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APPARATUS FOR REMOVING FOREIGN MATERIAL FROM AIR

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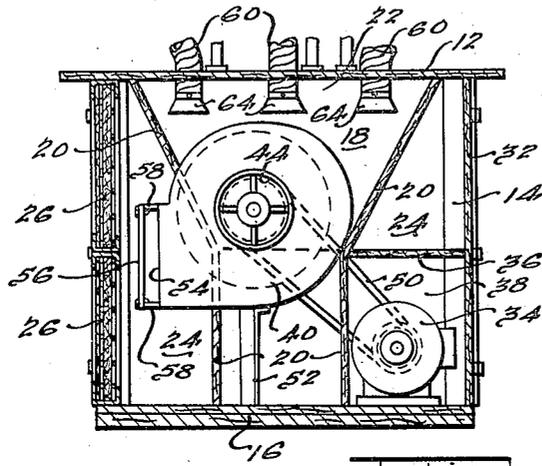


FIG. 3.

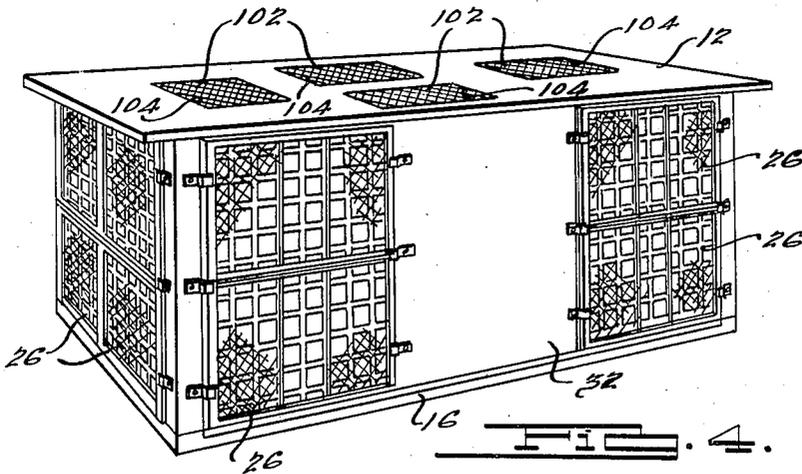


FIG. 4.

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## APPARATUS FOR REMOVING FOREIGN MATERIAL FROM AIR

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3 Claims. (Cl. 98—115)

The present invention relates to apparatus for removing foreign material from air and particularly relates to the dry type of such apparatus.

One of the primary objects of the present invention is to provide improvements in apparatus of the type mentioned, in which the cleaning unit is incorporated in a portable, plural station work bench, and in which the cleaned air may be returned directly to the room in which the bench is located, in the region of the workers around the edges of the bench.

A further object of the invention is to provide improved means for discharging the dust containing air into a suction chamber having the inlet of the suction fan disposed therein so that a substantial portion of the foreign material is removed from the air before entry into the inlet of the fan.

A further object of the invention is to provide improvements in apparatus of the type mentioned, in which the air from the suction chamber is discharged into a plenum chamber and diffused therein so that when passed through filters, in being discharged back into the room, the passage is not concentrated at a particular point, but spread over the entire area thereof.

The work bench is adapted to support a plurality of grinders at a plurality of work stations thereon, and another object of the invention is to provide improved, individual means for conducting the grinding dust from the grinding wheel to the suction chamber for each of the grinders, which is universally adjustable so that the bench may be used to its best advantage when different operations are being performed at the various work stations.

Another object of the invention is to provide compact and inexpensive air cleaning apparatus associated with a portable work bench so that the work bench, including the cleaning apparatus, may be conveniently moved to the desired location in the work room.

Other objects of the invention will become apparent from the following specification, the drawings relating thereto, and from the claims hereinafter set forth.

In the drawings, in which like numerals are used to designate like parts in the several views throughout:

Figure 1 is a perspective view of a portable work bench and cleaning unit having a plurality of work stations therein and embodying features of the present invention;

Fig. 2 is a cross-sectional view taken substantially along the line 2—2 of Fig. 1;

Fig. 3 is a cross-sectional view taken substantially along the line 3—3 of Fig. 2; and

Fig. 4 is a view similar to Fig. 1 and illustrating a modified form of the present invention.

Referring to the drawings, and referring particularly to Figs. 1 to 3 thereof, one embodiment of the present invention is illustrated in which a combined work bench and cleaning unit are generally indicated at 10. Such bench includes a horizontal work surface 12, which may be formed of a suitable material, but which is preferably formed of tempered masonite so that it is spark resistant. The top 12 may be supported on suitable upright frame members 14, which may be formed of wood or other suitable material and be suitably secured thereto. The frame members 14 rest upon a bottom member 16 and are secured thereto. The bottom member thus confines the bottoms of the chambers, which will be described hereinafter. The top 12 overhangs the frame members 14, as shown in Figs. 1 to 3, so that the operators may conveniently work at the bench.

It will be understood that the bench may be of suitable shape or size so that it provides a plurality of work stations. Grinders (not shown) may be disposed on the work surface 12 and secured thereto at the various work stations. It will be appreciated that, if desired, such work stations may be separated from each other by vertical partitions which may be suitably mounted to the top of the work surface 12.

A suction chamber 18 is formed under the surface 12 and is enclosed by side wall members 20 and end wall members 22. The upper portions of such wall members are flared outwardly, as shown in Figs. 2 and 3, so that apertures may be provided through the work surface 12 over a substantial area thereof for communication with suction chamber 18. One of the wall members 20 or 22 adjacent to the bottom thereof may be provided with a removable door so that access may be had to the bottom of chamber 18 for the purpose of removing the dust which has been collected therein.

A plenum chamber 24 is disposed around the suction chamber 18 within the confines of the work surface 12. Such plenum chamber 24 is defined by the top member 12, the bottom member 16, and means including vertically disposed air filter members 26. Such filter members 26 are conventional fibrous filter sections comprising frames having fibrous material, such as glass wool, disposed therein. The air is cleaned as it passes through the fibrous material. The sec-

tions 26 may be disposed on each other and on the floor member 16 between the frame members 14, and are removably secured thereto by means of pivoted clamps 28. Such clamps 28 may be removably attached to the frame members 14 by means of thumb screws 30 so that the filter 26 may be removed for cleaning.

The remaining portion of the plenum chamber is defined by a removable wall member 32 which is removably secured to a pair of the adjacent frame members 14 on one side of the bench in an upright position. A small chamber adapted to contain the driving motor 34 is enclosed by means of a top wall member 36 and side wall member 38, as shown in Figs. 2 and 3. The plenum chamber is continuous around the bench through the space above the wall member 36.

A fan, or blower, 40 of the centrifugal or sirocco type is mounted within the suction chamber 18. Such fan includes the usual scroll shaped housing having a center partition 42 with axially disposed inlet passages 44 at the opposite ends thereof. The paddle fan members 46 are keyed to a drive shaft 47, which is mounted within suitable bearings in the inlets 44 and projects outwardly beyond one end thereof. A pulley 48 is keyed to the outer end of the shaft and has a drive belt 50 associated therewith. The pulley 48 and drive belt 50 are preferably enclosed within a suitable housing (not shown) for the purpose of protecting the belt and pulley against the action of the dust. The belt and housing extend through a sealed opening in one of the walls 20 to a position within the space under the top wall member 36 and between the side wall members 38.

The blower housing is mounted in spaced relation to the bottom of chamber 18 by means of a mounting member 52. The discharge portion of the scroll shaped fan housing passes through the opposite wall member 20 into the plenum chamber 24 so that the discharge openings 54 discharge the air from the blowers into the plenum chamber. In order to diffuse the air within the plenum chamber 24 and so that it is not blown directly through the filters at a particular place, a diffusion baffle 56 is mounted in spaced relation to the edge of the discharge openings 54, by means of spaced brackets 58. Thus the air that discharges from the lower outlets 54 strikes against the plate 56 and is diffused in all directions along the plenum chamber 24. The air may then pass around through the chamber and be discharged through all of the filter sections 26.

To conduct the dust-laden air from the immediate region that it is blown off the grinding wheel, a plurality of flexible conduit members 60 are provided. Such conduit members 60 may be in the form of tubular rubber members having coil springs imbedded therein, so that the members 60 may be bent to the positions desired. A funnel-shaped member 62 is secured to the inlet end of each of the conduits 60 and it will be understood that there is one conduit member provided for each of the work stations. Each conduit member is then passed through a sealed aperture 64 provided in the work surface 12 and communicating with the interior of the suction chamber 18. Each of the suction members 60 extends downwardly within chamber 18 so that a portion of the flexible end thereof is received within such chamber. Each of the discharge ends has a funnel member 64 secured thereto, and by having a portion of the flexible conduit disposed within the housing it will be appreciated

that the discharge ends may be bent slightly so that the air discharged therefrom is discharged in the desired direction. That is, the discharge may be either directed downwardly or may be directed toward the sides 20 and 22 to effect a change in direction of the air and assist in the removal of the foreign material therefrom. The air is discharged into the suction chamber in a generally downward direction so that the heavier particles are separated from the air and drop to the bottom of the suction chamber 18.

The fan 40 is positioned in spaced relation to the bottom of the chamber 18 so that the inlets 44 are disposed in spaced relation thereto. Thus, a substantial portion of the foreign material drops to the bottom of the chamber and air passing through the inlets of the blower is partially clean. This assists in increasing the life of the blower 40.

Since the bench may be used for a number of different purposes, it is desirable that the inlet ends 62 of the conduit 60 be so mounted that they may be fixed in various positions to most effectively gather the dust-laden air for a particular operation. Thus a universally adjustable means is provided for universally positioning the inlets 62 of each of the conduits. This means includes a tubular mounting member 70, which is disposed adjacent its particular conduit and fixed to the top of the work surface 12. An upstanding rod member 72 is received within the tubular member 70 and may be vertically adjusted by means of a set screw 74. A bracket 76 is pivoted to the upward end of the rod member 72 and may be adjustably fixed by means of a set screw 78. The outer end of the bracket 76 is provided with an upstanding boss which has pivotally mounted thereon a pivot pin 80. The pivot pin 80 has a plate member fixed thereto, which is substantially normal to the pin 80 and a complementary plate member is disposed in facing relation to the first named plate member. It may be pivotally set with respect thereto by means of a pivot set screw 82, which passes through the plate members. The last mentioned plate member has a boss which slidably and rotatably receives thereto a rod member 84. The rod member 84 may be adjusted with respect thereto by means of a set screw 86. The rod 84 is pivotally connected to another rod member 88 by means of a plate member 90 having a boss which slidably and pivotally receives the rod 84 therethrough. Another plate member 92, which is complementary to the plate member 90, is pivotally adjustable thereto by means of a pivot set screw 94 passed through the plate members. One end of the rod member 88 is received through a boss in the member 92 and may be adjustably fixed thereto by means of a set screw. The opposite end of the member 88 is pivotally connected to a band 96 by means of a pivot pin 98. The band 96 embraces the tubular member 60 adjacent the outlets 62. The mounting means just described provides a universal mounting for the inlet end of the edge of the conduits 60. Thus, by setting the various elements of the mounting means just described, the inlet 62 may be fixed at any position within its work region.

A modified structure is shown in Fig. 4 and such structure is substantially the same as that described above, except that in place of the conduit member 60, for conducting the dust-laden air from the grinding region to the suction chamber, a plurality of grilles or screens 102 are disposed within apertures 104, provided through the

working surface 12. Such grilles provide communication from the grinding regions to the suction chamber 18. The dust-laden air passing into such chamber is directed downwardly so that a substantial portion of the dust drops to the bottom of the chamber before entry into the fan inlets. The remaining structure may be the same as that described above, in connection with the embodiment first described.

What is claimed is:

1. Apparatus for removing foreign material from air, comprising a portable work bench having a work surface thereon, means providing a suction chamber under said work surface, means providing a plurality of apertures through said surface at spaced places on said surface and communicating with said suction chamber, an elongated flexible conduit member extending through each of said apertures having its outlet communicating with the interior of said suction chamber, adjustable means mounted on said surface and connected to the conduit members adjacent the inlets thereof for adjustably positioning each of said inlets, a suction fan having its inlet disposed within said suction chamber above the bottom of said chamber, means defining a plenum chamber around said suction chamber below and within the projected area of said work surface, said last named means including air filtering members, the outlet of said fan being directed into said plenum chamber, and means disposed adjacent said outlet to diffuse the air discharged through said outlet within the plenum chamber.

2. Apparatus for removing foreign material from air, comprising a portable work bench having a work surface thereon, means providing a suction chamber under said work surface, means providing a plurality of apertures through said surface at spaced places on said surface and communicating with said suction chamber, an elongated flexible conduit member extending downwardly through each of said apertures with a portion of flexible conduit extending into said

chamber and with its outlet communicating with the interior of said chamber, adjustable means mounted on said surface and connected to the conduit members adjacent the inlets thereof for adjustably positioning each of said inlets, a suction fan having its inlet disposed within said suction chamber above the bottom of said chamber, means defining a plenum chamber around said suction chamber below and within the projected area of said work surface, said last named means including air filtering members, the outlet of said fan being directed into said plenum chamber, and means disposed adjacent said outlet to diffuse the air discharged through said outlet within the plenum chamber.

3. Apparatus for removing foreign material from air, comprising a portable work bench having a work surface thereon, means providing a suction chamber under said work surface, means providing a plurality of apertures through said surface at spaced places on said surface and communicating with said suction chamber, an elongated flexible conduit member extending downwardly through each of said apertures with a portion of the flexible conduit extending into said chamber and with its outlet communicating with the interior of said chamber, adjustable means mounted on said surface adjacent each conduit member and connected to the adjacent conduit member adjacent the inlets thereof for individually adjustably positioning each of said inlets, a suction fan having its inlet disposed within said suction chamber above the bottom of said chamber, means defining a plenum chamber around said suction chamber below and within the projected area of said work surface, said last named means including air filtering members, the outlet of said fan being directed into said plenum chamber, and means disposed adjacent said outlet to diffuse the air discharged through said outlet within the plenum chamber.

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