The present invention is an industrial air filtering and conditioning assembly for use in a workspace. The invention employs one blower and filter assembly to produce both filtered and conditioned air. The invention includes a high capacity filter assembly for filtering contaminants from air to produce filtered air within the workspace. A blower for drawing air from the workspace through the filter assembly and a condenser operatively positioned adjacent to the blower. The blower passes the filtered air over the condenser to condition the air by removing heat and humidity. The condensed air is passed back to the workspace to provide both filtered and conditioned air to the workspace.
FIG. 1
INTEGRAL INDUSTRIAL AIR AND CONDITIONING FILTER ASSEMBLY

RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 61/876,299 filed on Sep. 11, 2013.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH

[0002] NONE

TECHNICAL FIELD

[0003] This invention relates generally to industrial air filtering systems and, more particularly, to an integral industrial air filtering and conditioning system that uses one filter and one blower fan.

BACKGROUND

[0004] Air filters and air conditioners are well known in industrial applications. Air filters are used to filter contaminants from the air in an industrial facility and air conditioners are used to condition the air and remove heat and humidity from the air. These units are always separate units that perform their functions separately. One drawback to having these separate units is the cost, i.e. the cost to install the separate units, the cost to separately operate the units and the cost to maintain the separate units.

[0005] Another drawback to typical air conditioning units is there tendency to require regular maintenance and in particular the need to clean the cooling coil assembly or evaporator coils. Air conditioning units have to draw air over the cooling or evaporator coils to cool and dehumidify the air. If that air contains entrained contaminants, they can be deposited on the coils, which over time, build to the point of fouling. Although a typical air conditioner has a filter, the filter can foul. The filters in an air conditioner are not high capacity filters resulting in contaminants being able to pass through and be deposited on the coils.

[0006] Another problem with typical air conditioning units is their inability to be directed to the workspace where the greatest temperatures are likely to exist. With a typical air conditioning unit the conditioned air is exhausted to the building and not necessarily at the workstation.

SUMMARY OF THE INVENTION

[0007] The present invention overcomes the above disadvantages by providing an integral industrial air and conditioning filter system that has a shared high capacity filter assembly and a shared blower assembly.

[0008] There are a number of advantages in using air conditioning systems integrated with dust collection and filtration systems. Air must be filtered before passing through the cooling coil to prevent dirt build up and fouling. Typically filters in an industrial air conditioning system are depleted very rapidly, however, by using high capacity filters, which can also be cleaned and reconditioned automatically with a compressed air reverse pulse cleaning mechanism, extended operating time and filter replacement time can be achieved, reducing maintenance costs, labor costs and replacement parts costs.

[0009] A fan or blower assembly is required to create airflow for a dust collection and air filtration system to operate. Likewise a fan or blower assembly is required to create airflow for an air conditioning system to operate. However by integrating a dust collection air filtration system with an air conditioning system, a common fan or blower assembly can be used to create airflow for both systems simultaneously, giving reduced capital costs and increased energy savings by not having to set up and operate multiple independent fan or blower assemblies for air conditioning and dust collection systems.

[0010] The present invention is an industrial air filtering and conditioning assembly for use in a workspace with a shared high capacity filter assembly and a shared blower assembly. The invention includes a high capacity filter assembly for filtering contaminants from air to produce filtered air within the workspace. A blower for drawing air from the workspace through the filter assembly and a condenser operatively positioned adjacent to the blower. The blower passes filtered air over the condenser to condition the air by removing heat and humidity. The condensed air is passed back to the workspace to provide both filtered and conditioned air to the workspace.

[0011] In this way, the air is both filtered and conditioned with the use of a single filter assembly and blower. This reduces the contamination of the condenser, costs of installation and costs of operation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is a schematic view of the integral industrial air filtering and conditioning system of the present invention.

[0013] FIG. 2 is a perspective view of the integral industrial air filtering and conditioning system of the present invention;

[0014] FIG. 3 is a partial perspective view of the integral industrial air filtering and conditioning system of the present invention;

[0015] FIG. 4 is a partial perspective view of the integral industrial air filtering and conditioning system of the present invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[0016] With reference to FIG. 1, the integral industrial air filtering and conditioning system of the present invention is shown generally at 20. Air containing contaminants, such as dust and smoke, inside a manufacturing building 13 is drawn into a filter cabinet 10 either directly or through intake screens or through a system of connected ductwork pipes. In the filter cabinet 10 the air is passed through high capacity dust collection filters to capture and reduce levels of the contaminants in the airflow. The filter cabinet 10 can also house a compressed air reverse pulse cleaning mechanism to recondition the high capacity filters to extend the length of time before filters are required to be replaced due to excess containment accumulation.

[0017] After passing through the filters the cleaned air passes to the blower housing 11 containing the fan blower wheel and motor which generates the pressure differential necessary to create airflow. Airflow then passes to the coil plenum 12, where it passes through a cooling coil assembly or evaporator, where the temperature of the air is reduced. The coil plenum 12 has coils, which in one embodiment contain refrigerant in a gaseous state. The gaseous refrigerant draws
heat and humidity from the air passing across the coils. In another embodiment, the coil plenum has coils that contain circulating cooling water.

[0018] The coil plenum 12 can either be directly connected to the blower compartment 11, or connected via sheet metal ductwork to allow some distance between blower housing 11 and the coil plenum 12. Cleaned and cooled air is then returned inside the manufacturing building 13. The conditioned air is both less humid and cooler providing a better work environment in the workstation.

[0019] The cooling coil inside the coil plenum 12 is connected to the air conditioning condenser 14 outside the manufacturing facility 13 by tubing or pipes 15 which convey either direct expansion refrigerant for example R410A or chilled water.

[0020] There are a number of advantages of using air conditioning systems integrated with dust collection and filtration system. Air must be filtered before passing through the cooling coil to prevent dirt build up and fouling. Typically filters in an industrial air conditioning system are depleted very rapidly, however by using high capacity filters, which can also be cleaned and reconditioned automatically with the compressed air reverse pulse cleaning mechanism, extended operating time and filter replacement time can be achieved, reducing maintenance costs, labor costs and replacement parts costs.

[0021] A fan or blower assembly is required to create airflow for a dust collection and air filtration system to operate. Likewise a fan or blower assembly is required to create airflow for an air conditioning system to operate. However by integrating a dust collection air filtration system with an air conditioning system, a common fan or blower assembly can be used to create airflow for both systems simultaneously giving reduced capital costs and increased energy savings by not having to set up and operate multiple independent fan or blower assemblies for air conditioning and dust collection systems.

[0022] With reference to FIG. 2, the system includes a workstation 22, which can be for example a welding station. The station 22 is operatively connected to a blower 28 in the disclosed embodiment, a duct 26 operatively connects the station 22 and air filtering unit 24. In operation, the air filtering system has at least one blower that draws air from the station and passes it through filters in unit 24 to filter the air.

[0023] Once filtered, the air is passed through an evaporator 28. In the disclosed embodiment, refrigerant circulates through the evaporator 28 through refrigerant lines 34 to a compressor 30, then a condenser 32, an evaporator valve, and then back into the evaporator 28. As should be appreciated by those of ordinary skill in the art, the condenser 32 could take different forms, such as for example a fan blowing over the coils in the condenser 32, a cooling tower to dissipate heat, a chilled water system, etc.

[0024] With reference to FIG. 2, an example of a workstation 22 is illustrated. The workstation is operatively connected to a filtering unit 24. As in the previous embodiment, the air passes from the workstation 22, through filters in the filtering unit 24 and through the evaporator 28 for cooling and dehumidifying. Once conditioned, the air is returned to the workstation 22 through for example a duct shown schematically at 36.

[0025] With reference to FIG. 3, a further example of a workstation 22 is illustrated. In this embodiment, the work-
12. The industrial air filtering and conditioning assembly of claim 8, further including a compressed air reverse pulse cleaning mechanism to recondition the filter assembly.

13. The industrial air filtering and conditioning assembly of claim 8, further including a cooling tower.

14. The industrial air filtering and conditioning assembly of claim 8, further including a condenser.

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