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The invention relates to a device for dispensing liquid media from individual chambers of a tanker truck according to claim 1.

As is known, tanker trucks have a plurality of chambers which may be filled with various media. For filling and dispensing purposes, each chamber is assigned a floor valve that is connected via a line section to a collector. Connected to the collector is a discharge line, the end of which is connected to a discharge hose. This is at least wound on a drum and has a discharge nozzle on the end. A feed pump and a volume meter are located in the discharge line. A shutoff valve is provided at the discharge side of the volume meter. In addition, a collector valve is arranged in the area at which the line sections are connected to the collector. Furthermore, a filling coupling as well as a filling valve are connected to the line section so that the chambers in a depot can be filled via the floor valve.

It is known from WO 98/33675 to return to the relevant chamber a product that is in the line system after conclusion of the dispensing process. In one embodiment, a manifold is equipped with a connecting section with which the discharge nozzle is connectable. The manifold runs to the top side of the individual chambers and is connected via associated valves to the chambers. In a second embodiment, the connection for the discharge nozzle is connected via a selector valve and check valves to the discharge lines which are connectable at the floor to the chambers. The return of product after the filling process to a so-called full hose system is especially desirable when the chambers contain different products, and mixing is to be avoided or minimized when discharging product from a different chamber.

With a full hose system with a known device, the return occurs as follows: After discharging, the pump is stopped or the discharge valve is closed. The floor valve of the tank chamber from which a product was discharged is closed. The nozzle of the discharge hose is connected to the return connection. Optionally, the collector can be drained up to the pump while opening the ventilation and lowering the liquid level. Otherwise, emptying occurs entirely by means of the new product to be discharged from a different tank chamber. Then the floor val-

ve of the chamber with the new product opens. The pump is restarted, or the discharge valve opens. As much liquid is pumped from the chamber until the new product arrives at the end of the hose, i.e., at the nozzle. This can be easily determined when the volume meter measures the quantity flowing through the
5 discharge line. The volume of this line section is known. If the collector was drained previously, this can be easily included since the volume of the collector is of course known. The discharge valve is closed, or the pump is stopped. The discharge nozzle is closed at the hose end. Finally, compressed air enters the space between the connection of the nozzle and the connection to the discharge
10 line so that the space no longer contains any liquid. Finally, the discharge nozzle is disconnected from the return connection.

As can be seen, a substantial volume of product remains in the discharge line and discharge hose after conclusion of the discharge process. There is a danger of the operator not returning this volume into the relevant chamber but rather diverting it for different purposes. This cannot be discerned using the existing means of a discharge system. Furthermore, the danger exists of the operator returning the medium to a wrong tank chamber during the return. This occurs either for purposes of deception or accidentally. Finally, a manipulation can
20 occur when the operator starts the volume meter before discharging to a customer's tank and only then connects the discharge nozzle to the customer's tank. Here, the medium is circulated in the pump without the volume meter being intermediately set to zero before the nozzle is coupled to the customer's tank.

25 The object of the invention is therefore to offer a device for discharging liquid media from individual chambers of a tanker truck in which the return of product from the line system of the discharge device into a chamber is monitored.

This object is achieved by the features of claim 1.

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With the device according to the invention, the connection for the return is assigned a sensor before or after the check valve that sends a monitoring signal

to a control device of the discharge device when a liquid medium flows through the connection.

According to one embodiment of the invention, the control device monitors
5 whether the first starting signal from the volume meter and the monitoring signal of the sensor appear within a predetermined time window. This takes into account that the volume meter starts first during the return before the medium flows through the return connection and the check valve in the connection opens for the return. The response of the sensor is therefore of course delayed.
10 This delay is monitored within the time window as a safety measure against manipulation. The same process can occur at the end of returning. The time window formed by the volume meter signal and sensor signal is also monitored in the control device.

15 According to another embodiment of the invention, the monitoring signal and the signal from the volume meter are correlated in the control device, and the control device generates a feedback signal upon a predetermined correlation. With the assistance of the sensor, the volume flowing through the connection can be determined and compared with the volume measured by the volume meter.
20 If the measured values do not correspond, a manipulation has occurred.

According to another embodiment of the invention, the sensor can be designed such that it only responds to a specific flow of liquid under pressure. If for example gas is conducted through the return connection or respectively into the
25 line section between the return connection and the check valve, a monitoring signal is not generated by the sensor, or respectively the signal from the sensor is not considered as indicating a proper return in the control device. Manipulation with compressed air, providing it is available in the tanker truck, is thereby excluded.

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According to another embodiment of the invention, the monitoring signals of the sensors are assigned within the control device to the chambers, or respectively the floor valves of the chambers. The control device determines the chamber in

which a return is occurring. This makes it possible to automatically stop the return when the discharge nozzle is not coupled to the relevant connection. In this manner, undesirable product mixing or manipulation is avoided when for example the operator routes the returned product into an empty tank chamber in order to subsequently steal it.

Finally, an additional possibility of manipulation is prevented in that the control device automatically resets the volume meter to zero after the conclusion of a pumping process. This prevents the volume meter from recirculating in a circuit and fabricating a discharged amount that actually was not provided to a customer and is subsequently stolen. The device according to the invention makes such a manipulation identifiable or impossible.

A particularly advantageous embodiment of the invention provides assigning a sensor to the check valve that monitors the position of a valve member of the check valve.

In the discharge device according to the invention, a connection for the discharge nozzle is provided between the floor valve and collector valve of each line section. This connection preferably has a preferably curved, vertical pipe sleeve that is provided at the end with connecting means for the discharge nozzle. These means often have a union nut that is screwed onto a thread of the discharge nozzle. A check valve is assigned to the connection that prevents the product from exiting via the connection. According to the invention, the sensor assigned to the check valve monitors the position of a valve member of the check valve and sends a monitoring signal to a control device for the discharge device.

After the operator has connected the discharge nozzle to the connection, the assigned floor valve is opened. The collector valve remains closed. The product then flows driven by the pump through the floor valve back into the relevant chamber. The volume flowing back into the chamber is measured in the volume

meter. The monitoring signal of course arises later than the first initial signal of the volume meter. This time window is monitored as mentioned.

During the return process, the medium can be removed from the collector by gravity and pumped back. An air relief valve is assigned to the collector for this which ensures that the collector can be emptied. Alternately, the "old" medium from the collector and discharge line is returned by being pushed out by the new medium. This of course brings about a larger mixing of the products.

10 To prevent air from entering the feed pump during the draining of the collector, the discharge line is assigned an empty signalling sensor upstream from the pump. Once this empty signalling sensor responds, the feed pump is stopped, and the return process is interrupted. The remaining product still located in the line system is then returned into the chamber with the assistance of the "new" medium.

A compressed air connection is assigned to the return connection for the discharge nozzle. The compressed air serves to remove liquid from the section between the connection and check valve when returning is completed. During this, the discharge nozzle remains connected to the connection.

A wide variety of sensors can be used to detect the response of the check valve during the product return. According to one embodiment of the invention, a proximity sensor is provided which responds when the valve member of the check valve assumes a position that corresponds to the set volumetric flow of the pump. According to another embodiment of the invention, a guide pushrod is assigned to the valve member and moves into the open position in the region of the proximity sensor during the adjustment of the valve member. The monitoring signal generated thereby is sent to the control device that is assigned to the device and also monitors the return. If the control device registers a specific discharge amount without a monitoring signal appearing, this is an indication that the product has been diverted somewhere else.

The check valve can be designed such that it only opens adequately when a specific volumetric flow flows through the return connection under pressure. If the check valve only opens slightly when compressed air is supplied, the sensor assigned to the valve member does not respond. The check valve or respectively the initial tension of the valve member should be configured correspondingly. Of course, the sensor can also perform a measurement of the position of the valve member, i.e., generate a position-dependent signal, wherein the level of the signal is indicative that a proper, manipulation-free return of the medium has been determined.

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The invention will be further explained below with reference to an exemplary embodiment depicted in the drawings.

Fig. 1 portrays a highly schematic discharge device according to the invention.

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Fig. 2 schematically portrays a part of the discharge device according to Fig. 1.

Fig. 3 portrays a check valve with a sensor for the discharge device according to Fig. 1 and 2.

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Fig. 1 depicts a tank 10 that for example belongs to a tanker truck (not shown). The tank 10 has three chambers 12, 14, 16. Each chamber is assigned a floor valve 18 or respectively 20 or respectively 22 at the bottom side. The floor valves 18 to 22 are connected to a collector 36 via a line section 24, or respectively 26 or respectively 28 and a collector valve 30 or respectively 32 or respectively 34. At one end of the collector 36, a discharge line 38 is connected in which a feed pump 40 and volume meter 42 are arranged. Downstream from the volume meter, a discharge hose 46 having a discharge nozzle 48 at the end is connected via a shutoff valve 44. Such a discharge valve is conventional. If for example product is to be discharged from the chamber 12, the floor valve 18 and the collector valve 30 are opened, and the pump 40 conveys the medium from the chamber 12 to the discharge nozzle 48, and from there into a receptacle. The volume meter 42 meters the discharged amount. The shutoff valve 44 is

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opened during this. The individual processes are controlled by a control device 50 which is indicated in Fig. 2. Said control device has a number of control lines 52 or respectively 54 that lead to individual actuators of the discharge device. A plurality of sensors of the discharge device are also connected to the control device 50 as indicated by 56. Furthermore, the volume meter 42 is connected to the control device 50 via the signal line 91.

The floor valve 18 as well as the collector valve 30 and collector 36 are indicated in Fig. 2. Flanged to the collector valve 30 is a filling valve 58; the chamber 12 is filled via the filling valve 58 in a depot. This provision is also conventional.

A housing 60 which is connected to a vertical, curved pipe sleeve 62 is flanged between the collector valve 30 and floor valve 18 in the line section 24. A check valve 64 is arranged between the pipe sleeve 62 and the housing 60. At the free end, the pipe sleeve 62 has a connection 66 to which the discharge nozzle 48 can be connected. This is not depicted in particular. A compressed air connection 72 is connected to the pipe sleeve. A pipe sleeve 62 is assigned to each chamber 12 to 16. Only one is portrayed in Fig. 2.

After conclusion of the discharge process, the product that is located in line section 24, collector 36 and discharge line 38 as well as the hose 46 can be returned to the chamber 12. To this end, the discharge nozzle 48 is connected in a sealing manner to the connection 66. The floor valve 18 is then opened. The collector valve 30 is closed. It is closed after conclusion of the discharge process. Subsequently, the pump 40 is started, and the medium is pumped back into the chamber 12.

The medium can be returned from the collector and discharge line in two different ways. In one case, the collector 36 is drained by means of gravity while the pump is running, and a vent valve 68 permits draining. Draining occurs until just before the pump 40 which is indicated by an empty signalling sensor 70. Its signal is sent to the control device 50 that stops the pump 40 or closes the discharge valve 44. Subsequently the floor valve of an additional chamber such as

the tank chamber 14 or 16 is opened, i.e., floor valve 20 or respectively 22, so that the "old" media still located in the system is pressed out by the "new" medium and returned to the tank chamber 12. By means of the volume meter 42 and the known volumes in the discharge system, it can be determined when the new medium has arrived at the discharge nozzle 48. Another option is to press out the "old" media in the entire discharge system with the "new" medium. In this case as well, it can be determined by means of the volume meter 42 when the new medium has arrived at the discharge nozzle 48. In the latter case, the product mixing is greater than in the first case.

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After conclusion of the described return process, medium is still located in the pipe sleeve 62. This is also pushed back into the associated chamber via the check valve 64 with the assistance of the compressed air supplied via the connection 72 while the discharge nozzle 48 is closed at the connection 46. Then the discharge nozzle is removed from the connection 66, and the new medium can be discharged via the discharge nozzle 48 in the described manner.

Fig. 3 shows the housing 60 in section. The pipe sleeve 62 can also be seen which is connected to the housing 60 in a sealing manner. To this end, an annular collar 73 is provided that is formed with the pipe sleeve 62 and lies via a sealing ring 76 on the housing 60 in a sealing manner. A valve housing 78 is arranged in a recess of the housing 60. In the valve housing 78, there is a valve disc 82 which is shown in closed position on the left and in open position on the right. A spring 84 pretensions the valve disc 82 against a conical valve seat 74 in the annular collar 73. The valve disc 82 has a pushrod 86 in the middle which is guided in a guide section 88 of the valve housing 78. In the open position, the pushrod 86 extends into the interior of the housing 60. A proximity sensor 90 is arranged in a wall of the housing 60 and extends relatively close to the pushrod 86. The proximity sensor 90 which functions according to a known principle detects via the pushrod 86 when the valve disc 82 is in the open position. The proximity sensor 90 sends a signal to the control device 50 via a line 92 as shown in Fig. 2. The sensor 90 detects when product is being returned into the associated chamber via the connection 66 and the pipe sleeve 62. If volume is

metered by the volume meter 42 upon conclusion of a discharge process without the proximity sensor 90 emitting a monitoring signal, this is an indication that product has been removed from the discharge line system in an impermissible manner. As already mentioned, the occurrence of a monitoring signal from the sensor 90 is registered in the control device 50, the monitoring signal being related to the generation of a first signal of the volume meter 42, or the starting of the volume meter. The volume meter 42 starts at the beginning of returning before the sensor 90 can determine the flow of the product. When returning is carried out properly, both signals must be in a specific time relationship, i.e., occur within a set time window.

The assignment of the connections 66 for the return to the individual chambers 12 to 16 is also registered in control device 50. If a monitoring signal occurs, the control device "knows" the tank chamber in which a medium is returning. This yields a way to monitor the return to the relevant chamber. A mistaken return to a wrong chamber is noticed immediately and can be identified by the control device 50 by, for example, turning off the pump 40 or closing the discharge valve 44. A manipulated return to the incorrect chamber to later steal the medium from this chamber can also be either registered or stopped in this manner.

As mentioned, the volume meter 42 also meters the returned volume. If, however, the volume meter 42 is not reset to zero following conclusion of this process and the discharge nozzle 48 is connected to a customer tank, the customer is being defrauded the amount of the product that is recorded by the volume meter during the return of the product in the circuit. This manipulation can therefore also be displayed by the device according to the invention or prevented by other measures.

As described, the valve member 82 is pretensioned by the spring 84 against the valve seat 74. When for example compressed air is fed to the pipe sleeve 62, the valve member 82 opens a certain amount in order to let the compressed air pass through; however, the opening stroke of the valve member 82 is significantly less than the opening stroke travelled when liquid medium is flowing through.

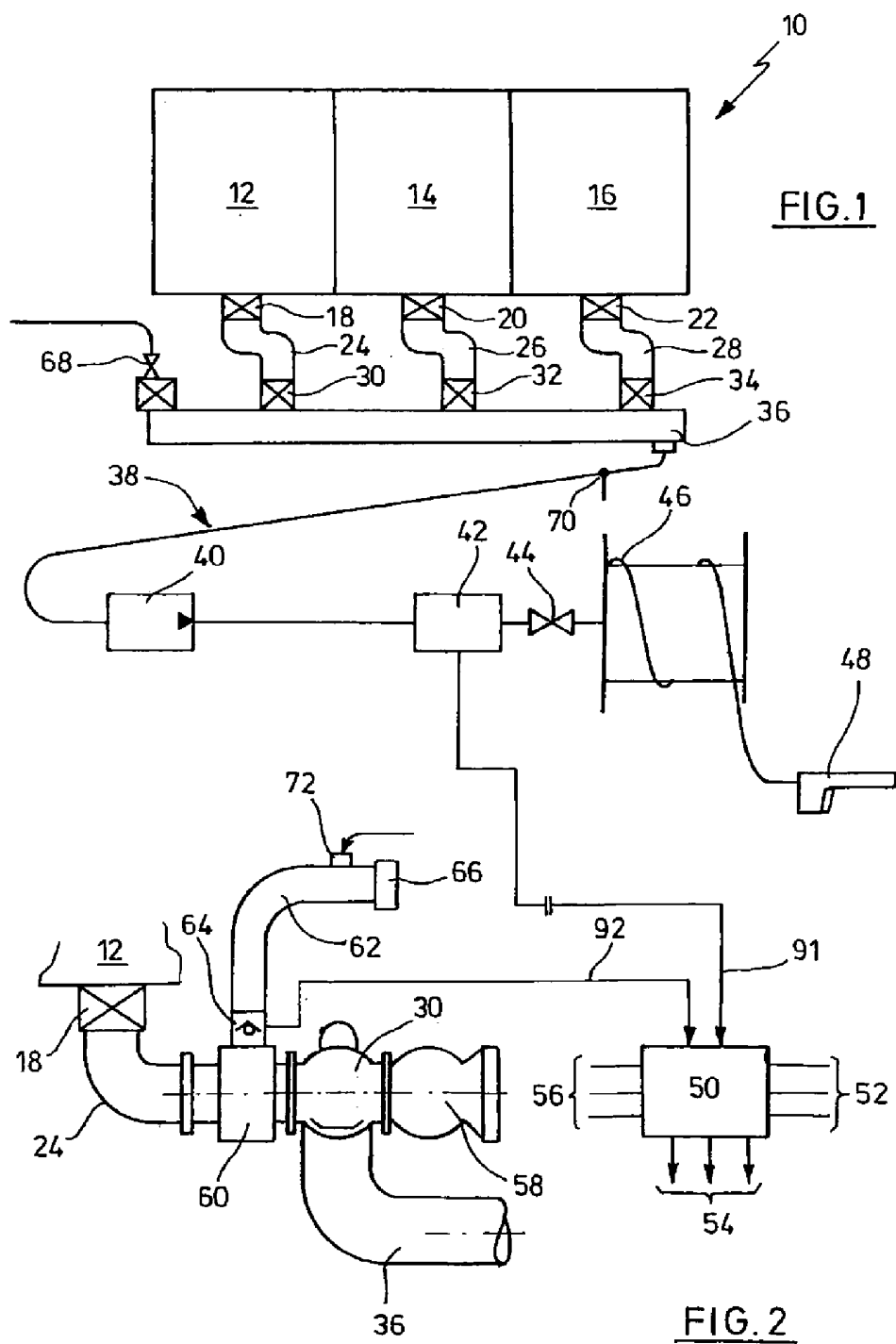
Only the latter stroke is detected by the sensor 90 and converted into a monitoring signal. An attempted manipulation is thereby prevented by compressed air.

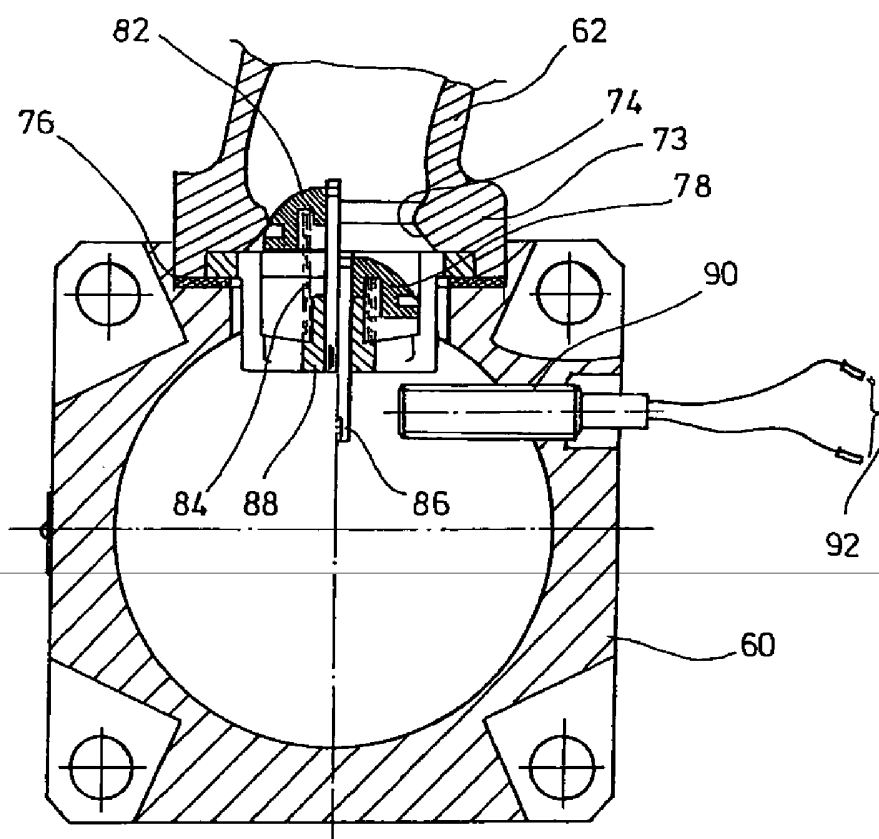
Patentkrav

1. Apparat til udlevering af flydende medier fra en tankvogns enkelte kamre, hvorved hvert af kamrene (12, 14, 16) er forbundet med en kollektor via en bundventil (18, 20, 22) og en kollektorventil (30, 32, 34), og kollektoren (36) er forbundet med en udleveringsslange (46) via en udleveringsledning (38), hvilken udleveringsslange (46) har en udleveringspistol (48) ved enden, hvorved der endvidere i udleveringsledningen (38) er anbragt en pumpe (40) og en volumnentæller (42), hvorved der i et ledningsafsnit (24, 26, 28) imellem bundventil (18, 20, 22) og kollektorventil (30, 32, 34) er tilvejebragt en tilslutning (66) til udleveringspistolen (48), hvilken tilslutning (66) er forbundet med ledningsafsnittet (24, 26, 28) via en kontraventil, **kendetegnet ved**, at tilslutningen er tilknyttet en sensor (90) før, efter eller i kontraventilen, hvilken sensor (90) afgiver et overvågningssignal til en styreindretning (50) i udleveringsapparatet, når der strømmer et flydende medium igennem tilslutningen.
2. Apparat ifølge krav 1, **kendetegnet ved**, at styreindretningen (50) sætter overvågningssignalet og signalet fra volumnentælleren (42) i relation til hinanden, og styreindretningen (50) fremstiller et tilbagemeldingssignal, når signalerne har en på forhånd given korrelation.
3. Apparat ifølge krav 2, **kendetegnet ved**, at styreindretningen (50) overvåger om det første eller det sidste signal fra volumnentælleren (42) og overvågningssignalet viser sig inden for et på forhånd givet tidsvindue, hvorved det første signal svarer til volumnentællerens (42) start, og det sidst signal til dens stop.
4. Apparat ifølge et af kravene 2 eller 3, **kendetegnet ved**, at sensoren (90) kun reagerer, når der strømmer en bestemt væskestrøm under et på forhånd givet tryk igennem tilslutningen.
5. Apparat ifølge et af kravene 1 til 4, **kendetegnet ved**, at i styreindretningen (50) er sensorernes overvågningssignal tilknyttet kamrene (12, 14, 16) henholdsvis bundventilerne (18, 20, 22), og styreindretningen (50) derved konstate-

rer i hvilket kammer (12, 14, 16) der foregår en tilbageføring af et flydende medium.

6. Apparat ifølge krav 5, **kendetegnet ved**, at styreindretningen (50) standser en tilbageføring, når overvågningssignalet ikke er tilknyttet det kammer (12, 14, 16), hvorfra det tilbageførte medium stammer fra udleveringsledningen (38) eller hører til det kammer (12, 14, 16), hvortil mediet skal tilbageføres.
7. Apparat ifølge et af kravene 3 til 6, **kendetegnet ved**, at styreindretningen (50) efter tilbageføringens afslutning automatisk tilbagestiller volumentælleren (42) til nul.
8. Apparat ifølge krav 7, **kendetegnet ved**, at tilslutningen til udleveringspistolen omfatter en opad stående krum rørstuds (62), som er forbundet med et hus (60), som er anbragt i forbindelse med ledningsafsnittet (24) imellem bundventil og kollektorventil.
9. Apparat ifølge krav 8, **kendetegnet ved**, at sensoren (90) er anbragt i en væg i huset (60) eller rørstudsens, og at der er anbragt en føringsstødstang (86) i kontraventilen, og som føres i en føringsboring i ventilhuset (78).
10. Apparat ifølge et af kravene 8 eller 9, **kendetegnet ved**, at sensoren (90) er en tilnærmelsessensor.



FIG.3