

June 30, 1964

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3,138,818

TRAVELING OVERHEAD SUCTION CLEANER

Filed July 2, 1962

3 Sheets-Sheet 1

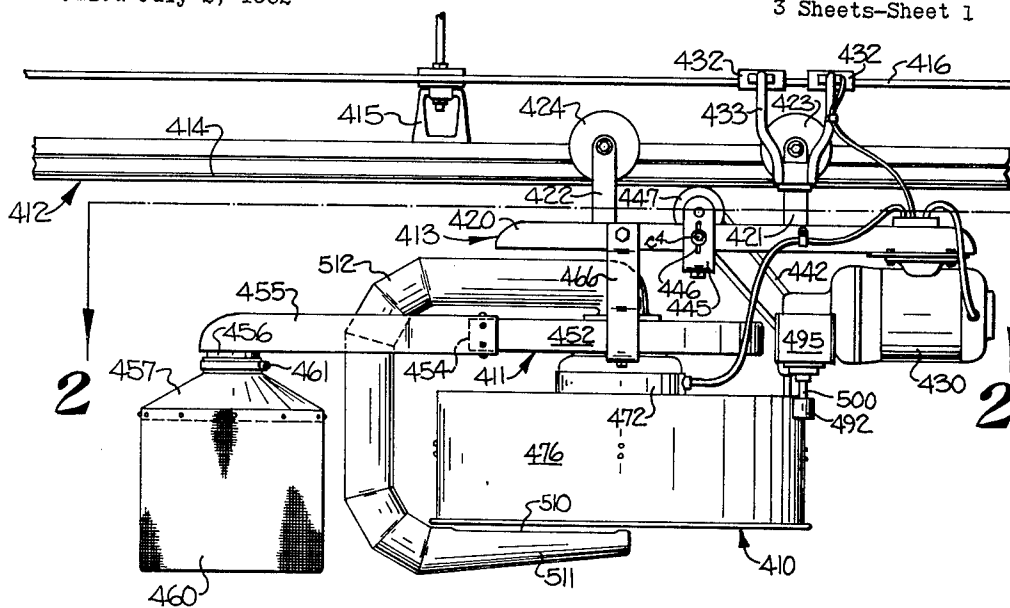


Fig-1

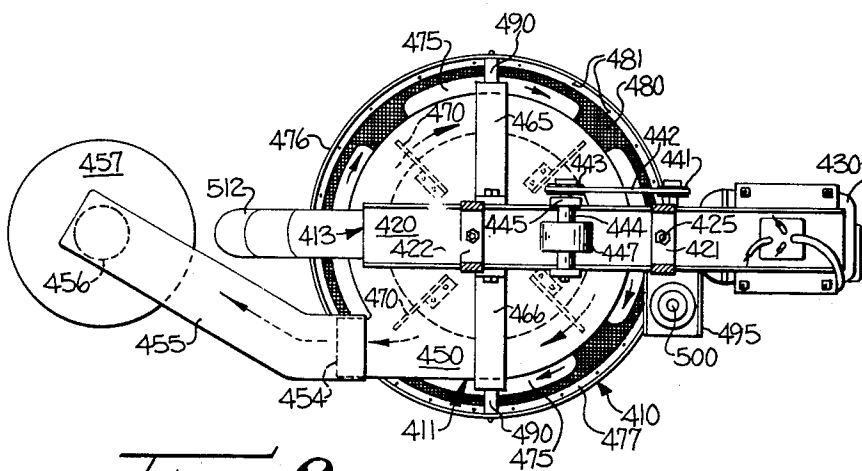


Fig-2

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3 Sheets-Sheet 2

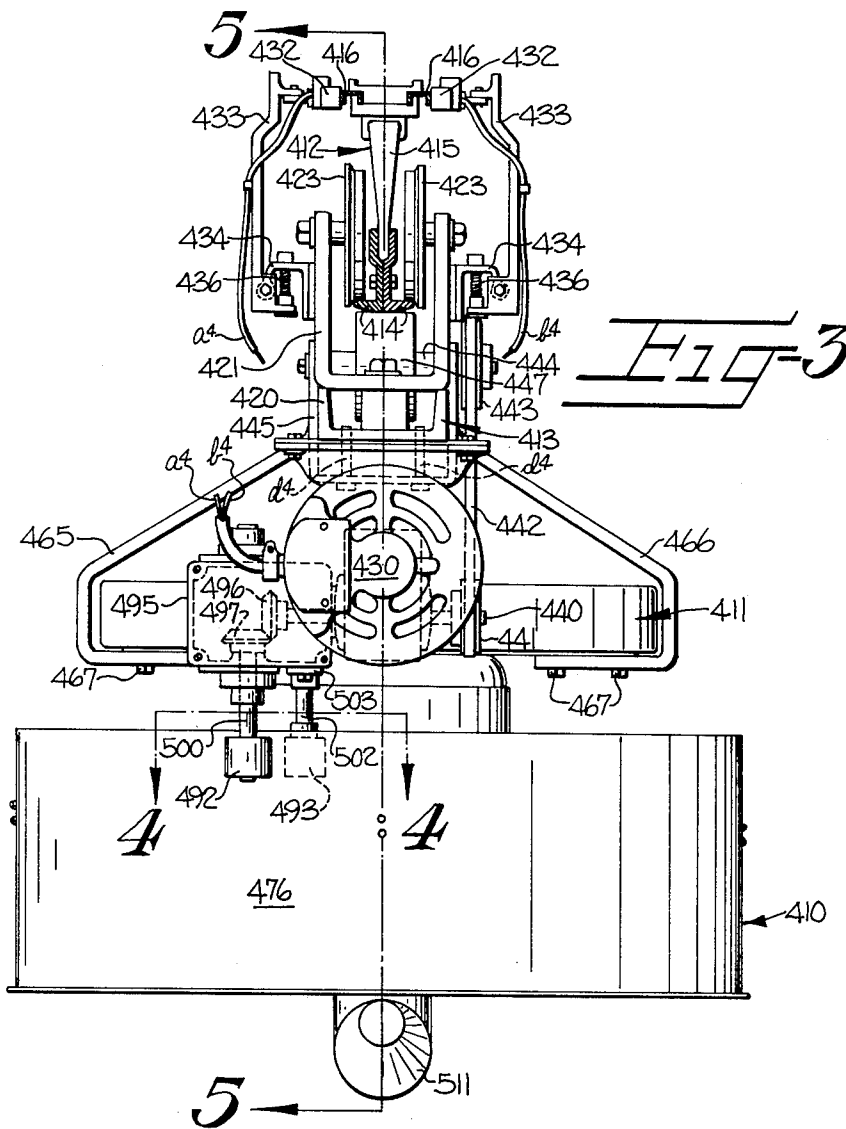
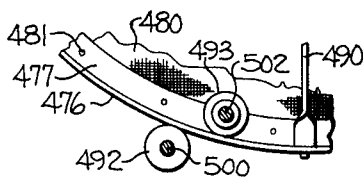


Fig-4

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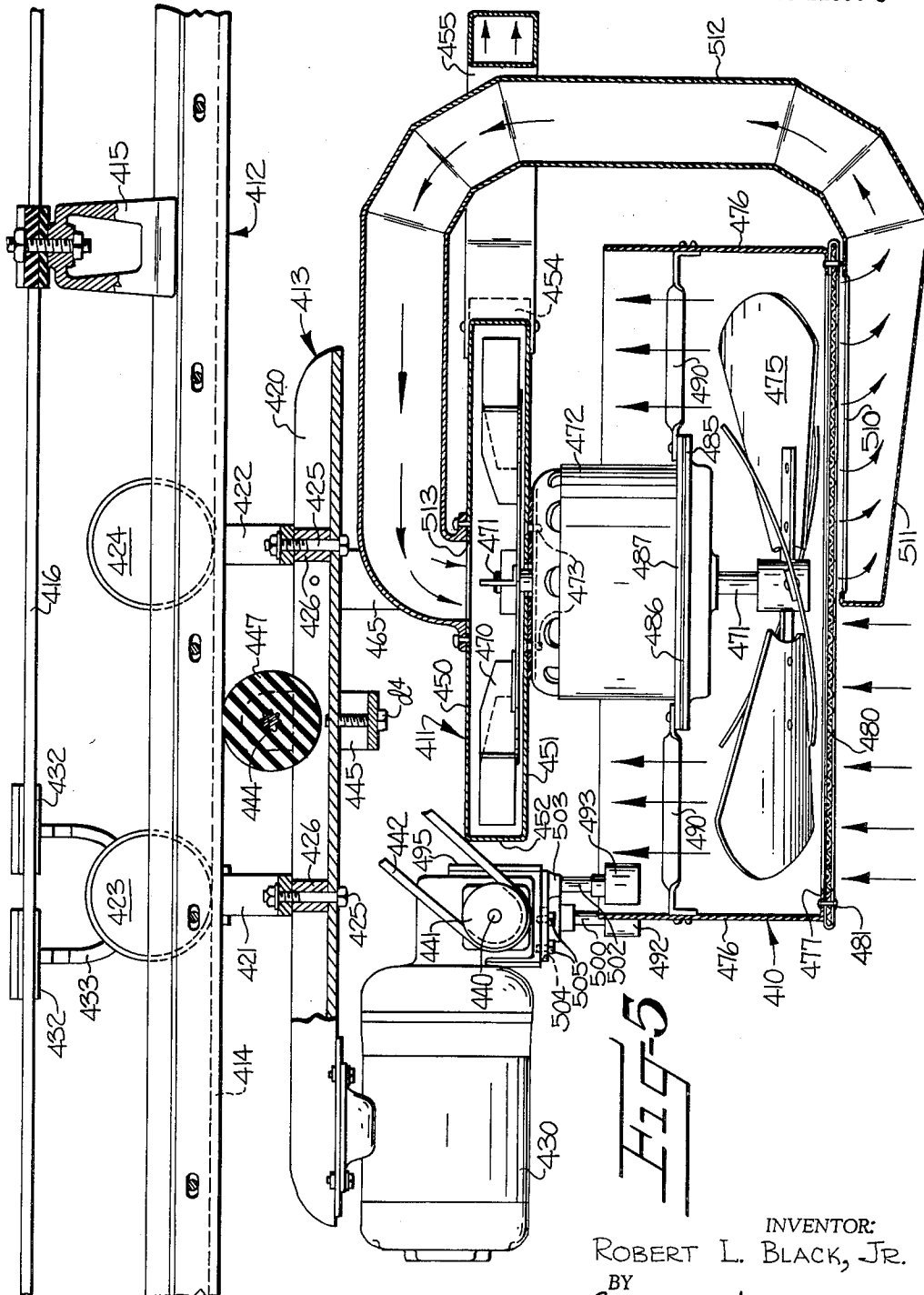
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TRAVELING OVERHEAD SUCTION CLEANER

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3 Sheets-Sheet 3



H15-5

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TRAVELING OVERHEAD SUCTION CLEANER
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8 Claims. (Cl. 15—312)

This invention relates to the art of disposing of residual textile fibers generated by textile manufacturing operations and is particularly concerned with removal from the air ambient fibers, generally known as fly, which are generated in card rooms and other fiber preparation rooms.

This application is a continuation-in-part of my co-pending application Serial No. 128,511, filed August 1, 1961, now U.S. Patent No. 3,055,038, dated September 25, 1962, and entitled Traveling Cleaning Apparatus.

In textile rooms in which textile strands are processed, such as rooms having roving frames, winders, spinning frames, twister frames or looms therein, the problem of disposition of residual lint has been effectively overcome by the use of travelling suction and/or blowing cleaners of the general type disclosed in said co-pending application. However, the lint problem in card rooms and similar rooms, such as picker rooms and fiber blending rooms, is quite different from that of rooms in which strands are wound onto and/or off of suitable cores. It is well known that there is much more fly generated in a card room than in a spinning room, because of the very contrasting nature of the textile operations performed therein.

Textile yarns, as processed in spinning rooms, comprise filaments or strands of conjoint fibers, but in a card room, the fibers are generally in the form of loose fluffy masses or slivers or very thin webs from which substantial amounts of fly are cast during the handling thereof so that the removal of lint from the air poses the most aggravating problem in card rooms as opposed to the removal of lint from machine and floor surfaces, as is required in spinning rooms.

Also, many hand trucks, sliver cans, lap rolls and other articles are necessarily stored, in somewhat arbitrary fashion, in a card room and are frequently shifted from place to place. The usual suction and/or blowing nozzles traveling adjacent the floor and card machines would not only be encumbered by such articles, but might also interfere with the handling and shifting of such articles.

It is therefore an object of this invention to provide an improved self-contained traveling overhead suction cleaner particularly adapted for use in card rooms and which includes a rigid collecting filter surface through which air is drawn by an air impeller to attract fly to said surface where it accumulates as lint, and including a suction nozzle closely adjacent said surface, with means effecting relative rotational or traversing movement between the collecting surface and the nozzle and conveying the lint sucked into the nozzle to a collection zone traveling with the suction cleaner.

In its preferred embodiment the traveling suction cleaner of the present invention is a self-contained unit comprising a driven carriage movable along an overhead track and supporting a pair of spaced coaxially disposed housings having respective rotary impellers therein. One housing is of tubular form, open at both ends, and has a filter or screen covering its suction end. The other housing is preferably of volute form to form a centrifugal suction blower to the inlet of which a suction nozzle is connected and to the outlet of which is connected a collection chamber of at least partially porous or foraminate construction. The mouth of the suction nozzle is disposed closely adjacent the outer surface of the screen, and means is provided for rotating the screen to move the

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same past the nozzle so that lint collected on the screen is sucked off the same and conveyed to the collection chamber.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which—

FIGURE 1 is a side elevation of the improved traveling overhead suction cleaner mounted on a portion of a track adapted to be suspended from the ceiling of a textile room such as a card room or above other similar textile manufacturing operations;

FIGURE 2 is a top plan view of the structure shown in FIGURE 1 partially in section and looking down substantially along line 2—2 in FIGURE 1;

FIGURE 3 is an enlarged end elevation of the traveling overhead suction cleaner looking at the right-hand side of the structure shown in FIGURE 1;

FIGURE 4 is a fragmentary sectional plan view taken substantially along line 4—4 in FIGURE 3; and

FIGURE 5 is a longitudinal vertical sectional view through the apparatus taken along line 5—5 in FIGURE 3.

Referring more specifically to the drawings, the numerals 410 and 411 indicate, respectively, a relatively large lower main housing or suction blower and a relatively small, upper auxiliary housing or suction blower, which are suspended from an overhead track broadly designated at 412, by means of a common carriage broadly designated at 413.

Track 412 may be of conventional or other construction and is suitably suspended from the ceiling or other superstructure in a textile room to enable movement of the traveling cleaner over the textile manufacturing operation. In this instance, track 412 comprises a pair of opposed flanges 414 suitably suspended from the ceiling, not shown, by means of brackets 415, which brackets also support suitable electrodes or conductors 416 which are suitably insulated from brackets 415 and extend longitudinally of and parallel to the flanges 414. The conductors 416 are connected to opposed sides of a suitable source of electrical energy, not shown, as is well known.

Carriage 413 comprises a substantially horizontally disposed main frame member 420 in the form of a channel bar whose flanges project upwardly and engage a pair of longitudinally spaced substantially U-shaped brackets or trolleys 421, 422. The trolleys 421, 422 have respective pairs of rollers or wheels 423, 424 journaled thereon, straddling the track 412 and riding upon the flanges 414. Trolleys 421, 422 are suitably secured to main frame member 420 by bolts 425 which extend through the web of channel bar 420 and also extend through spacing blocks 426 and through the lateral lower portion of each trolley 421, 422 (FIGURE 5).

Carriage 413 may be propelled along track 412 by any suitable means and, in this instance, the trolley is propelled along track 412 by means of an electric motor 430 suitably secured to one end portion of, and depending from, frame member 420 of carriage 413. Although the traveling suction cleaner may travel in either direction along track 412, the end portion of channel bar 420 from which electric motor 430 is suspended shall be termed as the rear portion thereof for purposes of orientation. Electric motor 430 has a pair of conductors a^4 , b^4 leading therefrom to suitable brushes or sliding contacts 432 which yieldably engage distal surfaces of the electrodes 416.

In this instance, the brushes 432 are suitably secured to, but insulated from, the upper portions of pivoted arms 433 whose lower portions are pivotally connected to angle brackets 434 carried by trolley 421. The flanged upper portions of brackets 434 have the upper ends of compression springs 436 positioned thereagainst, whose lower

ends bear against underlying portions of the pivoted arms 433, thus urging the upper ends of the pivoted arms 433 inwardly toward electrodes 416.

Electric motor 430 is preferably of the gear-reduction type and has a shaft 440 extending laterally therefrom on which a pulley 441 is suitably secured. Pulley 441 has an endless belt 442 mounted thereon which extends upwardly and is also mounted on a pulley 443. Pulley 443 is fixed on a shaft 444 (FIGURE 5) which extends across and above frame member 420 and is journaled in opposed upright portions of a substantially U-shaped bracket 445. Opposed portions of bracket 445 straddle frame member 420 and each has a vertically extending slot 446 therethrough which is loosely penetrated by a screw c^4 (FIGURE 1) threaded into the corresponding flange of main frame member 420. As best shown in FIGURES 3 and 5, the lower substantially horizontal or bridging portion of bracket 445 is loosely penetrated by a pair of screws d^4 which extend upwardly and are threaded through the web of channel bar 420.

The medial portion of shaft 444 has a carriage driving roller or traction wheel 447 fixed thereon which is preferably made from a yieldable material, such as rubber or the like, and which bears against the lower surface of track 412. It is apparent that the screws c^4 , d^4 facilitate adjustment of bracket 445 so that the roller 447 may tightly engage the lower surface of track 412.

It is thus seen that the flow of current through electrodes 416 causes current to flow through electric motor 430 to drive pulley 441, belt 442, pulley 443 and roller 447 and to thereby cause the carriage 413 to move along track 412.

The auxiliary housing 411 is a form of centrifugal blower, in that it is of volute form in plan (FIGURE 2). Auxiliary housing 411 includes top and bottom walls 450, 451 and a side wall 452 which form an offset outlet portion 454 to which an extension duct 455 is communicatively connected. The free end portion of duct 455 has a downwardly projecting, preferably circular, outlet portion 456 thereon to which the substantially frusto-conical upper end portion 457 of a traveling collection chamber 460 is suitably detachably connected, as at 461. The collection chamber 460 may be in the form of a porous or foraminate bag, as shown in FIGURE 1, or it may be of the type disclosed in U.S. Patent No. 3,011,202, for example, wherein the collection chamber also is broadly designated at 60. The type and size of collection chamber used with the present apparatus may, of course, depend upon the nature of the textile manufacturing operation over which the track 412 may extend and the size of the room in which the apparatus is used.

The auxiliary housing 411 is supported and fixed against rotation by a pair of strap frame members 465, 466 which are parts of carriage 413. As best shown in FIGURE 3, frame members 465, 466 are suitably secured to opposed sides of frame member 420, then extend downwardly in diverging relationship past substantially diametrically opposed sides of auxiliary housing 411 and then inwardly. The inwardly projecting lower portions of frame members 465, 466 are suitably secured to the lower wall 451 of housing or centrifugal blower 411, as by screws 467 (FIGURE 3).

It is thus seen that the upper housing 411 rests upon and is suitably secured to the substantially horizontal lower portions of the frame members 465, 466 of carriage 413. The upper housing 411 has an air impeller or fan 470 therein (FIGURE 5) which is fixed on the upper end of the shaft 471 of an electric motor 472 suitably secured to and depending from the lower wall 451 of auxiliary housing 411, as by screws 473.

The shaft 471 of electric motor 472 also projects from the lower end of electric motor 472 and has a relatively large fan or air impeller 475 fixed thereon within the lower housing 410. The lower housing 410 comprises an annular wall 476 which is preferably made from sheet metal and has an inwardly projecting annular flange 477 on the

lower end thereof which defines a relatively large air inlet opening for the lower or main housing 410. The air inlet opening of housing 410 is covered by a rigid substantially circular filter or screen 480 which is suitably secured to the flange 477, as by rivets 481. The impeller 475 is positioned closely above the filter 480 and motor 472 is positioned partially within the wall 476 of housing 410. The annular wall 476 is of substantially greater diameter than the mean diameter of auxiliary housing 411 and, also, the upper end of housing 476 is open, thus defining a discharge opening through which the air drawn into housing 410 through filter 480 is discharged to thus dislodge lint and other light material from track 412 and from the ceiling and other surfaces thereabove.

The electric motor 472 may be considered as a part of carriage 413, since the main housing 410 of the traveling cleaner is mounted for rotation on the casing of electric motor 472 and is substantially concentric with the impeller 475. To this end, it will be observed in FIGURE 5 that the lower portion of the casing of motor 472 has an annular flange 485 fixed thereon or formed integral therewith, which flange carries an annular race 486 upon which an annular support ring 487 is supported for rotational movement thereon. Ring 487 has a plurality of circularly spaced, radially extending spokes or arms 490 attached thereto or formed integral therewith, which extend outwardly and are suitably secured to the inner surface of the annular wall 476 of housing 410 whereby the main housing 410 is supported for rotation by carriage 413 about an axis substantially concentric with the axis of impeller 475.

Means are provided for imparting rotation to main housing 410 at a relatively slow speed as compared to the speed of impeller 475. In this instance, the means for imparting rotation to housing 410 comprises a pair of closely spaced staggered rollers 492, 493 made from a yieldable material, such as rubber, and which engage respective outer and inner surfaces of annular wall 476 of housing 410. The outer roller 492 is a driven roller and the inner roller 493 is an idler roller.

The driven roller 492 is driven by means of electric motor 430. Therefore, electric motor 430 has a gear box 495 mounted thereon into which the shaft 440 of electric motor 430 extends and which has a bevel gear 496 fixed thereon. Gear 496 meshes with a bevel gear 497 fixed on the upper end of a shaft 500 journaled in the lower wall of gear box 495 and projecting downwardly therefrom. Roller 492 is fixed on the lower end of shaft 500.

The idler roller 493 is rotatably mounted on the lower end of a shaft 502 whose upper end is fixed in a bracket 503 (FIGURES 3 and 5) having an elongate slot 504 therein which is loosely penetrated by screws 505 for adjustably securing bracket 503 to the bottom wall of gear box 495. It is apparent that the slot 504 in bracket 503 permits roller 493 to be adjusted toward and away from the inner surface of the annular wall 476 of main housing 410. The electric motor 430 may also be adjustable in a like manner relative to main frame member 420 of carriage 415. It is thus seen that motor 430 imparts rotation to main housing 410 and its filter 480; thus effecting relative rotational movement between filter 480 and the elongate mouth 510 of a suction nozzle 511.

In this instance, suction nozzle 511 is stationary, but it is apparent that the suction nozzle may rotate about an axis substantially concentric with the axis of, but relative to, filter 480 without departing from the spirit of the invention. The mouth or inlet opening 510 of suction nozzle 511 is disposed closely adjacent the lower surface or inlet side of filter or screen 480 and extends from a point adjacent the center of filter 480 radially outwardly to a point adjacent the perimeter of filter 480. Thus, with each revolution of filter 480, the entire outer surface or lint collecting surface of filter 480 traverses the mouth 510 of suction nozzle 511.

Suction nozzle 511 is connected to the inlet end of a duct 512 which extends upwardly past the rotatable main housing 410, past the stationary auxiliary housing 411 and then inwardly where it is communicatively connected to the upper wall 450 of auxiliary housing 411 for communication with the interior of housing 411 through an air inlet 513.

It is thus seen that I have provided an improved self-contained traveling suction cleaner for removing from the air ambient fibers which are generated by a textile operation and wherein, as the traveling cleaner is propelled along track 412, the fan or impeller 475 draws air through filter 480 to attract fly from the adjacent areas of the room past which the traveling cleaner moves, and which fly collects as lint on the collecting surface of filter 480. Since housing 410 rotates continuously during the movement of the traveling cleaner along track 412, the filter 480 is continuously rotated past the mouth 510 of nozzle 511 so that lint which accumulates on filter 480 is withdrawn therefrom and directed to the inlet of suction blower 411 where the suction current is converted to a blowing current to blow the lint into the collection chamber 460 traveling with the traveling cleaner. The collection chamber 460 may be removed from the duct 455 periodically to empty the collected lint therefrom.

In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. A traveling suction cleaner adapted to be mounted on a track extending over a textile manufacturing operation in a textile mill and comprising;

- (a) a carriage,
- (b) an electric motor on said carriage,
- (c) first and second spaced air impellers driven by said motor,
- (d) a first housing enclosing said first impeller and forming an air inlet at one end thereof and having an air outlet,
- (e) a second, volute housing enclosing said second impeller and spaced from said first housing,
- (f) means connecting both housings to said carriage,
- (g) said second housing having an air inlet and an air outlet,
- (h) a collection chamber connected to said last-named outlet,
- (i) a filter covering the inlet of said first housing,
- (j) a suction nozzle connected to the inlet of said second housing and disposed closely adjacent the outer surface of said filter, and
- (k) means to effect relative rotational movement between the filter and said nozzle.

2. A traveling suction cleaner adapted to be mounted on a track extending over a textile manufacturing operation in a textile mill and comprising;

- (a) a carriage,
- (b) an electric motor on said carriage,
- (c) first and second coaxially spaced air impellers operatively connected to said motor,
- (d) a first substantially circular, tubular, housing encircling said first impeller and forming an air inlet at one end thereof and an air outlet at its other end,
- (e) a second, volute housing enclosing said second impeller and spaced from said first housing,
- (f) means connecting both housings to said carriage,
- (g) said second housing having an air inlet and an air outlet,

(h) a collection chamber connected to said last-named outlet,

(i) a filter covering said inlet of said first housing,

(j) a suction nozzle connected to the inlet of said second housing and disposed closely adjacent and extending substantially radially of the outer surface of said filter, and

(k) means to effect relative rotational movement between the filter and said nozzle.

3. A traveling suction cleaner adapted to be mounted on a track extending over a textile manufacturing operation in a textile mill and comprising;

- (a) a carriage,
- (b) an electric motor on said carriage,
- (c) first and second coaxially and vertically spaced air impellers operatively connected to said motor,
- (d) a first substantially circular, tubular housing encircling said first impeller and forming an air inlet at its lower end and an air outlet at its upper end,
- (e) a second volute housing enclosing said second impeller and spaced from said first housing,
- (f) means connecting both housings to said carriage,
- (g) said second housing having an air inlet and an air outlet,

(h) a collection chamber connected to said last-named outlet,

(i) a filter covering the inlet of said first housing,

(j) a suction nozzle disposed closely adjacent and extending substantially radially of the outer surface of said filter,

(k) duct means connecting said nozzle to the inlet of said second housing, and

(l) means to rotate said filter relative to said nozzle.

4. A structure according to claim 3, in which said motor has a substantially vertical shaft extending there-through and said impellers are operatively connected to said motor by being fixed on the shaft with said first impeller being on the lower end of said shaft beneath the motor and said second impeller being on the upper end of said shaft above the motor.

5. A structure according to claim 3 in which said first housing is spaced beneath said second housing, said second housing being fixed against rotation, and the axes of the impellers being substantially concentric with the axis of rotation of said filter.

6. A structure according to claim 5, wherein said filter is located adjacent the bottom of said first housing, said second housing having an upper wall, said air inlet of the second housing being formed in said upper wall, and said duct means comprising a duct extending substantially radially outwardly from said last-named inlet and downwardly past both housings to said nozzle.

7. A structure according to claim 5, wherein said filter is located adjacent the bottom of and is fixed to said first housing, said first housing comprising an annular wall, said means to rotate said filter comprising a pair of rollers straddling said annular wall and having their peripheral surfaces engaging inner and outer surfaces of said wall, a second electric motor on said carriage, and one of said rollers being operatively connected to and driven by said second motor.

8. A structure according to claim 7, including a traction wheel journaled on said carriage and adapted to engage said track, and means operatively connecting said second motor to said traction wheel for driving the same.

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