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[54] **METHOD FOR THE QUALITATIVE AND QUANTITATIVE DETECTION OF VAPOURS FROM LOW VOLATILITY COMPOUNDS**

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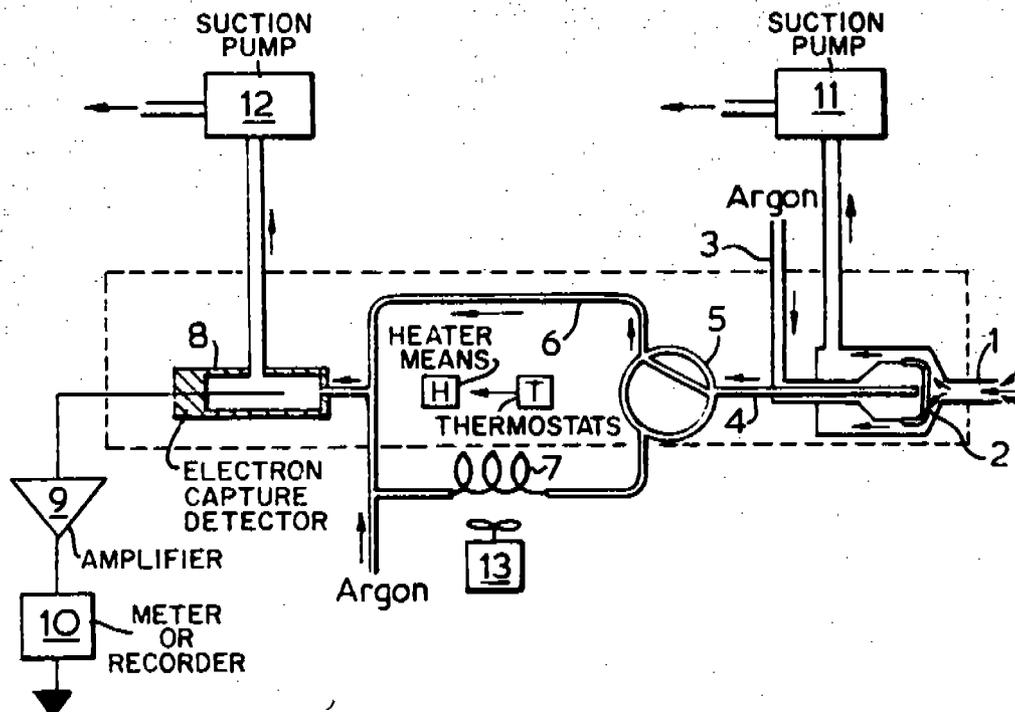
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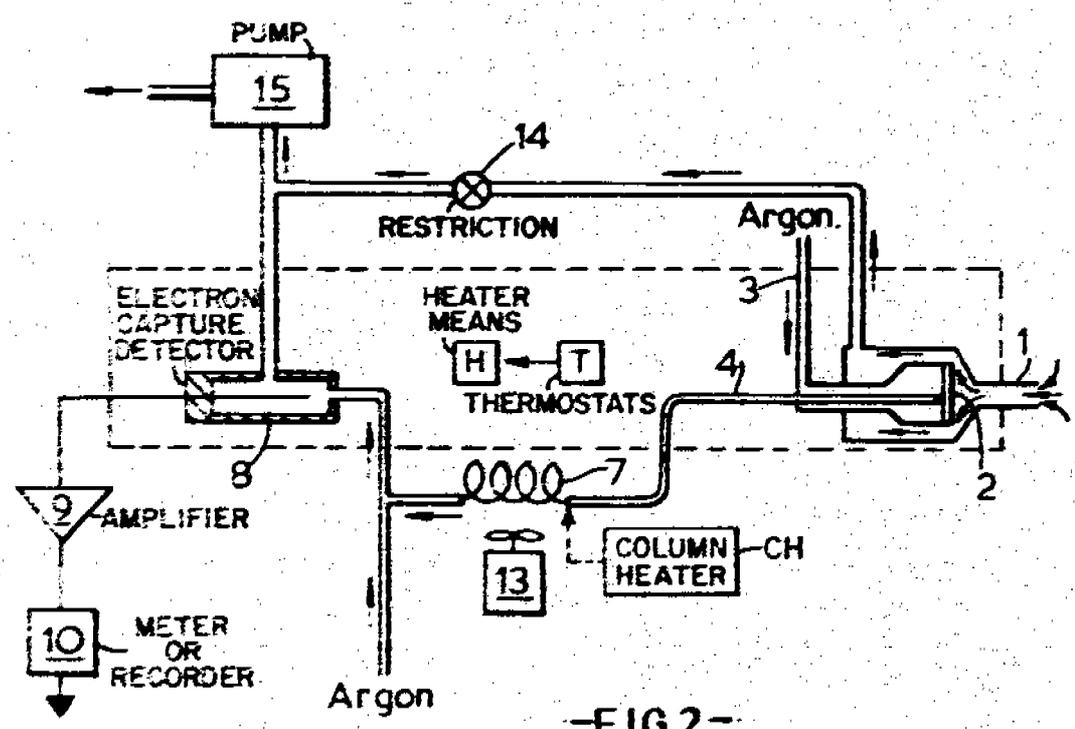
[57] **ABSTRACT**

A method and apparatus for detecting and identifying low concentrations of vapours in the atmosphere and emanating from materials having low vapour pressures. The vapours are isolated from the atmosphere by being drawn through a membrane having a greater permeability to the vapours than the remainder of the atmosphere. The presence of the vapours is detected by an electron capture detector and thereafter the vapours are separated one from another for individual identification in the detector.

20 Claims, 3 Drawing Figures







-FIG.2.-

tion that at least some component of interest in the atmosphere; and means in a carrier gas flow path between said isolating means and detector and actuable after said detecting for separating the isolated components one from another for individual identification in the detector.

9. An apparatus according to claim 8 in which the isolating means comprises a silastomer membrane.

10. An apparatus according to claim 8 in which the separating means comprises a chromatographic column and means for selectively raising and lowering the temperature of the column.

11. An apparatus according to claim 10 wherein a single said gas flow path is provided from said isolating means to said detector and through said chromatographic column interposed therebetween, said means for raising and lowering temperature including heating means for maintaining the column at an elevated temperature at which even the most involatile component of interest will pass rapidly through the column, so as to enable said indication by the detector that at least some component of interest is present in the atmosphere, and means for rapidly cooling said column thereafter to a reduced temperature so as to trap low volatility components of interest in the column, said separating of components one from the other being carried out by thereafter reactivating said heating means to gradually reheat said column and elute said trapped components therefrom as their elution temperatures are reached one by one.

12. An apparatus according to claim 10 in which said means for raising and lowering temperature comprises a thin wall of electrically conducting material of the column and means for passing an electrical current along said wall for heating the column and further comprises means including a fan for directing cold air at the column for cooling same.

13. An apparatus according to claim 10 in which said means for raising and lowering temperature include means for normally maintaining said column at least initially substantially at ambient temperature after there is indication of presence of a component of interest and wherein volatile components not of interest and to which the detector may respond pass rapidly through the column and detector at such ambient temperature whereas low volatility components of interest are trapped at the front of the column for later release to the detector for identification.

14. An apparatus according to claim 8 including first and second gas flow paths between the isolating means and the detector, in which said separating means comprises a chromatographic column in said second path, and further including selectively operable valve means for directing the flow along the first path to provide said indication that some components of interest are present and thereafter for directing the flow along the second path through said chromatographic column to accomplish said separating of components one from another, and means for raising and lowering the temperature of the column.

15. An apparatus according to claim 14 in which said means for raising and lowering the temperature of the column includes cooling means for normally maintaining said column at a reduced temperature so as to trap low volatility components of interest within said column and heating means for gradually increasing the temperature of the column to a temperature elevated above ambient temperature for eluting, in sequence, the trapped components of interest in separated form for sequential application to said detector, wherein said detector responds sequentially to said released components and the elution time or temperature of each detector signal identifies the particular component.

16. An apparatus according to claim 8 including a common pump means both for drawing a sample of the atmosphere into the vicinity of the isolating means and for drawing a carrier gas flow through the detector.

17. An apparatus according to claim 16 in which said common pump means directly connects to the gas output of the detector and connects through a further path to a portion of said isolating means for drawing atmosphere thereinto, the latter connection including a flow restrictor to enable a gas flow to be maintained from said isolating means through said detector.

18. An apparatus according to claim 8 in which the detector comprises an electron capture detector and said components of interest are electron capturing compounds.

19. An apparatus according to claim 18 in which the components of interest are nitrated explosives.

20. An apparatus according to claim 8 including heater means and thermostat means controlling same for heating to a controlled temperature said isolating means, said detector and the path therebetween utilized for carrying out said detecting that components are present.

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