operating time register, and audible “rate fault” alarm. In that patent, accuracy is achieved by using a timing circuit coupled with a mechanical bellows.

[0012] U.S. Pat. No. 6,216,548 illustrates a control system flow chart for an air sampling device for use in a controlled environment. In particular, the patent discloses a controller logic that involves turning on a pump, checking pressure, monitoring sampling time, drawing air into the sampler, shutting off the pump, and checking for leaks in the lines. The patent also teaches using a purge system for purging the lines and associated air particulate sampler using a purge gas such as nitrogen gas. In that patent, air sampling only occurs at one location (e.g., a processing chamber for semiconductor devices).

SUMMARY OF THE INVENTION

[0012a] According to a first aspect of the present invention, there is provided a system for tracking air contaminants, the system comprising:

a contaminant-collection device;

an identification tag associated with the contaminant-collection device, the tag encoded with identification information identifying the contaminant-collection device;

a first location tag encoded with first location information identifying a first location in which the contaminant-collection device collects the air contaminants;

a second location tag encoded with second location information identifying a second location of the contaminant-collection device after collecting the air contaminants;

a first identification reader configured to:

scan the identification tag at the first location;

decode the identification information encoded within the scanned identification tag;

scan the first location tag; and

decode the first location information encoded within the scanned first location tag;

a second identification reader configured to:

scan the identification tag at the second location;

decode the identification information encoded within the scanned identification tag scanned by the second identification reader;

scan the second location tag; and

decode the second location information encoded within the scanned second location tag; and

a processing device configured to:

receive and store the decoded identification information from the first and second identification readers;

receive and store the decoded first location information from the first identification reader; and

receive and store the decoded second location information from the second identification reader.

[0012b] According to a second aspect of the present invention, there is provided a system for tracking air contaminants, the system comprising:

a contaminant-collection device;

an identification tag associated with the contaminant-collection device, the tag encoded with identification information identifying the contaminant-collection device;

a first location tag encoded with first location information identifying a first location in which the contaminant-collection device collects the air contaminants;

a second location tag encoded with second location information identifying a second location of the contaminant-collection device after collecting the air contaminants;

a first identification reader configured to:

scan the identification tag at the first location;

decode the identification information encoded within the scanned identification tag;

scan the first location tag; and

decode the first location information encoded within the scanned first location tag;

a second identification reader configured to:

scan the identification tag at the second location;

decode the identification information encoded within the scanned identification tag scanned by the second identification reader;

scan the second location tag; and

decode the second location information encoded within the scanned second location tag; and

a processing device configured to:

receive and store the decoded identification information from the first and second identification readers;

receive and store the decoded first location information from the first identification reader; and

receive and store the decoded second location information from the second identification reader.

[0012c] According to a third aspect of the present invention, there is provided a system for sampling air in a controlled environment, the system comprising:

a subject configured to collect air contaminants in a controlled environment, the subject comprising an identification tag encoded with identification information identifying the subject;

a first location tag encoded with first location information identifying a first location in which the subject collects the air contaminants;

one or more air sampling devices, at least one of the one or more air sampling devices disposed in the controlled environment and comprising a first identification reader configured to:

scan the identification tag at the first location;

decode the identification information encoded within the scanned identification tag;

scan the first location tag; and

decode the first location information encoded within the scanned first location tag;

a second location tag encoded with second location information identifying a second location of the subject after collecting the air contaminants;

a second identification reader configured to:

scan the identification tag at the second location;

decode the identification information encoded within the identification tag scanned by the second identification reader;

scan the second location tag; and

decode the second location information encoded within the scanned second location tag; and

a vacuum source;

a controller connected to the vacuum source, wherein the controller is configured to be in separate air flow communication with the one or more air sampling devices via one or more respective vacuum air lines, the controller comprising a manifold, wherein the controller is further configured to separately control an actual rate of air flow from the one or more air sampling devices to the vacuum source respectively via each of the one or more vacuum air lines to selectively direct air flow respectively from each of the one or more vacuum air lines to the vacuum source; and

a computer configured to:

receive and store the decoded identification information from the first and second identification readers;

receive and store the decoded first location information from the first identification reader; and

receive and store the decoded second location information from the second identification reader.

[0013] There is provided a system for tracking one or more subjects. The system includes one or more subjects configured to collect air contaminants. Each of the one or more subjects includes an identification tag encoded with identification information identifying the each subject and other information regarding the each subject. The system further includes an identification reader configured to decode the identification information encoded within the identification tag of a scanned one of the one or more identification tags. A computer receives and stores the decoded identification information from the identification reader in a record in a database. The barcode scanner may be further configured to transmit location information identifying the location of the scanned one of the one or more identification tags. The location information is logged by the computer with the decoded identification information.

[0014] There is also provided a system for sampling air at a plurality of locations in a controlled environment. The system includes one or more air sampling devices, a vacuum source, a controller connected to the vacuum source, one or more subjects configured to collect air contaminants in the controlled environment, an identification reader, and a computer configured to receive data from the

at one of the one or more first locations;

decode the identification information encoded within the identification tag scanned by the first identification reader;

scan one of the one or more first location tags; and

decode the first location information encoded within the first location tag scanned by the first identification reader;

a second identification reader configured to:

scan one of the one or more identification tags of one of the one or more subjects at one of the one or more second locations;

decode the identification information encoded within the identification tag scanned by the second identification reader;

scan one of the one or more second location tags; and

decode the second location information encoded within the second location tag scanned by the second identification reader; and

a computer configured to:

receive and store the decoded identification information from the first and second identification readers;

receive and store the decoded first location information from the first identification reader; and

receive and store the decoded location information from the second identification reader.