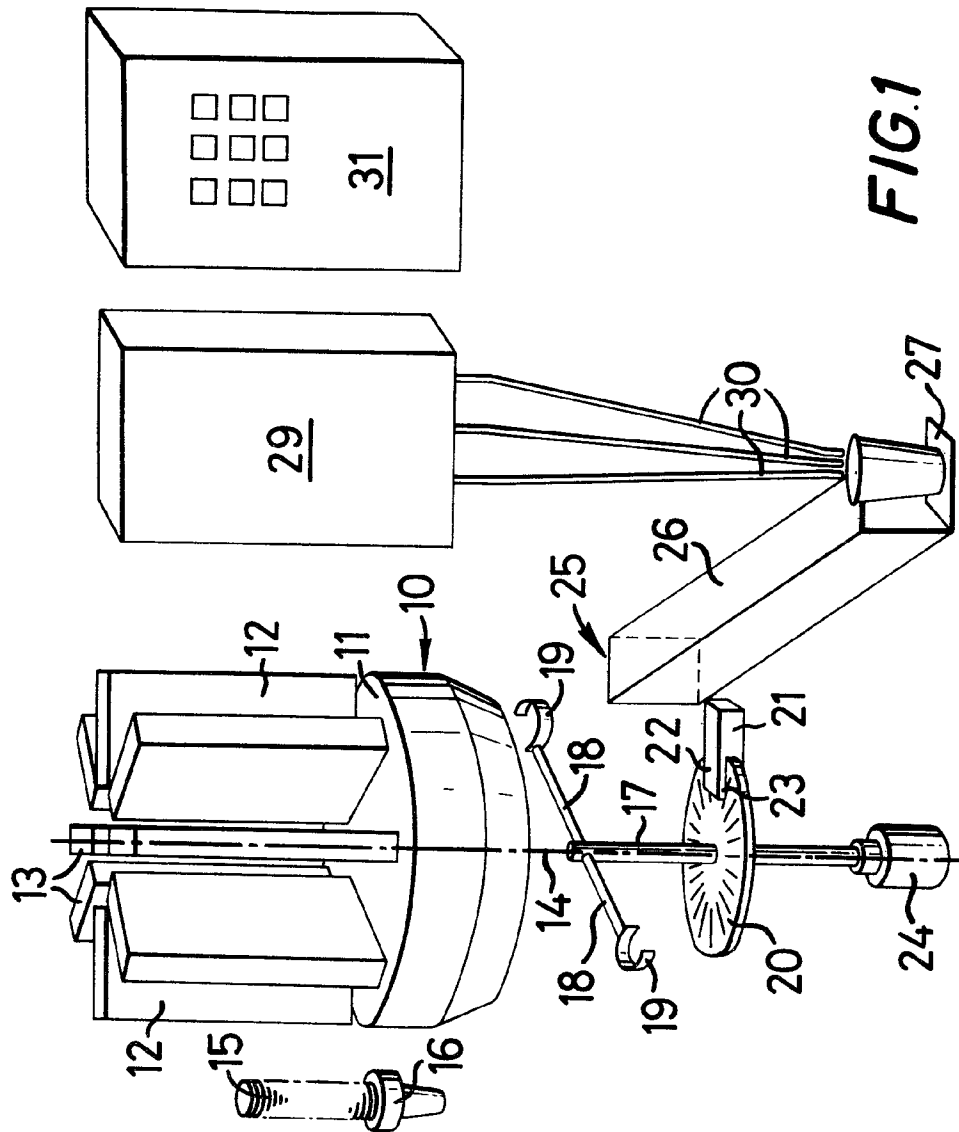
9. Apparatus as claimed in claim 8 wherein the microprocessor is associated with a
20 statistical display relating to an analysis of the operation of the apparatus.

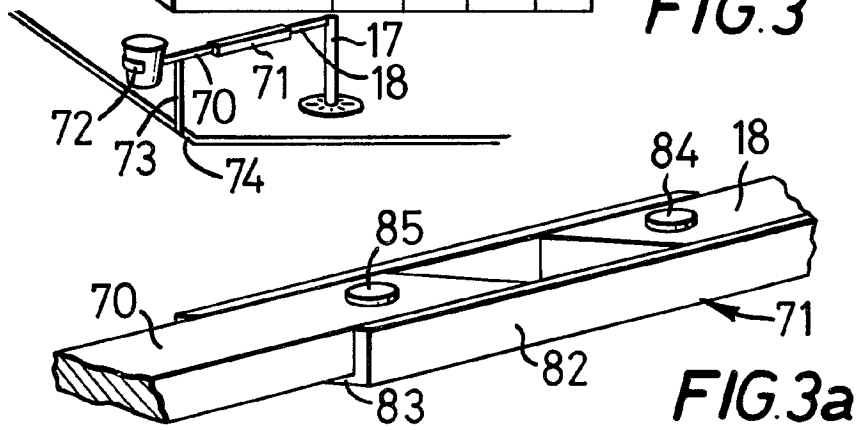
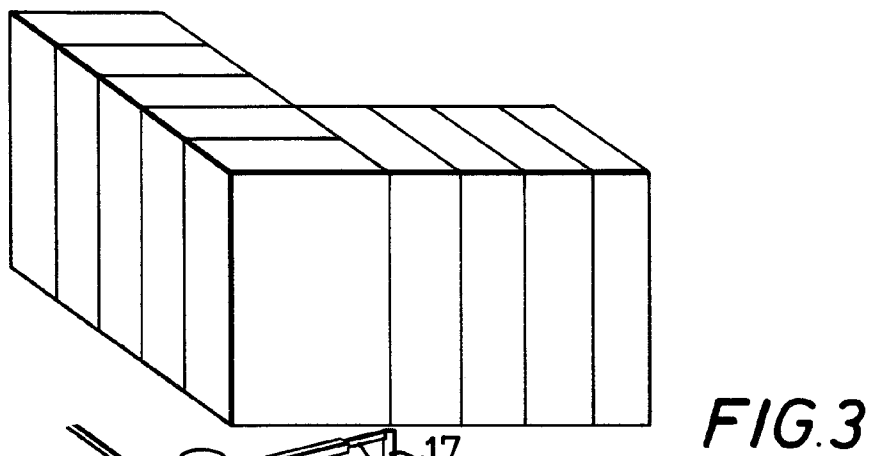
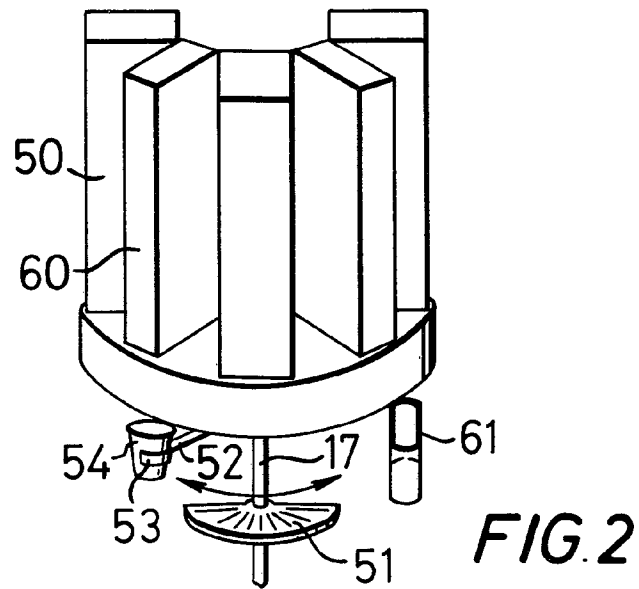
10. Apparatus as claimed in any preceding claim wherein the receptacle transport means

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includes indication means for determining
the position of said receptacle along
said path.





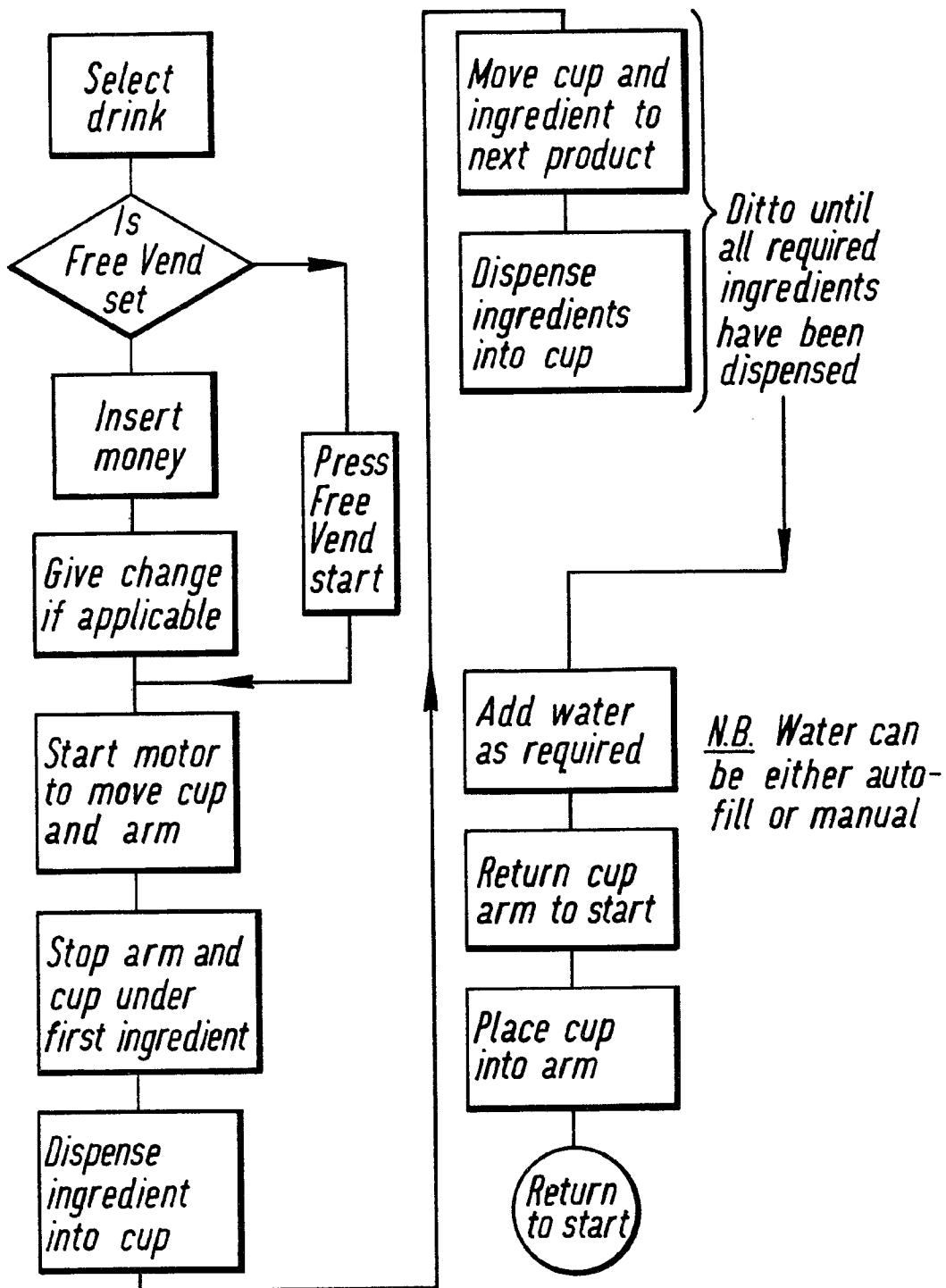


FIG. 4

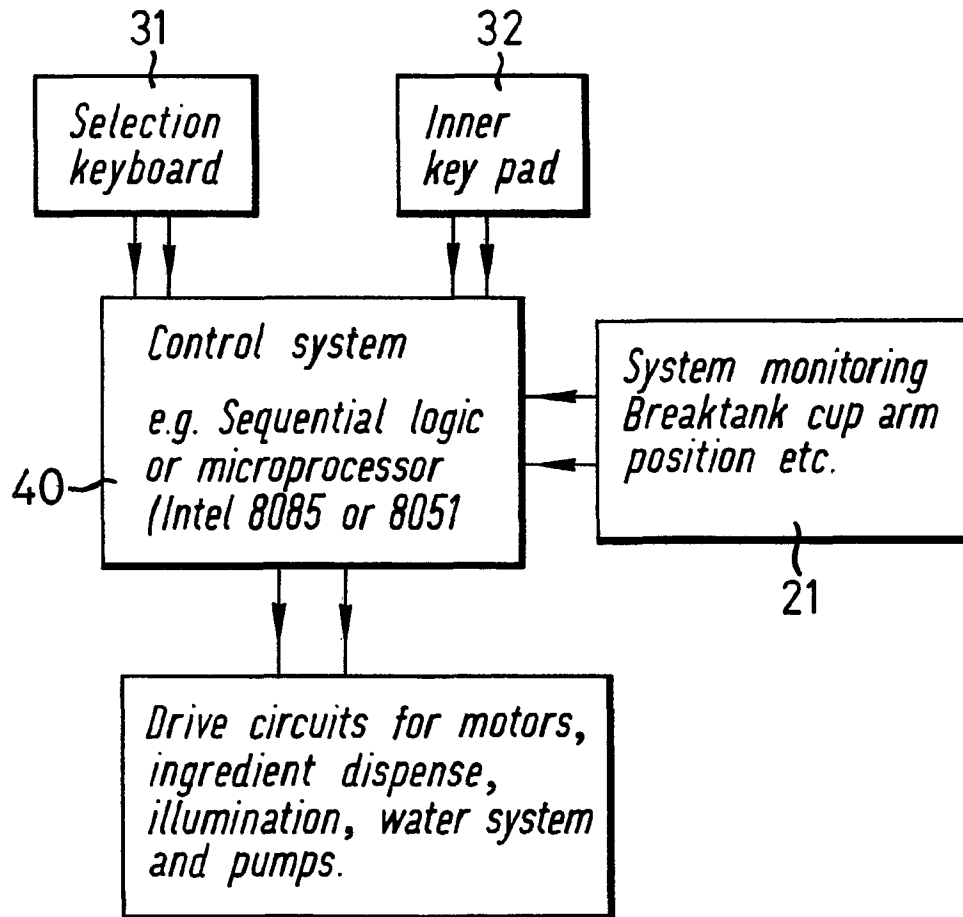


FIG.5



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<u>GB - A - 2 014 334</u> (VGL INDUSTRIES) * Abstract; figures; claims * ---	1,2, 4-7	G 07 F 13/10
	<u>GB - A - 2 013 622</u> (VGL INDUSTRIES) * Abstract; figures; claims * ---	1,2,4- 7	
	<u>FR - A - 2 200 567</u> (MARS) * Claims; figures 1 and 5 * ---	1,3-6	
	<u>GB - A - 2 028 539</u> (AMF) * Abstract; figures 1-4; page 2, line 22 to page 3, line 64 * ---	1,9	TECHNICAL FIELDS SEARCHED (Int. Cl.) G 07 F 13/00 13/06 13/10 A 47 J 31/00 31/40
	<u>US - A - 3 554 364</u> (C. LANE) * Abstract; figures; column 1, line 49 to column 2, line 27 * ---	1,2,4- 7	
P	<u>GB - A - 2 042 482</u> (VGL INDUSTRIES) * Abstract; figures; claims * ---	1,2,4- 7	
P/A	<u>US - A - 4 241 847</u> (F.N. LANCIA) * Abstract; figures * -----	1,2,5, 6	CATEGORY OF CITED DOCUMENTS X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
☒ The present search report has been drawn up for all claims			&: member of the same patent family, corresponding document
Place of search The Hague		Date of completion of the search 25.06.1981	Examiner DAVID