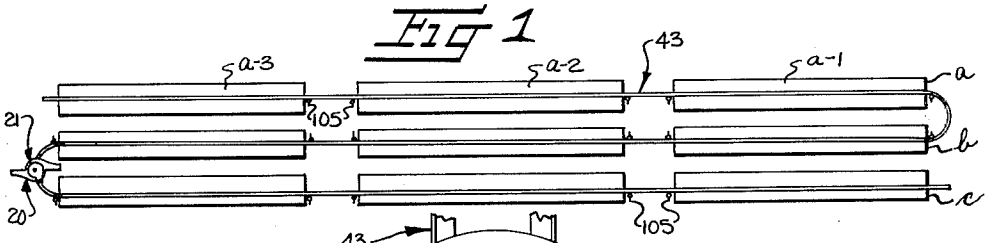
Jan. 16, 1962 G. B. HOLTZCLAW 3,016,559

TRAVELING CLEANER WITH AIR-DIVERTING MEANS

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Fig. 1



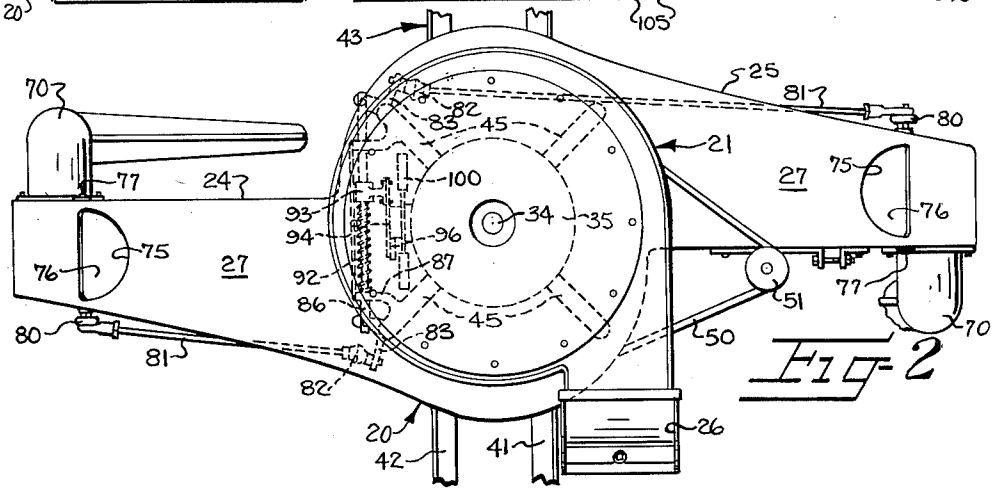


Fig. 2

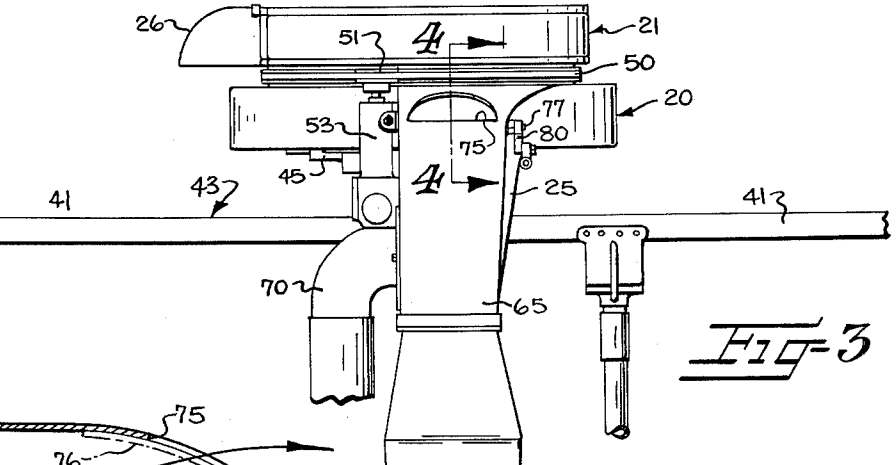


Fig. 3

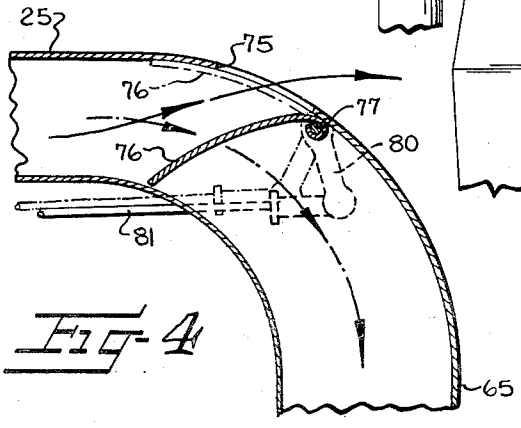


Fig. 4

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TRAVELING CLEANER WITH AIR-DIVERTING MEANS

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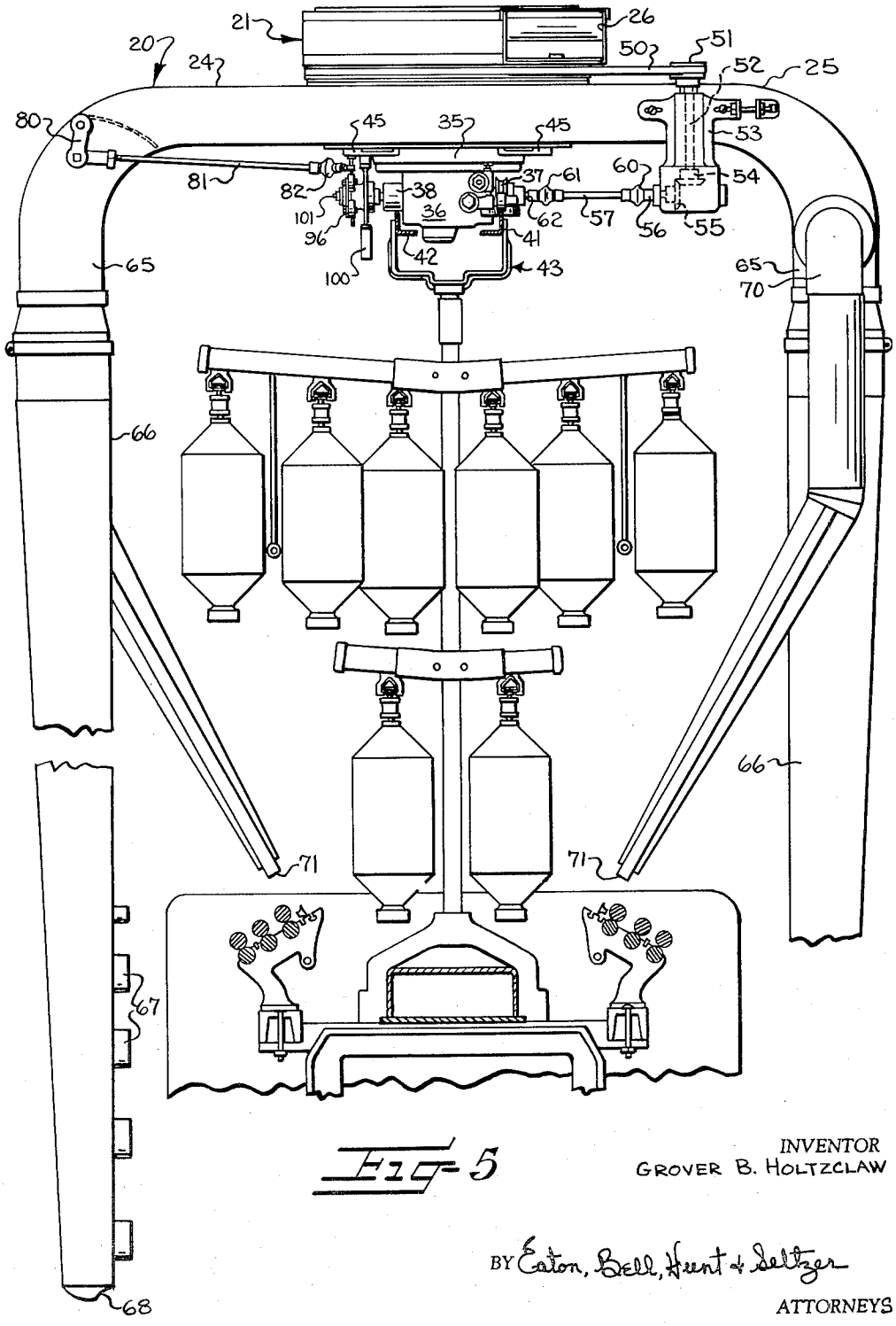


Fig. 5

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TRAVELING CLEANER WITH AIR-DIVERTING MEANS

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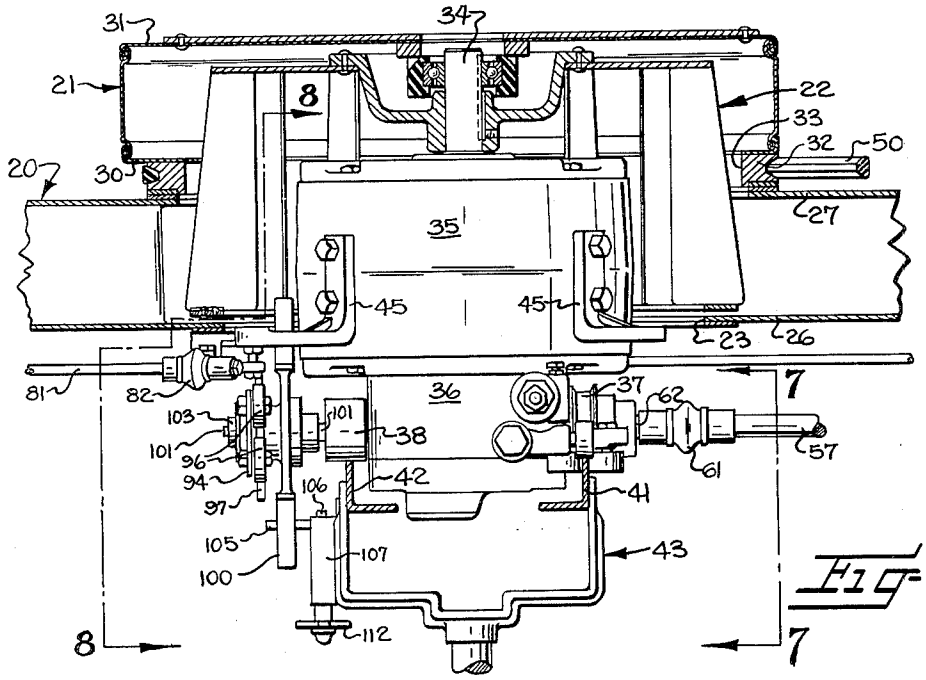


Fig-6

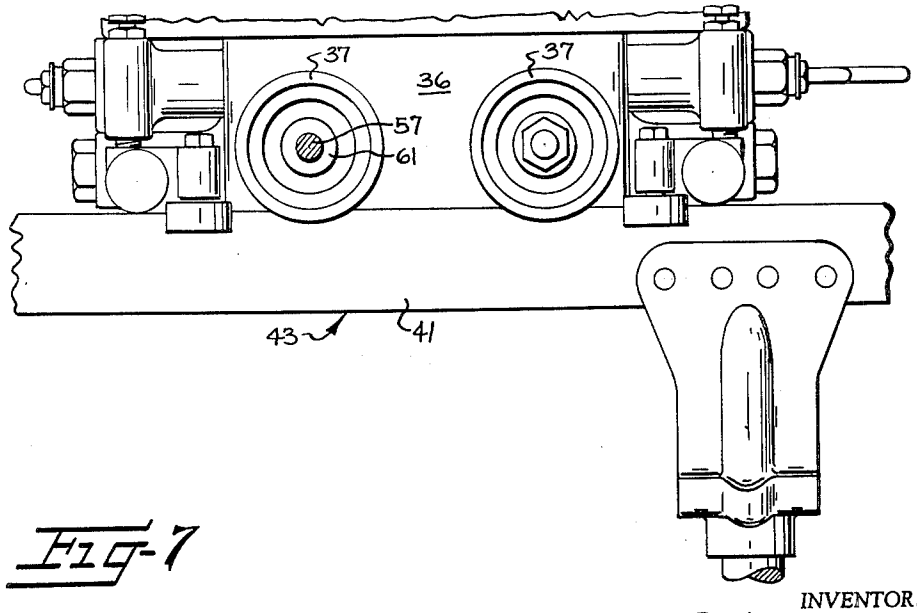


Fig-7

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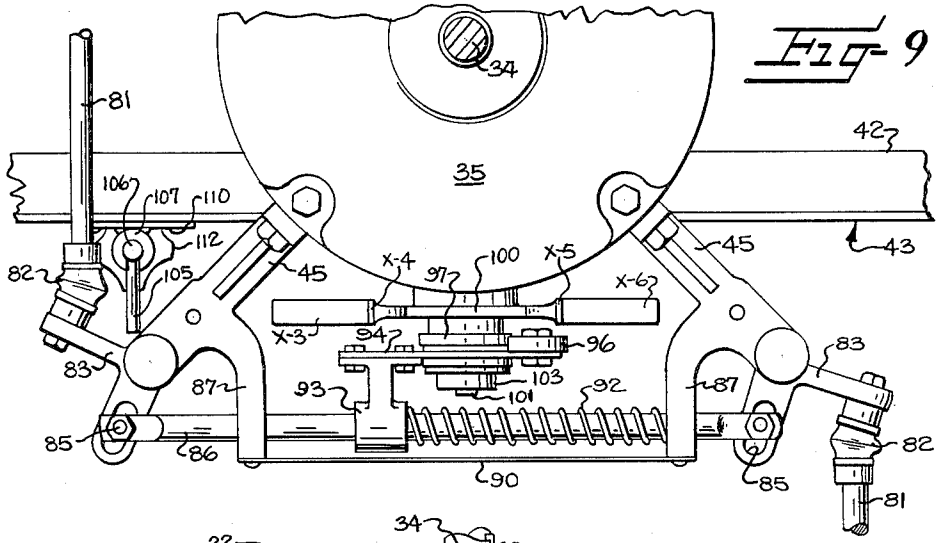
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TRAVELING CLEANER WITH AIR-DIVERTING MEANS

Filed Nov. 19, 1958 4 Sheets-Sheet 4

Fig- 9



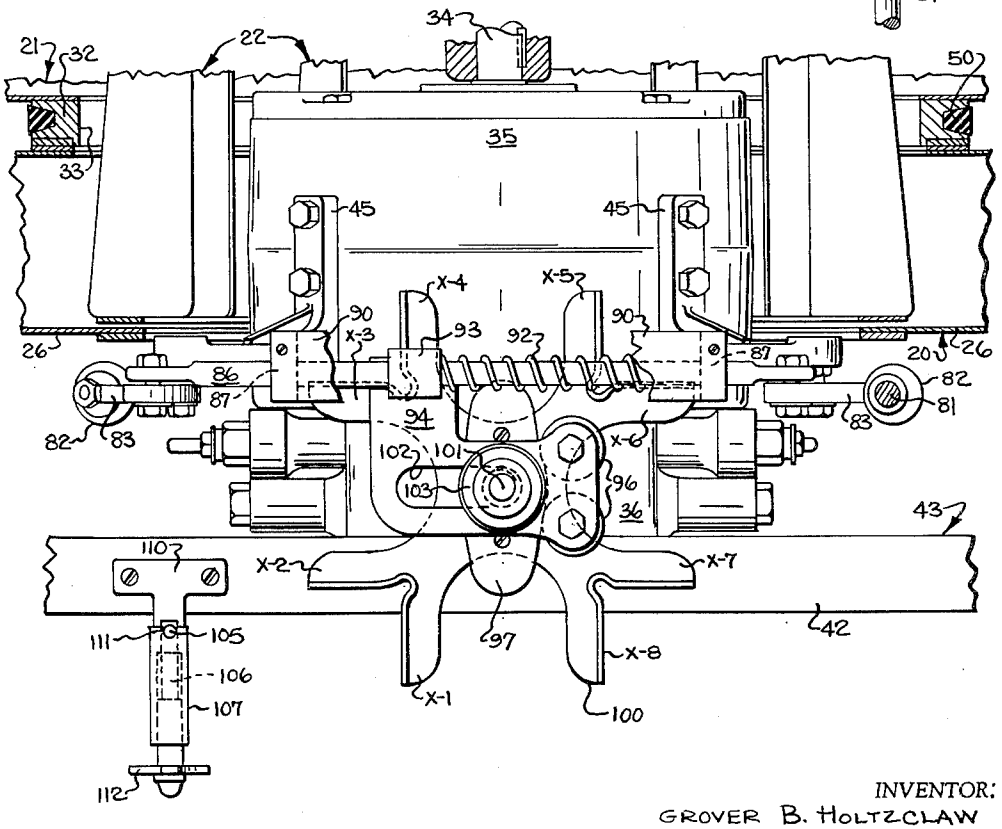


Fig- 8

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United States Patent Office

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3,016,559

TRAVELING CLEANER WITH AIR-DIVERTING MEANS

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Filed Nov. 19, 1958, Ser. No. 774,942

2 Claims. (Cl. 15—312)

This invention relates to a novel apparatus for removing lint, dust and other light material from machinery and adjacent surfaces of an enclosure, such as textile processing machinery and the ceiling, walls and overhead obstructions of a room containing such machinery.

The use of blower-type traveling cleaners for removing accumulations of lint, dust and other light material from machines and room surfaces has become accepted practice in the textile industry. Prior Patent No. 2,047,558 discloses a particular type of traveling cleaner which has met with considerable success, and which comprises a carriage which moves along a trackway extending horizontally over textile machines. The carriage has a motor and a rotatable fan. A casing surrounding the fan has one or more outlet conduits thereon and some of these outlets are generally provided with depending sleeves through which air is directed toward portions of the machines and/or floor from which lint and the like are to be removed. For example, I have disclosed improved flexible sleeves in my copending application, Serial No. 679,629, filed August 22, 1957, now Patent No. 2,931,061 and entitled, Flexible Sleeve for Traveling Cleaner. Such sleeves are provided with discharge openings along the length thereof for directing air currents to particular portions of the machines and floor past which they are moved.

My U.S. Patent No. 2,635,275, dated April 21, 1953, also discloses an updraft traveling blower which directs air upwardly and outwardly for removing lint and other light material from all upper surfaces of an enclosure, including the ceiling, portions of the side walls and all overhead obstructions, such as lights, conduits, piping, shafting, motors, ducts, etc.

A more powerful combination traveling unit for cleaning both machines and room surfaces is disclosed in my copending application, Serial No. 772,935, entitled Apparatus for Cleaning Machines and Room Surfaces, filed November 10, 1958.

While such blower-type traveling cleaners have minimized the problem of removing lint and other light material from textile machines and adjacent surfaces of the enclosure in which the machines are located, they have also produced another problem, in that it is sometimes desirable that the downward flow of air from the traveling cleaner be interrupted at certain predetermined intervals of predetermined duration during its travel between adjacent machines, or adjacent rows of machines, or above any particular machine or machines which are not in operation at that particular instant. For example, the effects of the downwardly directed air currents from the traveling cleaner are undesirable during the general piecing of ends or during doffing operations on spinning machines. The cleaning effect of air currents against rovings or slivers on spinning and roving frames is highly desirable while these machines are running, but is undesirable when the machines are idle, since the repeated movement of the air currents against the strands of roving and sliver on idle machines may cause injury to the delicate strands.

It is therefore an object of this invention to provide an improved apparatus for removing lint and other light material from rows of textile machines which includes a

traveling blower for directing air currents toward various elements of the machines and/or toward the floor adjacent the machines while moving the air currents longitudinally of the machines, said blower being equipped with means for interrupting and deflecting upwardly and/or outwardly such air currents during movement of the blower past certain of such machines, or past any machines which are idle, or during movement over certain spare floor areas.

It is another object of this invention to provide apparatus which, in its preferred embodiment, comprises a centrifugal blower having one or more substantially radially extending ducts or hollow arms extending outwardly therefrom, to which sleeves are usually connected. Each sleeve may be provided with one or more orifices or nozzles thereon for directing currents of air from the blower to various surfaces of the machines and other adjacent surfaces. An automatic air deflector is included in one or more of said ducts to permit the flow of air from the centrifugal blower to be directed either through the sleeves or elsewhere. At predetermined intervals, an automatically operable means functions to move said deflector for cutting off the flow of air from a particular outlet or sleeve and diverting the current upwardly and outwardly to thereby permit uninterrupted operation of the blower over other machines in the circuit and to assist in cleaning surfaces of the enclosure or room above the level of the machines over which the traveling cleaner is moving.

It is still another object of this invention to provide apparatus of the character described in which means are provided, adjustable by the operator, for determining the intervals during its travel when said deflector is operated and the duration of such operation.

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 diagrammatic plan view showing an illustrative layout of machines and track over which the traveling cleaner of the present invention may be employed;

FIGURE 2 is an enlarged plan view of the improved traveling cleaner showing the same at a straight portion of the trackway;

FIGURE 3 is a vertical elevation looking at the right-hand side of FIGURE 2, with the lower portion of the sleeve broken away;

FIGURE 4 is an enlarged fragmentary vertical sectional view taken substantially along line 4—4 in FIGURE 3, showing the deflector occupying open and closed positions in solid and broken lines, respectively;

FIGURE 5 is an elevation looking at the left-hand side of FIGURE 3, but showing the traveling cleaner in association with the upper portion of a spinning frame and also showing the lower portion of one of the sleeves depending from the traveling cleaner;

FIGURE 6 is an enlarged elevation similar to the central upper portion of FIGURE 5, but showing the blower casings and impeller in cross-section, and showing one of the deflector control elements on the trackway;

FIGURE 7 is an enlarged fragmentary view looking along line 7—7 in FIGURE 6;

FIGURE 8 is an enlarged fragmentary vertical sectional view, most in elevation, taken substantially along line 8—8 in FIGURE 6;

FIGURE 9 is a fragmentary plan view of the blower motor and the deflector shifting mechanism, omitting the blower casings and the fan.

Referring more specifically to the drawings, a preferred embodiment of the invention is shown in association with a traveling cleaner similar to that disclosed in my

copending application, Serial No. 772,935, filed November 10, 1958 and entitled, Apparatus for Cleaning Machines and Room Surfaces, to the extent that the traveling cleaner includes lower and upper volute casings 20, 21 within which a common driven impeller or fan 22 is positioned (FIGURES 6 and 8) for drawing air into the casings 20, 21 through an opening 23, provided in the lower wall of the lower casing 20, and exhausting the air outwardly through a pair of substantially diametrically opposed ducts or hollow arms 24, 25 and for also directing air outwardly through an air outlet nozzle or spout 26 in the upper casing 21.

The upper casing 21 is continuously rotatable upon the lower casing 20 so that the current of air exhausted therefrom through nozzle 26 is caused to move in a general rotary path as well as being deflected upwardly and outwardly as will be later described. The present method and apparatus is also applicable to various other types of traveling cleaners which may or may not be equipped with a casing, such as casing 21, rotatable upon a lower casing, such as casing 20.

As best shown in FIGURE 6, lower casing 20 and upper casing 21 include respective bottom and top walls 26, 27 and 30, 31. An annular V-pulley or groove pulley 32, fixed to the lower surface of bottom wall 30 of casing 21, rides upon top wall 27 of lower casing 20 in concentric relation to impeller 22. In order to support casings 20, 21 on motor 35 and carriage 36, motor 35 is provided with a plurality of circularly arranged brackets 45 which extend outwardly and to the upper surfaces of which lower wall 26 of lower casing 20 is suitably secured.

Bottom wall 30 of upper casing 21 and top wall 27 of lower casing 20 are cut away so that these walls and annular pulley 32 collectively form an air opening 33 establishing communication between said lower and upper casings 20, 21, and through which the blades of impeller 22 loosely extend. Impeller 22 is fixed on a shaft 34 of an electric motor 35 supported upon a carriage 36. Carriage 36 serves as a gear box; having suitable gearing therein for driving one or more rollers 37, 38 journaled on opposite sides of carriage 36. Rollers 37, 38 ride upon tracks 41, 42 of a trackway 43.

Trackway 43 is suitably supported to extend above and parallel to rows of machines as shown in FIGURE 1. In this instance, three rows of such machines are shown indicated at *a, b, c* and the trackway is shown in the form of a double-ended trackway in FIGURE 1. Movement of the traveling cleaner, alternately in either direction along said trackway 43, may be effected by means substantially as disclosed in U.S. Patent No. 2,011,763, issued to W. B. Hodge et al. on August 20, 1935.

As heretofore stated, upper rotary casing 21 may be or may not be used in conjunction with the present invention, since the traveling cleaner disclosed herein is exemplary of many different types of traveling cleaners with which the present invention may be used. Upper casing 21 is fully disclosed in said copending application, Serial No. 772,935 and the means for driving the same will now be described.

Referring to FIGURES 2, 3, 5 and 7, it will be observed that pulley 32 is engaged by an endless belt 50 which also engages a relatively small pulley 51 fixed on a shaft 52 journaled in a bearing bracket 53 carried by duct 25. The lower end of shaft 52 has a bevel gear 54 fixed thereon which meshes with a bevel gear 55 fixed on one end of a shaft 56. Shaft 56 is connected to a shaft 57 by means of a universal joint 60 (FIGURE 5). The other end of shaft 57 also has a universal joint 61 thereon for connecting the same to a shaft 62 on which one of the carriage rollers 37 is secured. Thus, as carriage 36 moves along trackway 43, lower and upper casings 20, 21 are moved along therewith and upper casing 21 is rotated about a substantially vertical axis relative to lower casing 20.

Now, referring to FIGURE 5, it will be observed that ducts 24, 25 are each provided with an outwardly and downwardly curved outlet or throat portion 65 to which the upper end of an elongated sleeve or tube 66 is suitably communicatively connected. Each of the sleeves 66 is preferably made from a flexible material and is preferably of substantially the type disclosed in my said copending application, Serial No. 679,629. In this instance, the inner surface of each sleeve 66 is provided with a plurality of vertically spaced outlet openings or nozzles 67 and the lower end thereof is also provided with an outlet opening or nozzle 68.

The openings 67 are provided for directing currents of air against various parts of the textile machines, the machine in FIGURE 5 being shown in the form of a spinning frame. Opening 68 is provided for directing a current of air toward the floor upon which the machines in rows *a, b, c* are supported. In this instance, each downwardly curved portion or nozzle 65 of duct 24, 25 also has an additional tubular member 70 connected to one side thereof and extending downwardly therefrom, the lower portion thereof being extended inwardly at an angle and provided with an outlet opening 71 at its free end which is adapted, in this instance, to direct a current of air onto the back drafting rolls and adjacent elements of the spinning frame as shown in FIGURE 5.

From the foregoing, it is apparent that streams or currents of air discharged from lower casing 20 through the ducts 24, 25 and sleeves 66, 70 are of a design for efficiently removing lint and other light material from the rows of textile machines and adjacent surfaces as the traveling cleaner moves above the rows of machines *a, b, c* in FIGURE 1 and, at the same time, the rotary upper casing 21 directs a stream or current of air outwardly and upwardly from the traveling cleaner in a manner disclosed in said copending application, Serial No. 772,935 for removing lint and other light material from the ceiling, walls and overhead obstructions in the room in which the machines are disposed.

As hereofore stated, it is desirable that the downward flow of air from the traveling cleaner be interrupted during its travel over any idle machine or machines or over certain spare floor areas so that the currents of air will not agitate lint, dust and the like which may have accumulated on the floor between adjacent machines, or on various parts of an idle machine, and so the currents will not interfere with the operator or with anyone making repairs to a particular machine. It is apparent that such unnecessary agitation of lint and the like on idle textile machines and on the floors between adjacent machines might cause lint to rise and settle on adjacent machines and other surfaces and on the strands or other material being processed.

Deflector

Now, in order to prevent the discharge of air through outlet portion 65 of each duct 24, 25 without stopping rotation of impeller 22, I have provided means for interrupting and diverting the currents of air upwardly and outwardly from the ducts 24, 25 so the latter streams of air may contribute to the removal of lint and the like from walls, ceilings and overhead obstructions, this deflector means operating in conjunction with the rotary upper casing 21 when the traveling cleaner is equipped with a casing of this type.

To this end, it will be observed in FIGURES 2, 3, 4 and 5 that the throat formed by the curved outer portion of each duct 24, 25 is provided with a discharge opening 75 which is auxiliary to the discharge end of each duct and is normally closed by a hinged damper or deflector 76. Deflector 76 is shown in the form of a curved plate substantially corresponding to the curvature of the outer wall or upper wall 27 at said throat and disposed within the corresponding duct. Deflector 76 is of such width as to substantially seal each duct, against discharge of air into its sleeves 66, 70, when in the open position shown in solid lines in FIGURE 4. Deflector 76 is fixed to a

shaft 77 journaled in the side walls of the corresponding duct. The upper end of a crank 80 fixed to one outer end of shaft 77 has the free end of a link 81 pivotally connected to its lower end.

As best shown in FIGURE 2, links 81 extend inwardly from the respective cranks 80 and are universally or pivotally connected, as at 82, to outer arms of respective bell cranks 83. Bell cranks 83 are each oscillatably mounted on a corresponding one of the brackets 45, as best shown in FIGURES 2, 6, 8 and 9. As best shown in FIGURES 8 and 9, the arms of bell cranks 83 opposite from the respective links 82 are connected, by slot-and-pin connections indicated at 85, to opposite ends of a shifting element or rod 86 guided for substantially horizontal movement in arms 87 projecting outwardly from the adjacent brackets 45. Opposite ends of a dust shield 90 for a spring 92, are suitably secured to the outer ends of the arms 87.

A portion of shifter rod 86 between arms 87 is encircled by compression springs 92. One end of spring 92 bears against the right-hand arm 87 in FIGURES 8 and 9, and its other end bears against a cuff 93 fixed on rod 86. Cuff 93 is suitably secured to or formed integral with the upper portion of a substantially L-shaped follower carrier or arm 94 whose substantially horizontal portion has a pair of followers or rollers 96 journaled thereon and maintained in engagement with the periphery of a substantially symmetrical and eliptical cam 97 by compression spring 92.

Cam 97 is suitably secured to or formed integral with a rotatable actuating member or star wheel 100 which, along with cam 97, is rotatably mounted on a shaft 101. In this instance, shaft 101 is the shaft on which carriage roller 38 is mounted (FIGURE 6). The lower portion of follower arm 94 is provided with a substantially horizontal slot 102 loosely penetrated by shaft 101 for guiding follower arm 102 to maintain the same in the desired attitude relative to shifter rod 86. Arm 94 is retained on shaft 101 by a suitable collar 103 on the reduced free end of shaft 101.

Star wheel 100 is provided with a plurality of circularly arranged eccentric arms or abutments X–1 through X–8 adapted to engage control elements in the form of manually adjustable trip fingers 105 spaced along and carried by trackway 43. In this instance, one of the trip fingers 105 should be provided adjacent opposite ends of each machine in rows *a, b, c* (FIGURE 1) so as to operate the deflector shifting mechanism shown in FIGURES 8 and 9 to normally close deflectors 76 (FIGURES 2 and 3) as the traveling cleaner approaches each machine in each row *a, b, c,* and to open the deflectors 76 as the traveling cleaner leaves each machine, provided that all the machines in rows *a, b, c* are running.

Each trip finger 105 has a downwardly extending stem 106 thereon (FIGURES 6, 8 and 9) which is guided within a fixed tubular lower portion 107 of a bracket 110 suitably secured to and depending from the corresponding track 42 of trackway 43. The upper end of tubular portion 107 is provided with a recess 111 in which trip finger 105 may be positioned by manipulation of a handle or hand wheel 112, on the lower end of stem 106 for maintaining the same in active position.

It is apparent that, when any of the trip fingers 105 are not to be used, they may be turned to inactive position, by manipulation of the corresponding hand wheel 112, so as to extend parallel to trackway 43 and out of the path of travel of star wheel 100. Thus, deflectors 76 (FIGURES 2, 3 and 4) will remain in opened or closed position, as the case may be, as the blower moves past the corresponding inactive trip finger 105. On the other hand, when the trip fingers are turned outwardly, as shown in FIGURES 6, 8 and 9, it is apparent that a corresponding arm on star wheel 100 will engage trip finger 105 to cause star wheel 100 to rotate one-fourth of a revolution in either direction, depending upon the direction of movement of the traveling cleaner along trackway 43.

Method of operation

In FIGURES 2, 3, 4, 5, 6, 8 and 9, the parts of the shifting mechanism are shown in the position occupied thereby when the air deflectors 76 occupy open position with respect to opening 75 in each duct 24, 25; that is, each deflector 76 occupies lowered position so the air flowing through the ducts 24, 25 is deflected upwardly through the corresponding opening 75. This would ordinarily be the position occupied by the deflectors 76 as the traveling cleaner passes over wide alleys between adjacent machines in each row *a, b, c* (FIGURE 1) or as it passes around a bend in the trackway 43 as shown in the left-hand portion of FIGURE 1.

Assuming, therefore, that the traveling cleaner is moving along trackway 43 between adjacent machines in rows *a, b, c,* it is apparent that, as corresponding arms on star wheel 100 (FIGURE 8) engage alternate active trip fingers 105 in advance of each machine, regardless of the direction of movement of the traveling cleaner, a quarter-revolution is imparted to star wheel 100 and cam 97 to move high point of cam 97 into engagement with followers 96, thus shifting shifter rod 86 to the right in FIGURES 8 and 9 or toward the bottom of the drawing in FIGURE 2. In so doing, the links 81 are moved inwardly toward the central portion of lower casing 20 to thereby raise deflectors 76 to close the respective openings 75 and to thus permit the stream of air produced by impeller 22 to flow through ducts 24, 25 and downwardly through outlet portions 65 and sleeves 66, 67 to be discharged in the form of multiple streams or currents through ports or nozzles 67, 68, 71 to thereby impinge upon various elements of the machines and the floor past which the traveling cleaner is moving.

As corresponding arms on star wheel 100 (FIGURE 8) engage intervening active control elements or trip fingers 105, immediately succeeding each machine in each row *a, b, c,* a quarter-revolution is imparted to star wheel 100 (FIGURE 8) to return the elements of the shifting mechanism to the positions shown in FIGURES 2, 4, 6, 8 and 9. In so doing, a corresponding low surface of cam 97 moves into engagement with followers 96 and spring 92 moves cuff 93 and follower arm 94 from right to left along with shifter rod 86.

By referring to FIGURES 2 and 9, it is apparent that this causes links 81 to move outwardly with respect to the central portion of lower casing 20 to move deflectors 76 downwardly to open position. In so doing, it will be observed in FIGURE 4 that the currents of air then pass upwardly and outwardly from ducts 24, 25 through openings 75 and are thus deflected upwardly and outwardly from the traveling cleaner, since each deflector 76 then occupies the solid-line position shown in FIGURE 4 and prevents the flow of air into and through the corresponding sleeves 66, 70.

If it is desired that each deflector 76 remains open as the traveling cleaner moves from adjacent the trailing end of one machine, past the next succeeding idle machine and/or additional idle machines and to a succeeding operating machine, the operator merely turns trip elements 105 disposed at opposite ends in any idle machine so they occupy positions substantially parallel to the trackway 43. Assuming, for example, that machine *a–2* in row *a* of FIGURE 1 is idle, the trip fingers 105 adjacent opposite ends thereof would be turned inwardly and, as the traveling cleaner moves away from machine *a–1* in a right to left movement in FIGURE 1, the trip finger 105 adjacent the left-hand end of machine *a–1* would actuate the shifting mechanism to shift the deflectors 76 to open position so as to divert the currents of air upwardly from the traveling cleaner. The deflectors then remain in this position throughout movement of the traveling cleaner across the aisle between machines

a–1, a–2, during its movement throughout the length of machine a–2, and during its movement across the aisle between machines a–2, a–3. Of course, upon star wheel 100 contacting control finger 105 adjacent the right-hand end of machine a–3, another step in rotation would be imparted thereto to raise deflector elements 76 to closed position as shown in broken lines in FIGURE 4, thus permitting currents of air to impinge upon the various elements of machine a–3 and upon the floor adjacent machine a–3.

It is thus seen that I have provided a traveling cleaner having a novel deflector means for diverting upwardly or outwardly currents of air which normally flow downwardly from the blower thereof and including means for controlling the deflecting means so as to direct currents of air downwardly as the traveling cleaner passes over any operating machine and for directing the currents of air upwardly and outwardly with respect to the traveling cleaner as the traveling cleaner passes between adjacent machines, between adjacent rows of the machines, or over any idle machine or machines.

In the drawings and specification there have been set forth preferred embodiments 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. In a traveling cleaner apparatus adapted to move along a track above a row of textile machines, said traveling cleaner apparatus including a casing movable along said track, a fan in said casing, at least one outwardly extending duct on said casing having a downwardly extending outlet portion for discharging air from said fan, said duct having at least one opening in a medial portion thereof, a deflector pivotally mounted within said duct adjacent said opening, said deflector being movable between first and second positions, said deflector serving to close said opening while in said first position so that air passes through the outlet portion, and while in said second position, said deflector serving to open said opening while closing the duct to the passage of air therethrough beyond said opening whereby the air is deflected outwardly through said opening from said fan, means for moving said deflector from either of said positions to the other including a crank movable in fixed relation to said deflector and disposed exteriorly of said duct, a rotatable member movable with said casing and having a plurality of circularly spaced abutments thereon, a cam rotatable with and in fixed relation to said rotatable member, a follower carrier, follower means on said carrier engaging said cam, a shifter rod connected to said follower carrier, linkage connecting said shifter rod with said crank, a plurality of control elements spaced along said track, each control element comprising a trip finger adjustably supported by said track for movement into and out of the path of travel of corresponding abutments on said rotatable member whereby a step in rotation is imparted to said rotatable member and said cam with movement of said casing past each successive trip finger in the path of said rotatable member, alternate movements of said rotatable member and cam serving to move said shifter rod in one direction and to move said deflector from said first to said second position, and intervening movements of said rotatable member and said cam serving to shift said shifter rod in the opposite direction to move said deflector from said second position to said first position.

2. In a traveling cleaner apparatus adapted to move along a track above a row of textile machines, said traveling cleaner apparatus including a casing movable along said track, a fan in said casing, outwardly extending duct means on said casing having outwardly and downwardly curved outlet means for discharging air from said fan, said duct means having at least one opening in the curved outlet means thereof, a deflector pivotally mounted within said duct, adjacent said opening and remote from the casing, said deflector being movable between first and second positions, said deflector serving to close said opening while in said first position so that air passes through the outlet means, and while in said second position, said deflector serving to open said opening while closing the duct means to the passage of air therethrough beyond said opening whereby air is deflected outwardly through said opening from said fan, means for moving said deflector from either of said positions to the other including a crank movable in fixed relation to said deflector and disposed exteriorly of said duct, a rotatable member movable with said casing and having a plurality of circularly spaced abutments thereon, a cam rotatable with and in fixed relation to said rotatable member, a follower carrier, follower means on said carrier engaging said cam, a shifter rod fixed to said follower carrier, linkage connecting said shifter rod with said crank, a plurality of control elements spaced along said track, each control element comprising a trip finger adjustably supported by said track for movement into and out of the path of travel of corresponding abutments on said rotatable member whereby a step in rotation is imparted to said rotatable member and said cam with movement of said casing past each successive trip finger in the path of said rotatable member, alternate movements of said rotatable member and cam serving to move said shifter rod in one direction and to move said deflector from said first to said second position, and intervening movements of said rotatable member and said cam serving to shift said shifter rod in the opposite direction to move said deflector from said second position to said first position.

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