

the bottle neck 65' and applies pressure against a washer 73 to force the washer 73 in the direction of the lip 66 of the collection bottle. The collection bottle 61 is supported on the table 14 by compressing the spring 72, sliding the neck 65' in one of the slots 51 until the lip 66 is positioned in the annular recess 52 and then releasing the spring 72 so that the bottle is resiliently held onto the table 14.

A material discharge tube 74 which is the end of the chromatograph column generally indicated at 74 includes an elbow section 75 with a downwardly extending end portion on the end of which a needle tip 76 is held by means of seal cap 77 of heat resistant material such as, for example, Teflon (see FIG. 12). The lower surface of the seal cap 77 is tapered downwardly for creation of a seal with the bottle sealing cap 67, and the extended end of the needle tip 76 is provided with a V-shaped groove 78 (see FIGS. 12 and 13) for piercing the bottle caps 67 without creating a pressure surge.

Referring now to FIGS. 1, 4 and 5 movement of the collection table is controlled by a lever arm 81 which is supported on the lower end of a vertical shaft 82 rotatably mounted in a bearing sleeve 83 on the frame 11. Rotatably mounted on a pin 80 at the free end of the lever arm 81 is a vertically aligned roller 84 which rolls on the periphery of the table 14 and into the notch or initial portion of the slots 51 as the table 14 is rotated. A switch lever 86 is fixedly secured on the upper end of the shaft 82 for actuating two switches 87 and 88 such as, for example, micro switches in accordance with the position of the lever arm 81. Each of the micro switches 87 and 88 has a switch arm 89 which is adjustably attached to the lever 86 by an adjusting screw 91 and a lock nut 92. The switch 87 stops the table 14 when the roller 84 rolls into the initial portion of the slots 51, while the switch 88 affects the termination of a collecting cycle and initiation of a repeat collection cycle. The operation of both of these switches will be described in the operational example set forth in detail below with reference to FIG. 14.

Referring now to FIGS. 2-4, a pair of indexing or positioning rollers 95 is provided with each of the rollers being rotatably held in the lower notched end of a vertically aligned roller holder shaft 96. The shafts 96 are supported on the frame 11 on opposite sides of the drive shaft 12 a distance such as to place the rollers 95 over the top beveled edges 54 of the slots 51. When the table 14 is raised to its elevated position for inserting the tip 76 of the discharge tube 74 into a collection bottle, these rollers 95 engage the beveled edges 54 to ensure proper positioning of the bottle inlet tube 65 beneath the needle tip 76 of the discharge tube 74.

The operation of the present invention will now be described with reference to the operation of a typical gas chromatograph of the type well known in the art, it being understood that the scope of the present invention includes the use of the apparatus described in other processes and with other associated apparatus.

Referring now to FIG. 14 which schematically illustrates operation of the invention, a gas chromatograph generally indicated at A for use in combination with a sample collection apparatus B includes a sample supplying syringe 101 for supplying a precise quantity of sample to a chromatograph column 102 contained within an oven 103 which is provided with an exhaust door 104. The material within the column 102 is directed through a detector 105 of a well known non-destructive variety and then through the discharge tube 74 into collection bottles in the collection apparatus. The output from the detector 105 is fed to a recorder 106 of, for example, the strip chart variety. A power supply 107 in the chromatograph besides supplying power to other portions of the chromatograph supplies electrical power to the recorder 106, and table drive motor 19, the solenoid 37, a recycling control 108 and switches 87 and 88 which are

in turn connected to relays 109 and 110 respectively. Relay 109 upon activation opens a normally closed contact 111 in the power line to the motor 19 and solenoid 37, while relay 110 upon activation closes a normally open contact 112 in the power line to the recycling control 108.

The recorder 106 is provided with a trigger switch 113 for closing the relay 114 whenever the pen 106a of the recorder passes a particular level, this switch 113 being adjustable for selecting the level at which it is desired to collect or waste material from the discharge tube 74. Upon closing or activation, the relay 114 closes a normally open contact in the line between the contact 111 and the motor 19 and solenoid 37. When the switch 87 is closed, the relay 109 opens contact 111 to drop out the contact 115, and the switch 88 upon closing causes contact 112 to close to supply power to the recycling control 111. The contact 112 is opened in response to a signal from a timer (not shown) when the steps for initiating a new collection cycle have been completed.

By way of example, the operation of the gas chromatograph and sample collection apparatus will now be described as utilized to collect the components of a 1.0 ml. sample containing n-alkanes C_6 to C_{14} . The sample was inserted in the chromatograph column 102 by the syringe 101, and after a length of time, the passage of the components was detected by the detector 105 and the recorder trace shown was produced. Initially, the lever arm 81 was positioned in raised position at the table notch indicated as C, and as the recorder pin 106a passed the level switch 113 at position D of the chart, relay 114 closed contact 115 connecting the solenoid 37 and table drive motor 19 to the power supply 107. Immediately, the solenoid 37 pulls its plunger 34 downward causing the lever rod 32 to force the drive shaft 12 and table 14 downward to the position shown in FIG. 2 and in which position the drive motor 19 causes the table 14 to rotate until the lever 81 entered the initial portion of the first slot 51 after position C. Upon entering this slot, the lever arm 81 caused rotation of the lever arm shaft 82 and the switch lever 86 closing the switch 87, opening the contact 111 and dropping out the contact 115, and thereby cutting off power to the solenoid 37 and the drive motor 19. Upon de-energization of the solenoid 37, the solenoid plunger 34 was released and the table drive shaft 12 with the table 14 attached thereto moved upward under the influence of the spring 23, the driving key 18 on the shaft 12 sliding within the keyway 17 on the gear 16. The air pot 41 and the leaf spring 46 caused smooth vertical movement of the table 14. As the table 14 rose to the position shown in FIG. 3, the rollers 95 nested in the slots 51 on the beveled edges 54 thereof precisely locating the discharge tube 74 in the center of the inlet tube 65 of one of the collection bottles 61. Upon upward movement of the table 14, the needle tip 76 of the discharge tube pierced the bottle sealing cap 67 and sealed the surface 79 of the sealing cap 77 to the bottle sealing cap 67. The roller 84 in the notch of the slot 51 applied horizontal pressure to the vent cap 69 on the bottle outlet tube 68 and opened the pressure exit opening 71 for passing carrier gas. Under those conditions as illustrated in FIG. 6, the component passing through the discharge tube 74 exhausted into the collection bottle through the inlet 65 and was collected in the bottle while the gas already in the bottle and the carrier gas exhausted through the opening 71.

The component C_6 was discharged into the collection bottle until the recorder pen advanced to chart position E at which time the level switch 113 again closed contact 115 and the solenoid 37 and table drive motor 19 again operated and advanced the table 14 to its next position. In this next position on the collection table 14 the slot 51 was left open without providing any collection bottle therein so that the material issuing from the discharge tube 74 between the time when the chart recorder pen moved from chart position E to position F wasted through the open