April 8, 1969 R. L. BLACK, JR 3,437,520

METHOD FOR COLLECTING FIBER WASTE IN TEXTILE MILLS

Original Filed April 24, 1961 Sheet 1 of 4

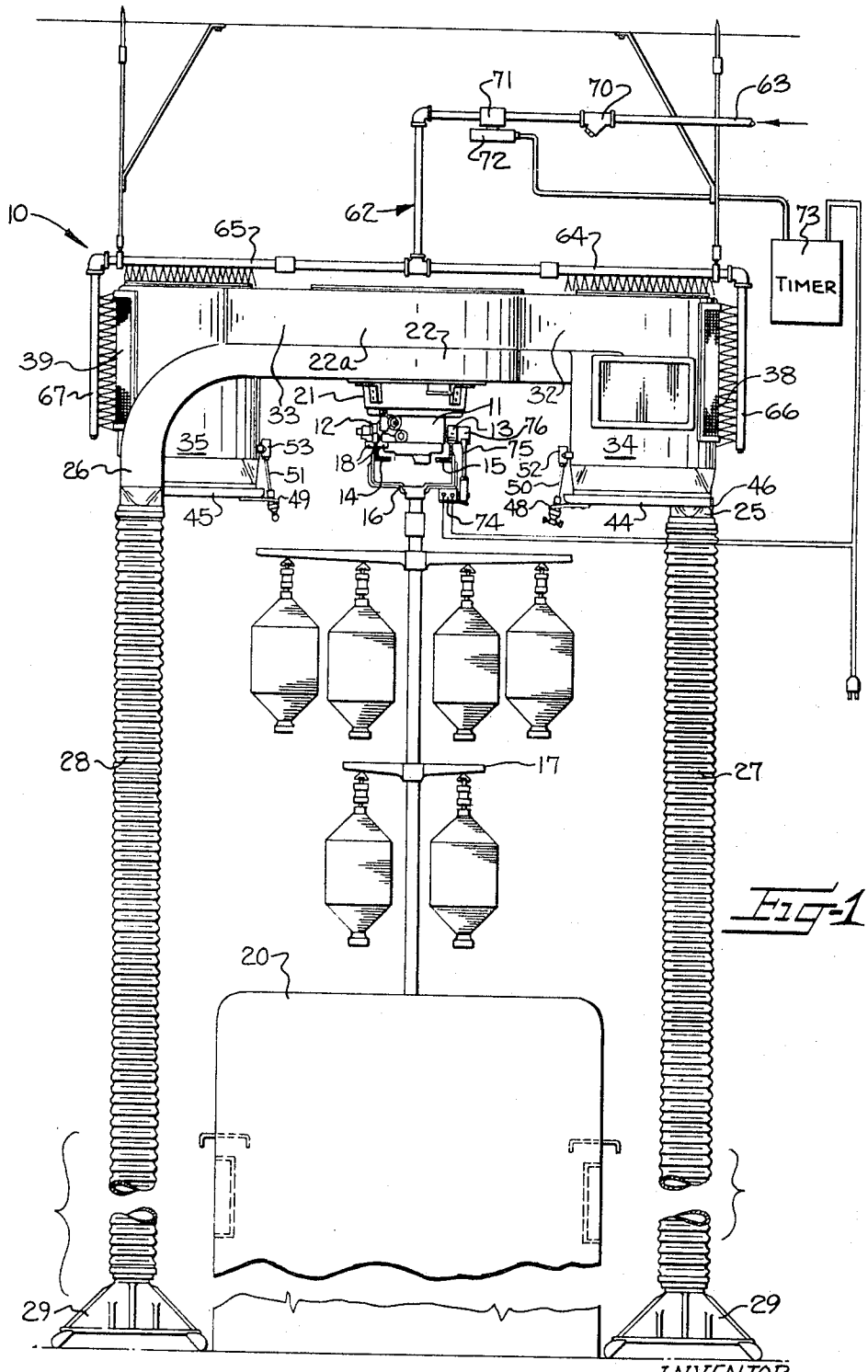



Fig-1

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METHOD FOR COLLECTING FIBER WASTE IN TEXTILE MILLS

Original Filed April 24, 1961 Sheet 2 of 4

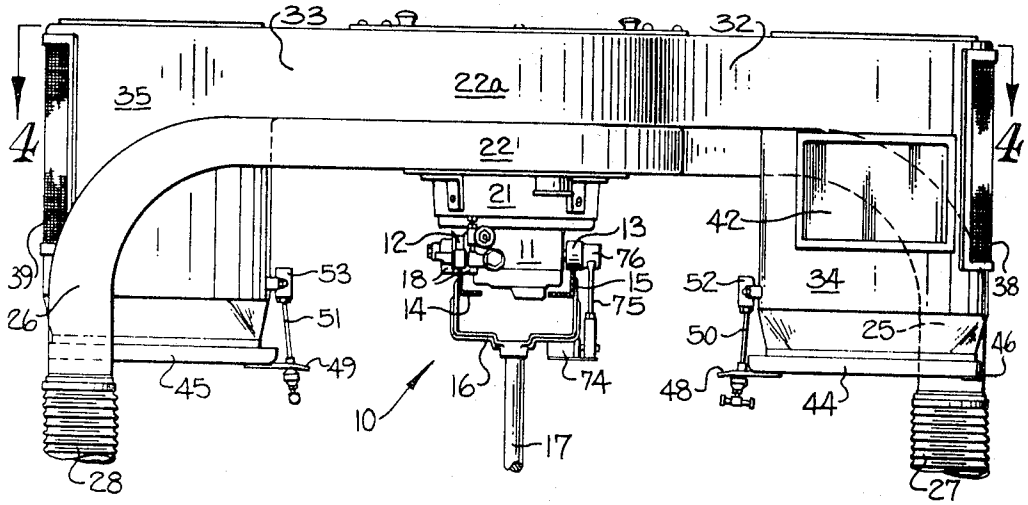



Fig-2

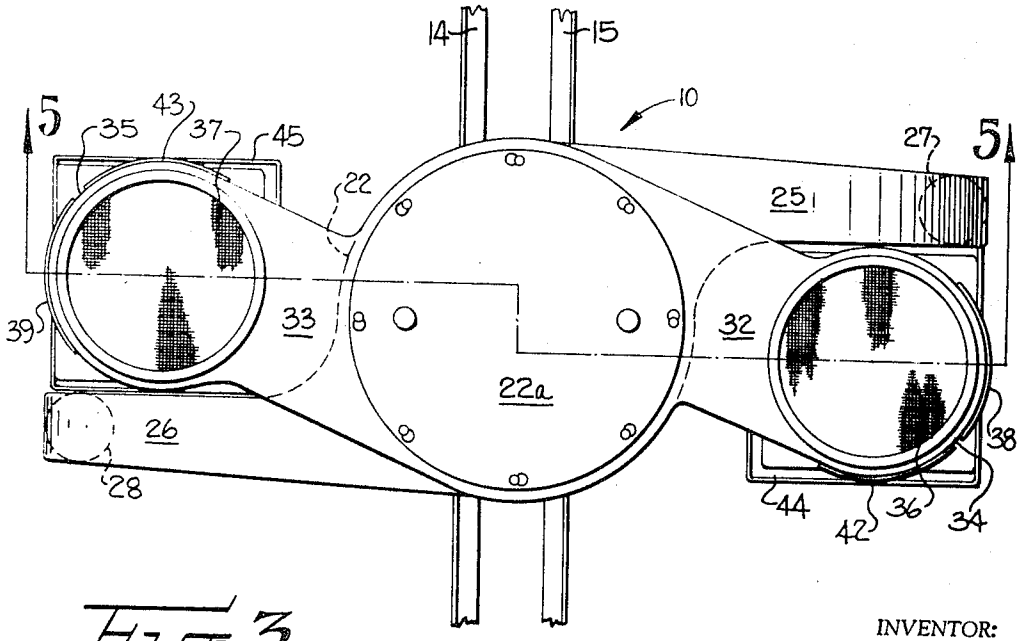



Fig-3

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METHOD FOR COLLECTING FIBER WASTE IN TEXTILE MILLS

Original Filed April 24, 1961 Sheet 3 of 4

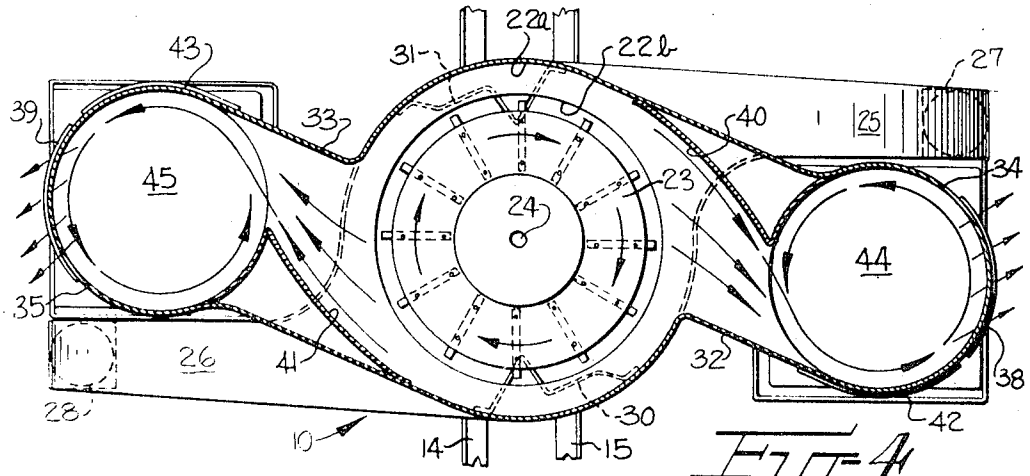



Fig-4

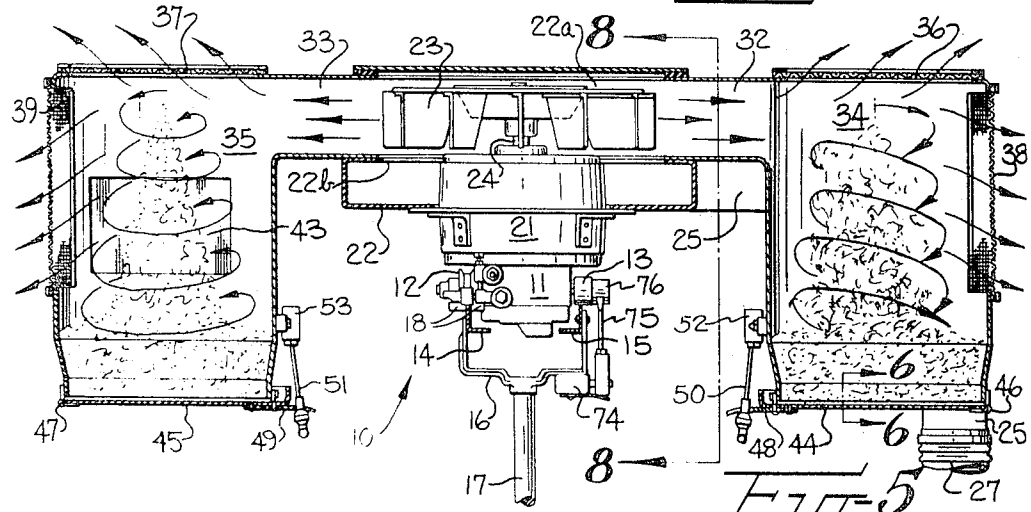



Fig-5

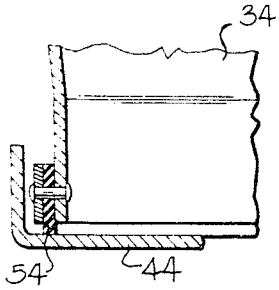



Fig-6

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April 8, 1969 R. L. BLACK, JR 3,437,520

METHOD FOR COLLECTING FIBER WASTE IN TEXTILE MILLS

Original Filed April 24, 1961 Sheet 4 of 4

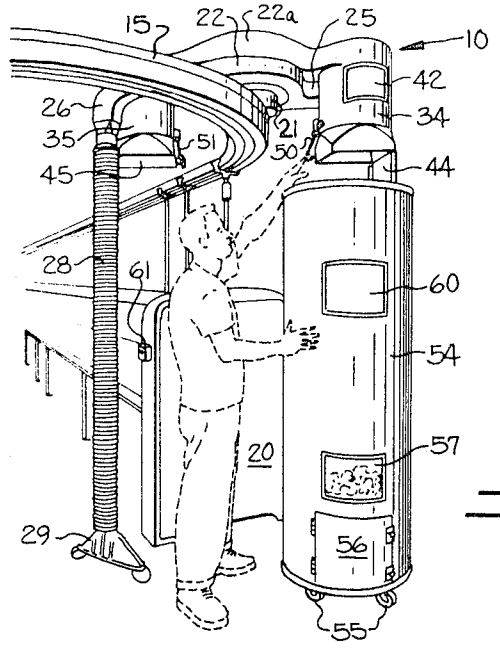



Fig-7

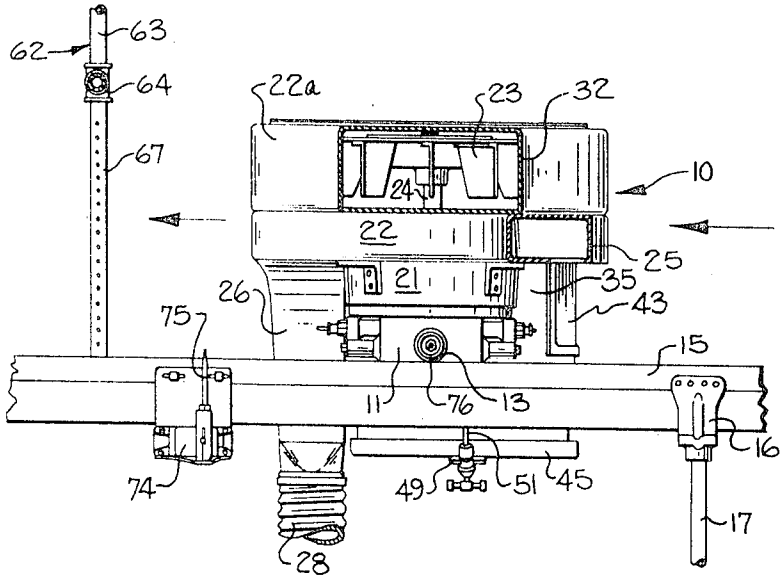



Fig-8

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Patented Apr. 8, 1969



3,437,520

# METHOD FOR COLLECTING FIBER WASTE IN TEXTILE MILLS

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Original application Apr. 24, 1961, Ser. No. 105,073, now Patent No. 3,188,680, dated June 15, 1965. Divided and this application Feb. 23, 1965, Ser. No. 434,316
The portion of the term of the patent subsequent to June 15, 1982, has been disclaimed
Int. Cl. A47l 7/00; B08b 5/04
U.S. Cl. 134—21 5 Claims

## ABSTRACT OF THE DISCLOSURE

This invention relates to a traveling suction cleaner for removing fiber waste accumulating on the floor of textile mills during the production of such waste by textile machines. The fiber waste laden air is directed into a receptacle on the traveling cleaner in such a way as to move in a generally helical path creating a low pressure area in the center of the chamber for collecting and storing the fiber waste in such a way as to prevent undue restriction of the air flow and to maintain the suction air velocity and volume at an adequate level to pick up and convey fiber waste from the floor. The collection chamber may be emptied after reasonable periods of time.

This invention relates to a method for removing fiber waste such as lint, dust and other light material from floors in textile mills. More particularly, this invention relates to an improved method for collecting material drawn into a traveling suction cleaning apparatus.

This application is a division of my copending application Ser. No. 105,073, filed Apr. 24, 1961, now Patent No. 3,188,680 issued June 15, 1965, and entitled Traveling Suction Cleaner for Textile Mills.

Heretofore, in a preferred method of collecting fiber waste, lint and other light material produced by operating machines in textile mills, a type of traveling suction cleaner has been utilized which was in the form of an overhead, track mounted, suction blower having a volute casing, to the inlet or inlets of which one or more suction ducts were connected, with an at least partially foraminate lint collection chamber connected to the outlet thereof. The free ends or nozzles of the suction ducts moved closely adjacent floor surfaces to be cleaned, and would suck lint and other light material thereinto and convey the same through the casing and into the chamber. Means were provided for automatically opening the chamber at predetermined intervals to discharge the collected material into a corresponding receptacle located adjacent the path of travel of the chamber. Such a receptacle was usually connected to a suction duct for conveying the material received therein to a point remote from the textile machines. Due to the fact that the collection chamber was automatically emptied quite frequently, the chamber needed be of only relatively small capacity.

The aforementioned type of traveling suction cleaner is very economical in many textile plants in view of its efficiency in automatically collecting and disposing of residual lint and other light material which usually accumulate on the floor and upon various parts of textile machines and upon the material being processed. However, some textile plants have a relatively small number of textile machines, so that the savings to be realized from fully automatic disposal of collected lint are less pronounced than in a plant containing a much larger number of machines. There is a need, therefore, for a method of collecting and storing large quantities of lint and other



light material sucked from floor surfaces to be cleaned into a high capacity collection chamber or receptacle without obstructing the flow of air through the receptacle which method is readily applicable to traveling suction cleaners of the character described, and wherein the collected material may be removed from the receptacle and disposed of manually at relatively infrequent intervals. In view of the space limitations in textile mills, it is important that such a method may be effected by use of a device constructed in a compact manner without materially increasing the overall height or width of the suction cleaning apparatus, but at the same time keeping the entire waste collection chamber above head height. Also, it is important that such a method may be practiced without unduly restricting the flow of air into suction nozzles of the cleaning apparatus and through the receptacle, that is, the volume and velocity of the suction air stream must be maintained at a level adequate to pick up and convey fiber waste effectively.

It is therefore an object of this invention to provide a method of collecting and storing lint and other light material in a receptacle, into which the material is conveyed from one or more suction nozzles by an air stream, without unduly restricting the flow of air into the nozzles, the method including causing the air stream to move in a helical path about a substantially vertical axis to the receptacle and closely adjacent the surface of a filter forming part of the wall of the receptacle to prevent the filter from clogging up with lint as air is exhausted therethrough, and utilizing the movement of air in said helical path while the air is exhausting to create a low pressure area in the central portion of the receptacle and thereby to cause the material to collect in the central portion of the receptacle.

It is another object of this invention to provide a method of removing and collecting fiber waste and other light material from the floor and/or other surfaces to be cleaned in a textile room having textile machines therein, which method comprises the steps of producing and applying a suction zone to the surface to be cleaned, entraining fiber waste and the like picked up by the suction in an air stream, directing the air stream laden with fiber waste and other material into a substantially vertically disposed internally unobstructed cylindrical receptacle having a cylindrical wall with a filter therein, creating a low pressure area in the central portion of the receptacle by directing the air stream into the receptacle against the inner surface of and in a path tangent to the cylindrical wall of the receptacle to cause the air to move in a helical path and thereby prevent the filter from clogging with fiber waste while collecting the fiber waste and other material in said central portion, and while exhausting air from the receptacle through the filter to prevent restricting the flow of the air stream.

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 an end elevation of a preferred embodiment of a traveling suction cleaner equipped for effecting the method of the present invention with parts in section and with portions shown schematically;

FIGURE 2 is an enlarged elevation of the upper portion of the apparatus shown in FIGURE 1 with portions broken away and removed for clarity;

FIGURE 3 is a top plan view of the apparatus shown in FIGURE 2;

FIGURE 4 is a sectional plan view taken substantially along line 4—4 in FIGURE 2;

FIGURE 5 is a transverse vertical section taken substantially along line 5—5 in FIGURE 3;

FIGURE 6 is an enlarged fragmentary detail taken substantially along line **6—6** in FIGURE 5;

FIGURE 7 is a perspective view of the apparatus of the present invention showing one manner in which the collection chambers may be emptied of collected material; and

FIGURE 8 is a sectional elevational view taken substantially along line **8—8** of FIGURE 5 with portions broken away.

Referring now to the drawings and more particularly to FIGURES 1, 2 5 and 8, the apparatus for carrying out the method of this invention is generally indicated at **10** and comprises a carriage **11**. Carriage **11** has suitable driven wheels **12** on one side and an idler wheel **13** on the other side which support carriage **11** on suitable tracks **14, 15**. A set of wheels **18** are provided for holding carriage **11** on tracks **14** and **15**. Tracks **14, 15** are mounted on suitable brackets **16**, only one of which is shown, which are supported on the floor or by a creel **17** mounted on a textile machine **20** over which the tracks **14, 15** extend. The machine **20** represents a row of textile machines in this instance.

A suction blower unit is mounted on carriage **11** and includes a suitable motor **21** fixed on carriage **11**. Motor **21** is provided with suitable connections disposed within carriage **11** for driving wheels **12** to move carriage **11** over tracks **14, 15**. A suction casing **22** is suitably mounted on motor **21** and has a volute blower casing **22***a* mounted thereon. Suction casing **22** has a pair of opposed inlet ducts **25, 26** (FIGURES 1 and 2) communicatively connected thereto.

A fan **23** (FIGURE 5) is mounted on a shaft **24** for rotation therewith within casing **22***a*. Shaft **24** is the output shaft of motor **21** or is operatively connected thereto for rotating fan **23**. A pair of ducts **25, 26** extend outwardly from casing **22** and are curved downwardly at their outer ends toward the surfaces to be cleaned. A pair of flexible ducts or tubes **27, 28** (FIGURE 1) are mounted on ducts **25, 26** respectively, and extend downwardly therefrom.

Tubes **27, 28** terminate terminate in suitable nozzles **29** which move in close proximity to the surfaces to be cleaned, which in this case is shown to be the floor of a textile manufacturing plant or the like. Suction casing **22** communicates with blower casing **22***a* through a substantially circular opening **22***b* formed in the proximal walls thereof and encircling the upper portion of motor **21**. A pair of substantially diametrically opposed baffles **30, 31** (FIGURE 4) are mounted in suction casing **22** adjacent opening **22***b* and serve to direct the air stream and lint drawn therethrough inwardly toward motor **21** so that the same may be drawn upwardly into blower casing **22***a*.

A pair of outlet ducts **32, 33** (FIGURE 4) are connected to casing **22***a* and extend outwardly therefrom. A pair of substantially cylindrical, upright collection chambers **34, 35** are mounted on the outer ends of ducts **32, 33**, respectively, and communicate with casing **22***a* therethrough. Fan **23** creates a suction in casing **22** and inlet ducts **25** and **26** as the same rotates and draws a stream of air laden with dust, lint and other light material through the nozzles **29**, tubes **27, 28**, ducts **25, 26**, casing **22** and opening **22***b* into blower casing **22***a*. Fan **23** discharges the air stream and material carried thereby outwardly through outlet ducts **32, 33** into collection chambers or receptacles **34, 35**.

Each of the collection chambers **34, 35** has an opening in the top thereof and an opening in the outer side thereof opposite the corresponding outlet ducts **32, 33**. Foraminous screen members or filters **36, 37** (FIGURE 5) are mounted in the openings in the tops of collection chambers **34, 35**, respectively. Foraminous screen members or filters **38, 39** may be mounted in the openings in the outer sides of collection chambers **34, 35**, respectively, opposite the corresponding outlet ducts **32, 33** to allow the air stream to escape from the collection chambers while



retaining the lint and other light material therein. Transparent members **42, 43** may be mounted in other openings in the sides of collection chambers **34, 35**, respectively, to allow the operator of the apparatus to visually monitor the amount of material collected in the collection chamber.

Collection chambers **34, 35** are of generally circular cross-section (FIGURE 4) at least in the area where the outlet ducts **32, 33** communicate therewith for reasons to be presently described. A pair of baffles or air deflectors **40, 41** are mounted in outlet ducts **32, 33**, respectively, adjacent the respective collection chambers **34, 35** and serve to channel or direct an air stream into each circular collection chamber in a direction offset laterally with respect to the substantially vertical axis of the chamber, or in other words in a substantially tangential manner as shown by the arrows in FIGURE 4.

The air stream is directed into each collection chamber in such a manner that it impinges on the adjacent curved inside surface of the cylindrical wall thereof and is directed thereby in a circular or helical path around the inside of the curved wall of each collection chamber. The curved path of the air stream within each collection chamber causes a cylonic effect or an area of reduced pressure in the central portion of each collection chamber which causes the material carried by the air stream to move into the central portion of the collection chamber where the same is collected. The collection of the fiber waste and other material in the central portion of the collection chambers largely keeps the same away from the foraminous screens **38, 39** in the sides of the collection chambers. In addition, the air stream travels across foraminous screen members **38, 39** in a path perpendicular to the openings therethrough or parallel to the inside surface of the screens **38, 39** so as to perform a wiping operation on the inside surface of the screens which also serves to keep lint and other material from collecting thereon and aids in the removal of any lint or other material which may have collected thereon previously. Thus, the filters **38, 39** will not unduly obstruct the flow of air into the suction nozzles **29** and through tubes **27, 28**.

Collection chambers **34, 35** may each be of substantially rectangular shape at the bottom portion thereof. The bottom of each chamber **34, 35** is open, thus forming a substantially rectangular discharge opening for removal of the collected material from each of the collection chambers. Doors **44, 45** (FIGURE 5) are respectively mounted on the bottom portions of collection chambers **34, 35** by suitable hinges **46, 47** for pivotal movement to selectively open and close the discharge openings in the collection chambers. Brackets **48, 49** are respectively mounted on doors **44, 45** and have slots formed therein. Latch members **50, 51** are pivotally mounted on the sides of collection chambers **34, 35**, respectively, by mounting brackets **52, 53**. Latches **50, 51** are manually movable into the slots formed in brackets **48** and **49** to latch doors **44** and **45** in position to close the discharge openings. A sealing member **54** (FIGURE 6) is mounted on each of the doors **44, 45** to seal the discharge openings against the passage of air therethrough when the doors **44, 45** are latched in closed position.

Removal of lint and the like from a collection chamber is easily accomplished after the unit has been stopped at some convenient point along its trackway and a receptacle such as **54** shown in FIGURE 7 is placed under the discharge opening. To open the discharge opening in either of the collection chamber **34** or **35**, the corresponding latch **50, 51** is manually removed from the slot in the corresponding bracket **48, 49** and the corresponding door **44, 45** is allowed to swing downwardly about its hinge **46, 47**. The collected material in the collection chambers **34, 35** will then fall by gravity therefrom into the receptacle. Receptacle **54** may be mounted on suitable wheels or casters **55** which render the receptacle portable for easy handling and positioning under collection chambers **34,**

35. A door 56 is mounted in a suitable opening in the bottom portion of receptacle 54 for removal of the material therefrom. A pair of transparent members 57, 60 are mounted in vertically spaced openings in the side of receptacle 54 for visual monitoring of the level of material therein. A suitable switch 61 (FIGURE 7) is mounted adjacent one end of textile machine 20 for stopping the traveling suction cleaning apparatus in position so that receptacle 54 may be moved beneath either of the collection chambers 34 and 35 for emptying the collected material therefrom.

At spaced points along tracks 14, 15, as desired, a filter cleaning device generally indicated at 62 (FIGURES 1 and 8) may be mounted adjacent the tracks for directing high velocity air currents inwardly through foraminous screen members 36, 37, 38 and 39 for aiding in the cleaning of the inside surfaces of the screens of any accumulation of lint and the like. Screen cleaning device 62 comprises an air supply pipe 63 communicating with any suitable source under pressure such as a compressor (not shown). A pair of pipes 64, 65 are connected at one end to air supply pipe 63 and extend outwardly therefrom to a position overlying collection chambers 34, 35 as the same move past said point on tracks 14 and 15. Pipes 64, 65 have openings formed in the bottom thereof in the area immediately overlying the path of travel of foraminous screen members 36, 37 for delivering currents of air downwardly against and through the screens. A pair of pipes 66, 67 are connected at one end to pipes 64, 65, respectively, at a point outwardly of the collection chambers and extend downwardly therefrom to positions spaced outwardly of and parallel to foraminous screen members 38, 39. Pipes 66, 67 have openings therein in the side facing the screens and in the area thereof opposite from the screens for delivering currents of air inwardly against and through screen members 38, 39.

Air supply pipe 63 has an air strainer 70 mounted therein for removing any impurities from the air passing therethrough and a two-way valve 71 mounted therein for controlling the flow of air therethrough. Valve 71 is opened and closed by a solenoid 72, the valve being opened when solenoid 72 is energized and closed when solenoid 72 is de-energized.

An electric control box 73 is suitably connected to solenoid 72 for energizing the same. Control box 73 has timing means (not shown) for maintaining solenoid 72 energized for a predetermined length of time after initial energization. Since such timing means are well known, an illustration and description thereof is deemed unnecessary. Such a timing means is shown in FIGURE 18 of U.S. Patent No. 2,751,621, for example. A switch 74 is suitably connected to control box 73 for initially energizing the same which, in turn, energizes solenoid 72 to open valve 71.

Switch 74 is mounted on one of the brackets 16 on the side adjacent track 15 a distance rearwardly of pipes 64, 65, 66 and 67, relative to the direction of travel of said apparatus, not less than one-half the horizontal dimension of screen members 38, 39 and preferably a distance exceeding this dimension. The spacing of switch 74 rearwardly of pipes 64–67 in combination with the timing means which maintains solenoid 72 energized for a length of time not less than the time required for the apparatus to travel along tracks 14 and 15 a distance equal to the horizontal dimension of screens 38, 39, insures that the entire surface of each screen 36–39 is subject to currents of air.

Switch 74 has a feeler arm 75 mounted thereon and extending upwardly therefrom to a point spaced above and outwardly from tack 15. An extension 76 is mounted on the side of wheel 13 and extends substantially horizontally outwardly therefrom. Extension 76 engages feeler arm 75 which closes switch 74 as the same moves along with the apparatus.

In carrying out the method of the present invention,



traveling suction cleaning apparatus 10 travels over textile machines 20 and removes lint, fiber waste such as dust and other light material from the floor of the room. Fan 23 is rotated by motor 21 drawing an air stream laden with the fiber waste and other light material up through inlet ducts 25, 26 into casing 22*a*. The fiber waste and other material is discharged from casing 22*a* by fan 23 and moves outwardly through outlet ducts 32, 33 into collection chambers 34, 35.

Baffles 40, 41 direct the air stream into collection chambers 34, 35 in such a manner that the air currents within the collection chambers assume a circular path, as aforementioned, causing the fiber waste and other material to collect in the central portion of the collection chambers away from foraminous screens 38 and 39 such that the screens are kept substantially free from fiber waste and other material which otherwise could clog the same and interfere with the discharge of the air stream from the collection chambers. Also, the circular path of each air current which is parallel to the inside surface of the screens has a tendency to wipe or blow any collected material therefrom and carry it around until it falls to the lower portion or is drawn into the central portion of the corresponding collection chamber. The air currents within the collection chambers escape outwardly and upwardly through screens 36, 37, 38 and 39 leaving the fiber waste and other material within the collection chambers.

The operator of textile machines 20 may visually monitor the amount of material collected in collection chambers 34, 35 through transparent members 42, 43. When enough material has collected within a collection chamber, the operator stops apparatus 10 by means of switch 61, moves receptacle 54 into position and opens doors 44 or 45.

As the suction cleaner travels over tracks 14, 15, the extension 76 on wheel 13 engages the feeler arm 75 of switch 74 to close the same. Switch 74 actuates the electric control box 73 which energizes solenoid 72 to open valve 71. When valve 71 opens, air flows through the air supply pipe 63 into pipes 64, 65, 66, 67 and outwardly through the openings therein against and through screens 36, 37, 38, 39 to remove any lint and other material which may have collected on the inside surfaces of the screens.

It will therefore be seen that a novel method of collecting fiber waste and other light material is provided which is carried out by an improved substantially cylindrical collection chamber which is connected to the corresponding air duct in such a manner as to cause the fiber waste laden air to enter the chamber in a direction toward a point laterally spaced from the vertical axis of the chamber so the air initially impinges against the curved wall of the chamber and is forced to flow in a circuitous or helical manner which creates a low pressure area centrally of the chamber and causes the fiber waste to collect thereat in the form of a mass which gradually falls toward the bottom of the chamber. The collected fiber waste may be stored for a reasonable period of time without adversely affecting the suction pickup volume and velocity. Further, the air stream directed into each chamber aids in keeping the screens clear of fiber waste and other material. Also, the method may include periodically directing air currents inwardly through the screens to assist in the removal of any lint and other material which may collect on the inside of the screens.

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 method of removing fiber waste which tends to accumulate on the floor of a room having a plurality of textile macines therein, collecting and storing said fiber waste,

which comprises producing a suction current of air of sufficient volume and velocity to pick up and convey fiber waste, causing said suction air current to travel in a predetermined path closely adjacent the floor alongside said machines, utilizing said suction air current for picking up and conveying fiber waste upwardly from the floor, directing the waste-laden air stream into the upper portion of a receptacle traveling with the suction current and closed to the escape of said fiber waste and having a filtered air exhaust in the top portion thereof, creating a low pressure area in the center portion of the receptacle by causing the air stream to move in a generally helical path within the receptacle, collecting the fiber waste in the central portion of said receptacle while exhausting the air stream from the receptacle and storing collected waste in the receptacle for a period of time covering a plurality of traverses of the traveling cleaner while maintaining the suction air stream at a sufficient volume and velocity to pick up and convey fiber waste from the floor.

2. A method according to claim 1 wherein a fan is used to produce the suction current of air and the fiber waste laden air current is passed through the fan before it is directed into the collecting and storage receptacle.

3. A method according to claim 1 wherein the helical movement of the air stream within the receptacle is such as to wipe the interior surface of a filter in the wall of the



receptacle to further maintain the same in an unclogged condition.

4. A method according to claim 3 wherein periodically compressed air is directed inwardly against the outside surface of the filter in the wall of the receptacle to dislodge from its inner face any fiber waste adhering thereto.

5. A method according to claim 2 wherein the helical movement of the air stream within the receptacle is such as to wipe the interior surface of a filter in the wall of the receptacle to further maintain the same in an unclogged condition.

**References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 1,035,822 | 8/1912 | Green | 55—484 |
| 3,053,700 | 9/1962 | Kulp | 134—21 X |
| 3,061,098 | 10/1962 | Brezinski. | |
| 3,086,891 | 4/1963 | McEachern. | |


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U.S. Cl. X.R.

15—306, 312; 55—337; 134—37