

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 251 793 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification: **01.07.92** (51) Int. Cl.⁵: **B67D 1/12**

(21) Application number: **87305855.6**

(22) Date of filing: **01.07.87**

(54) **Improved liquid dispensing arrangement.**

(30) Priority: **02.07.86 GB 8616106**

(43) Date of publication of application:
07.01.88 Bulletin 88/01

(45) Publication of the grant of the patent:
01.07.92 Bulletin 92/27

(84) Designated Contracting States:
AT BE DE GB NL

(56) References cited:
AT-B- 1 097
GB-A- 1 545 447
GB-A- 2 094 269
US-A- 4 006 840
US-A- 4 456 149

(73) Proprietor: **Pektron Ltd.**
Alfreton Road
Derby DE2 4AP(GB)

(72) Inventor: **Morgan, Phillip**
c/o Pektron Ltd. Alfreton Road
Derby, DE2 4AP(GB)

(74) Representative: **Drever, Ronald Fergus et al**
Swindell & Pearson 48, Friar Gate
Derby DE1 1GY(GB)

EP 0 251 793 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid (Art. 99(1) European patent convention).

Description

This invention is concerned with improvements in or relating to an arrangement for dispensing liquid, particularly carbonated beverages such as beer, under pressure from a container, for example to dispense in locations in a bar.

In GB-A-1545447, a dispensing arrangement provides for automatic control of the speed of the pump motor in accordance with a change in liquid pressure from a pre-set dispense pressure in the line between the supply and the dispensing tap when the latter is opened. Such control is effected by the action of a pressure switch together with the flow switch which senses liquid flow in the line. When the tap is closed, the flow switch switches off the pump with the line substantially at the dispense pressure. It is an object of the invention to provide an arrangement which provides advantages in relation to such a dispensing arrangement.

According to the present invention there is provided an arrangement for dispensing liquid under pressure from a supply, said arrangement, for moving the liquid in a line between the supply and dispensing means comprising a pump pressure sensitive means and liquid flow sensing means in the line between the pump and the dispensing means and electrical control circuitry operable to switch on the pump in accordance with a reduction in pressure in the line sensed by the pressure sensitive means the control circuitry including means operable by the pressure sensitive means when there is no liquid flow sensed by the liquid flow sensing means to provide a variable output signal proportional to pressure in the line, whereby to automatically and continuously vary the speed of the pump during dispense so as to maintain the pressure in the line at a desired operating level and thus provide a substantially constant rate of dispense, but, when there is no liquid flow sensed by the liquid flow sensing means the control circuitry is operable to drive the pump to cause the pressure in the line to reach a pre-set level above the desired operating pressure level before switching off the pump the control circuitry further being operable to switch off the pump after a pre-set time delay when there is no liquid flow sensed by the liquid flow sensing means and the pressure in the line does not reach the pre-set level, this being indicative of no liquid in the line.

Preferably the control circuitry includes drive means for the pump whereby control of the pump can be effected by automatic adjustment of the speed of the pump. The pump speed may be adjusted by means of phase angle control.

The operating level at which the pressure in the line is maintained may be pre-selected, and may be set by means of a manually adjustable

potentiometer included in the control circuitry.

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

Fig. 1 is a schematic view in part section of a liquid dispensing arrangement according to the invention; and

Fig. 2 is a graph showing pressure in the line during operation.

Referring to Fig. 1 of the drawings, a pump control unit comprises a body 10 having a substantially cylindrical cross section defining a through bore 12 and preferably formed of a moulded plastics material. The body 10 has at one end thereof a flange 16 by means of which an internally threaded securing nut 18 is retained on the body 10. The latter is arranged to be connected at said one end by means of the nut 18 to a delivery pipe 20 from a beer cask or barrel (not shown), an electrically operated pump 24 being operatively connected with the pipe 20. At its other end the body 10 has an outlet connection 26 connected by means of a delivery pipe 28 having two branches to respective dispensing taps 30, 32.

In the bore 12 there is located a control member or a float 34 comprising a magnet inserted into a slug preferably of hollow plastics material and sealed with a close-fitting plug. The bore 12 is stepped to define a shoulder 36 which limits movement of the float 34 in an upward direction as viewed in Fig. 1, when beer is flowing and at the lower end of the bore 12 there is provided a retaining bar 38 to retain the float 34 captive in the bore 12. A housing 40, preferably formed of a plastics material, is positioned with one side adjacent to the body 10. A pair of magnetic reed switches 42 are located in the housing 40 at said one side to be positioned close to an upper end of the bore 12, such that when flow of beer in the bore 12 occurs, the float 34 is moved to an upper position in the bore 12, as shown by dotted lines, alongside the reed switches 42. The effect of the magnet within the float 34 causes the reed switches 42 to move from a normally open to a closed position, thereby enabling flow to be detected.

A through aperture 44 is provided in a wall of the body 10 and is aligned with a through aperture 46 in the closely adjacent wall of the housing 40. Between the body 10 and the housing 40 a diaphragm 48 is located to cover the aligned apertures 44, 46. A spring loaded pressure button 50 in the housing 40 is biased against the diaphragm 48 such that any change in pressure of beer in the bore 12 results in a lateral movement of the diaphragm 48 and consequently movement of the pressure button 50 against the spring bias. The pressure button 50 has attached thereto a magnet 52 which is associated with a Hall effect sensor 54,

the latter being capable of detecting any movement in the magnet 52 and thus in the pressure button 50 due to the pressure in the bore 12. The sensor 54 gives a variable voltage and analogue output according to the position of the pressure button 50, which is proportional to the pressure within the bore 12, whereby the pressure can be sensed.

Electronic control circuitry 56 has, in circuit, the reed switches 42 and the sensor 54 and is also in circuit with the electric pump 24. A manually adjustable potentiometer 58 included in the circuitry 56 is adjustable from externally of the housing 40, and a manual override button 60 is also in circuit with the circuitry 56 and is accessible from externally of the housing 40.

When the taps 30, 32 are closed and there is no flow of beer in the line, the system pressure is high and is at a level (P) predetermined by the control circuitry 56 (see Fig. 2). This level (P) can be factory set and can be nominally set at 50 PSI (3.515 kg/sq.cm). When the tap 30 is opened the system pressure falls below the level (P) and this fall is detected by the pressure sensor 54 due to movement of the diaphragm 48 and the pressure button 50. While there is no flow in the line the control circuitry 56 causes the beer pump 24 to run at full speed. The flow which is subsequently created in the bore 12 raises the float 34 alongside the reed switches 42. The closure of the latter causes the control circuitry to adjust the speed of the beer pump 24 by means of phase angle control until the pressure detected within the bore 12 corresponds to an operating pressure setting C selected by the user by way of the pressure setting potentiometer 58. The control circuitry 56 therefore switches to a constant pressure mode, the system pressure selected by the user determining the speed of dispense at the bar tap 30.

If the tap 32 is then also opened, the system pressure will fall again. The control circuitry 56 is then arranged to automatically adjust the speed of the beer pump 24 until the pressure within the bore 12 once again corresponds to the setting C on the potentiometer 58. In this way the circuitry 56 by means of a closed loop feedback system varies the speed of the beer pump 24 so as to maintain constant pressure in the line, despite anything which may occur so as to otherwise affect the system pressure during dispense. Similarly, when the tap 32 is closed again with the tap 30 still open, the circuitry 56 will operate to maintain the pressure within the system constant at setting C.

When both taps 30, 32 are closed the flow of beer in the line will cease. The fall of the float 34 will close the reed switches 42 to enable the control circuitry 56 to detect that flow has ceased. The circuitry 56 is arranged to then cause the beer pump 24 to run again at full speed, thus causing

the system pressure to rise rapidly until the pressure reaches the relatively high preset value (P). When the level (P) is reached the sensor 54, together with the closure of the reed switches 42, causes the circuitry 56 to switch off the beer pump 24. The beer line is then again ready for further dispense.

When the circuitry 56 causes the beer pump 24 to run at full speed, i.e. if flow ceases in the bore 12 causing closure of the reed switches 42, if after a preset time period, for example of 30 seconds, either flow is not sensed by the reed switches 42 as a result of a tap being opened, or the pressure does not reach the preset level (P) if the beer taps are closed, the circuitry 56 operates to switch off the beer pump 24, on the assumption that the beer supply has run out. The manual override button 60 enables this delay period to be restarted when attaching a new barrel or installing the equipment.

There is therefore provided an arrangement wherein, during dispense, the flow rate can be automatically maintained substantially constant, even if a plurality of beer taps fed from a single electric pump had opened simultaneously. Installation and set up are very simple and the arrangement has only one control which requires adjustment by the user, i.e. the pressure setting potentiometer to determine the dispense pressure and therefore the speed of dispense. In between dispenses the line pressure is maintained at a relatively high preset level to help stop breakout of carbon dioxide in very gassy beers. The switching off of the beer pump after the time delay in the event that the beer supply runs out prevents excessive pump wear due to dry running.

It will be appreciated that the closed loop system can be used in any beverage dispense installation so to automatically maintain line pressure and thus flow rate at a substantially constant value during dispense.

Various modifications may be made without departing from the invention. For example control of the pump may be by other than speed control, and the configuration of certain of the components may differ from that described and shown, provided the components function in the required manner.

Claims

1. An arrangement for dispensing liquid under pressure from a supply, said arrangement, for moving the liquid in a line between the supply and dispensing means (30, 32), comprising a pump (24), pressure sensitive means (48, 52) and liquid flow sensing means (34, 42) in the line between the pump (24) and the dispensing

means (30, 32), and electrical control circuitry (56) operable to switch on the pump (24) in accordance with a reduction in pressure in the line sensed by the pressure sensitive means (48, 52), the control circuitry (56) including means operable by the pressure sensitive means (48, 52), when there is liquid flow sensed by the liquid flow sensing means (34, 42), to provide a variable output signal proportional to pressure in the line, whereby to automatically and continuously vary the speed of the pump (24) during dispense so as to maintain the pressure in the line at a desired operating level and thus provide a substantially constant rate of dispense, but, when there is no liquid flow sensed by the liquid flow sensing means (34, 42), the control circuitry (56) is operable to drive the pump (24) to cause the pressure in the line to reach a pre-set level above the desired operating pressure level before switching off the pump (24), the control circuitry (56) further being operable to switch off the pump (24) after a pre-set time delay when there is no liquid flow sensed by the liquid flow sensing means (34, 42) and the pressure in the line does not reach the pre-set level, this being indicative of no liquid in the line.

2. An arrangement according to claim 1, characterised in that the control circuitry (56) includes drive means for the pump (24) whereby control of the pump (24) can be effected by automatic adjustment of the speed of the pump (24).
3. An arrangement according to claim 2, characterised in that the pump speed is adjusted by means of phase angle control.
4. An arrangement according to any of the preceding claims, characterised by means (58) for pre-selecting the operating level at which the pressure in the line is maintained.
5. An arrangement according to claim 4, characterised in that the pre-selection means (58) comprises a manually adjustable potentiometer included in the control circuitry (56).
6. An arrangement according to any of the preceding claims, characterised in that the pressure sensitive means comprises a member (50) carrying a magnet (52) and the means associated with the pressure sensitive means comprises a sensor (54) in the control circuitry for detecting movement of the magnet (52).

Revendications

1. Dispositif de distribution de liquide sous pression à partir d'un stock, destiné à faire circuler le liquide dans une canalisation entre le stock et les moyens de distribution (30, 32), comprenant une pompe (24), des moyens sensibles à la pression (48, 52) et des moyens de détection de l'écoulement du liquide (34, 42) dans la canalisation entre la pompe (24) et les moyens de distribution (30, 32), et un circuit de commande électrique (56) fonctionnant pour mettre en route la pompe (24) en fonction de la baisse de pression dans la canalisation captée par les moyens sensibles à la pression (48, 52), le circuit de commande électrique (56) comprenant des moyens susceptibles d'être mis en service par les moyens sensibles à la pression (48, 52) lorsque les moyens sensibles à l'écoulement de liquide (34, 42) captent un écoulement, afin d'émettre un signal de sortie variable proportionnel à la pression dans la canalisation, faisant ainsi varier automatiquement et de façon continue le régime de la pompe (24) au cours de la distribution afin de maintenir la pression dans la canalisation au niveau de fonctionnement désiré et de fournir ainsi un taux de distribution sensiblement constant, mais, lorsque les moyens de détection de l'écoulement du liquide (34, 42) ne captent pas d'écoulement, le circuit de commande (56) peut entraîner la pompe (24) afin que la pression dans la canalisation atteigne un niveau prédéterminé supérieur au niveau de pression de fonctionnement désiré avant d'arrêter la pompe (24), le circuit de commande (56) pouvant en outre fonctionner pour arrêter la pompe (24) au bout d'un délai prédéterminé lorsque les moyens de détection de l'écoulement du liquide (34, 42) ne captent pas d'écoulement et que la pression dans la canalisation n'atteint pas un niveau prédéterminé, ceci indiquant qu'il n'y a pas de liquide dans la canalisation.
2. Dispositif selon la revendication 1, caractérisé en ce que le circuit de commande (56) comprend des moyens de commande pour la pompe (24), la commande de la pompe (24) pouvant être réalisée par réglage automatique du régime de la pompe (24).
3. Dispositif selon la revendication 2, caractérisé en ce que le régime de la pompe est réglé grâce à une commande par déphasage.
4. Dispositif selon l'une quelconque des revendications précédentes, caractérisé par des moyens (58) de pré-sélection du niveau de

fonctionnement auquel est maintenue la pression dans la canalisation.

5. Dispositif selon la revendication 4, caractérisé en ce que les moyens de pré-sélection (58) comprennent un potentiomètre réglable manuellement, compris dans le circuit de commande (56). 5
6. Dispositif selon l'une quelconque des revendications précédentes, caractérisé en ce que les moyens sensibles à la pression comprennent un organe (50) portant un aimant (52), et en ce que les moyens associés aux moyens sensibles à la pression comprennent un capteur (54) dans le circuit de commande pour détecter le mouvement de l'aimant (52). 10 15

Patentansprüche

1. Vorrichtung zur Abgabe einer unter Druck stehenden Flüssigkeit aus einer Versorgungsquelle, wobei diese Vorrichtung zum Transport der Flüssigkeit in einer Leitung zwischen der Versorgungsquelle und Abgabemitteln (30,32) eine Pumpe (24), drucksensitive Mittel (48,52) und den Flüssigkeitsdurchfluß erfassende Mittel (34,42) in der Leitung zwischen der Pumpe (24) und den Abgabemitteln (30,32) sowie eine elektrische Steuerschaltungsanordnung (56) zum Einschalten der Pumpe (24) bei einer Verringerung des Drucks in der von den drucksensitiven Mitteln (48,52) abgefühlten Leitung aufweist, wobei die Steuerschaltungsanordnung (56) Mittel aufweist, die beim Auftreten eines von den den Flüssigkeitsdurchfluß erfassenden Mitteln (34,42) erfaßten Flüssigkeitsdurchflusses durch die drucksensitiven Mittel (48,52) betätigbar sind, um ein variables, zum Druck in der Leitung proportionales Ausgangssignal zu erzeugen, wodurch die Drehzahl der Pumpe (24) während der Abgabe automatisch und kontinuierlich variiert wird, um den Druck in der Leitung auf einem gewünschten Betriebsniveau zu halten und dadurch eine im wesentlichen konstante Abgaberate vorzugeben, wobei die Steuerschaltungsanordnung (56) jedoch dann, wenn durch die den Flüssigkeitsdurchfluß erfassenden Mittel (34,42) kein Flüssigkeitsdurchfluß festgestellt wird, zum Antrieb der Pumpe (24) so ausgebildet ist, daß der Druck in der Leitung ein vorbestimmtes Niveau oberhalb des gewünschten Arbeitsdrucks vor dem Ausschalten der Pumpe (24) erreicht, wobei die Steuerschaltungsanordnung (56) weiterhin zum Ausschalten der Pumpe (24) nach einer vorbestimmten Zeitverzögerung ausgebildet ist, wenn durch die den Flüssigkeitsdurchfluß erfassenden Mittel (34,42) kein Flüssigkeitsdurchfluß festgestellt wird und der Druck in der Leitung nicht das vorbestimmte Niveau erreicht, was kennzeichnend für nicht vorhandene Flüssigkeit in der Leitung ist. 20 25 30 35 40 45 50 55

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Steuerschaltungsanordnung (56) Steuermittel für die Pumpe (24) aufweist, wobei die Steuerung der Pumpe (24) durch automatische Einstellung der Drehzahl der Pumpe (24) bewirkt werden kann.
3. Vorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß die Pumpendrehzahl mittels einer Anschnittsteuerung eingestellt wird.
4. Vorrichtung nach einem der vorhergehenden Ansprüche, gekennzeichnet durch Mittel (58) zur Vorbestimmung des Betriebsniveaus, auf dem der Druck in der Leitung aufrecht erhalten wird.
5. Vorrichtung nach Anspruch 4, dadurch gekennzeichnet, daß die Mittel (58) zur Vorbestimmung ein manuell einstellbares Potentiometer aufweisen, das in der Steuerschaltungsanordnung (56) enthalten ist.
6. Vorrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die drucksensitiven Mittel ein einen Magneten (52) tragendes Element (50) aufweisen und daß die den drucksensitiven Mitteln zugeordneten Mittel einen Sensor (54) in der Steuerschaltungsanordnung zur Erfassung der Bewegung des Magneten (52) enthalten.

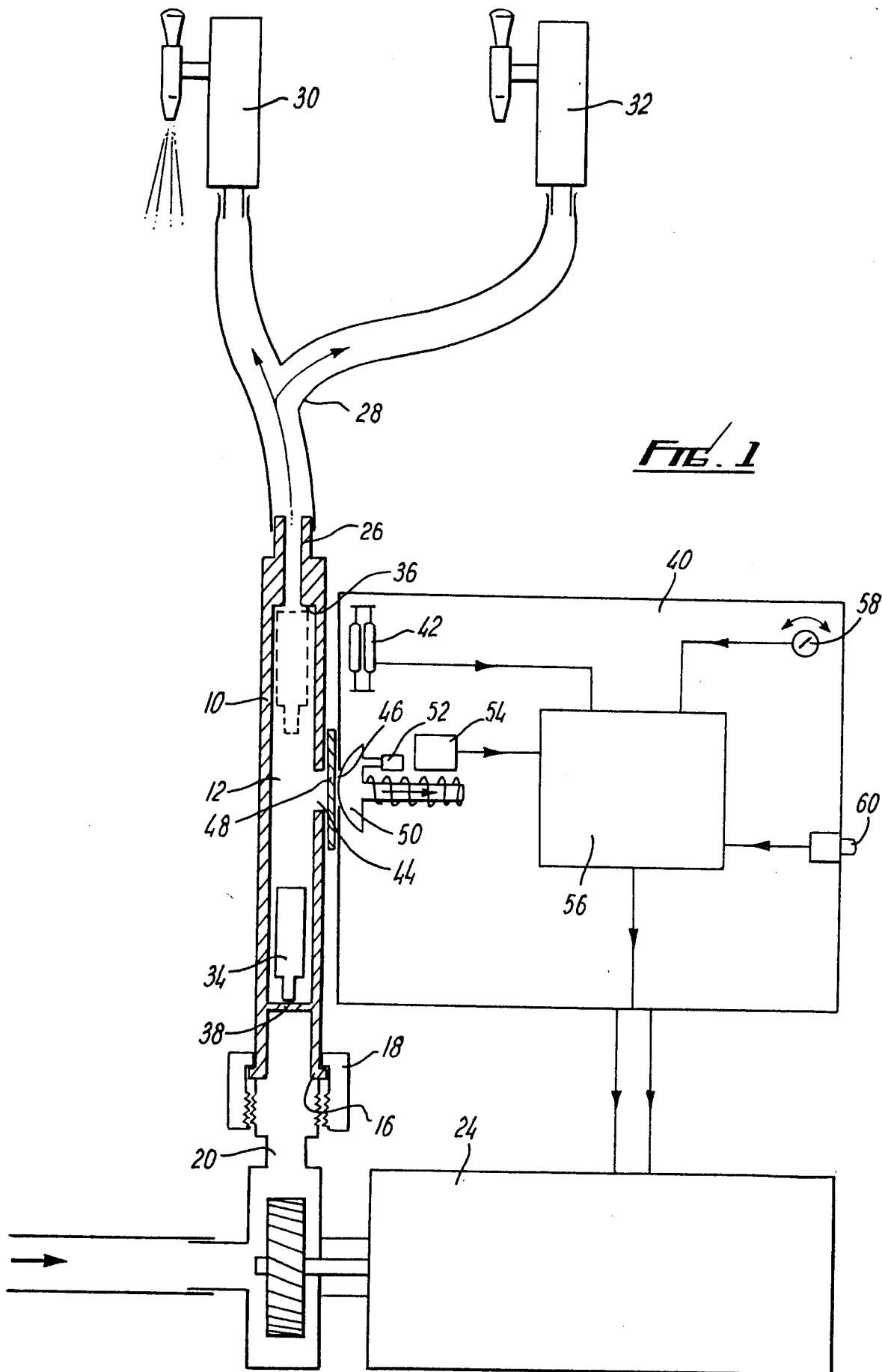


FIG. 2

