ABSTRACT OF THE DISCLOSURE

Method and means for cleaning the floors of textile mills or the like, having traveling overhead blowers with ducts extending from the blower to the mill floor to direct an airstream over the floor with a blocking barrier mounted in the airstream path, and a suction duct movable over the barrier to remove foreign matter therefrom.

This invention relates to the art of floor cleaning, more particularly to improved means for pneumatically cleaning the floors of textile mill areas containing textile producing and processing machinery such as spinning machines and the like.

A variety of pneumatic cleaning equipment has been evolved to implement the removal of foreign matter such as is normally produced and thrown into the atmosphere in a textile mill. This cleaning equipment takes the form of different types of blowing and suction devices positioned at various points in the mill to effect desired removal of the foreign matter.

In the utilization of pneumatic cleaning equipment, problems are engendered in that the necessary cleaning airstreams must act to remove the foreign matter, and not to further entrain it in the ambient atmosphere in the mill. Additionally, presently utilized cleaning equipment presents problems arising from the formation of whirlpools or eddy pockets in which foreign matter is entrained without being removed from the mill area.

These problems are seen in connection with presently employed cleaning equipment utilizing a travelling blower or positioned for movement adjacent the machinery to be cleaned. Suction and blow ducts are extended from a fan housing, and appropriate nozzles formed in the ducts to effect blowing and suction at desired points on the equipment. One of the most successful of such arrangements is to date has utilized a blow duct positioned for movement over one side of the machine, and a suction duct on the opposite side of the machine, so that the material to be cleaned which is entrained in the discharge from the blow duct is picked up by the suction duct. This arrangement serves to effect cleaning of the area beneath any given row of machines over which the cleaner travels. However, the floor area between adjacent rows of machines is not cleaned. Attempts to rectify this problem by increasing the suction power of the suction duct so that it will also entrain foreign matter from the aisle does not prove satisfactory in that the size of the necessary fan equipment becomes economically and mechanically prohibitive. Additionally since the travelling cleaners on adjacent rows do not move in unison, a variety of disturbing air currents is produced when the overhead cleaners of adjacent rows of machinery move past each other. In an attempt to obviate this problem, it has been proposed to provide a corporation of the overhead cleaners of adjacent rows of machinery in a mill area with blowers which have discharge orifices all facing in one direction so that a cleaning airstream is produced which is intended to sweep over the entire floor area. A trough is arranged at the far side of the last machine in the area extending along the line of the machines so that the material blown by the cleaning airstreams is collected in this trough. Periodically a blow-stream is established in the trough moving along the axis of the trough to discharge the material collected in the trough to a collecting point at the end thereof. Such arrangements have not proven entirely satisfactory due to the fact that the blowing action produces turbulence tending to redirect the collecting foreign material into the mill atmosphere, and additionally the arrangement becomes relatively expensive due to the complexity of the trough and blower equipment for cleaning the trough.

It is with the above problems and considerations in mind that the present means including both method and apparatus have been evolved. The novel means permits the effective cleaning of the entire floor area of a textile mill, both beneath a row of machines, and between adjacent rows of machines, with minimal turbulence thus preventing foreign matter from being thrown up from the floor into the ambient atmosphere, and minimal formulation of whirlpools. Additionally the complexity and hence cost of the novel equipment is of a relatively low order.

It is accordingly among the primary objects of the invention to provide improved pneumatic floor cleaning means particularly adapted for use in cleaning the floors of textile mill areas containing textile machinery such as spinning frames or the like, in which a cleaning airstream can be produced by relatively small and inexpensive fans.

A further object of the invention is to provide pneumatic floor cleaning means serving to clean the areas beneath a given row of machinery and the aisles between adjacent rows of machinery utilizing conventionally available travelling cleaners.

These and other objects of the invention which will become hereafter apparent are achieved by providing a travelling fan unit arranged for movement along a given row of machines, with blowers connected to the discharge end of the fan so as to direct a blowing airstream beneath the row of machines and over the floor area to be cleaned. A suction duct is connected to the same or an adjacent travelling fan unit with a suction orifice provided in said duct facing the extremity of the area to be cleaned. A blocking barrier is extended along the limit of the area to be cleaned intercepting the blowing airstream, and in the air paths produced by the suction airstream, so that the barrier acts as a collection point for the material entrained by the blowing airstream, and the suction airstream acts to clear the barrier as the suction duct moves thereover.

A feature of the invention resides in the fact that by the simple expedient of arranging a blocking barrier at the extremity of the area to be cleared, and utilizing a suction duct coupled to the suction side of the already provided travelling cleaner fan, effective cleaning of the entire floor area can be obtained with minimal turbulence and whirlpools.

Another feature of the invention resides in the formation of the blocking barrier of flexible air pervious flaps which move toward the suction duct to aid in delivering the collected material to the suction duct.

A further feature of the invention resides in the provision of an auxiliary blow nozzle directing a blow stream on the barrier flaps to aid in cleaning same.

The specific details of a preferred embodiment of the invention, and their mode of operation, are hereinafter made most manifest and particularly pointed out in conjunction with the accompanying drawings wherein:

FIG. 1 is a schematic elevational view of a mill area, looking at the ends of two spaced rows of spinning machines provided with overhead cleaners in conventional fashion, with appropriate floor space and blowing airstreams arranged in accordance with the teachings of this invention;

FIG. 2 is an enlarged schematic elevational view of the right hand spinning machine shown in FIG. 1; and
FIG. 3 is a perspective detail view showing the barrier and suction nozzle. Referring now more particularly to the drawings, like numerals in the various figures will be employed to designate like parts.

As illustrated in the drawings, the mill area M is provided with a floor 2, as best seen in FIG. 1. The mill area M, as shown in FIG. 1, includes two spaced rows of spinning machines, shown schematically, the row of machines to the left in FIG. 1 being designated S₂ and the row of machines to the right being designated S₁. Each spinning machine comprises a machine frame 8 having a guide rail 10 extending along the top thereof in conventional fashion. A travelling fan unit 12 is mounted on the guide rail for travel along the row of machines.

It will be understood by those skilled in the art that the term "row" as used herein is intended to designate one or more machines. Thus as illustrated in FIG. 1 the end of a row of machines S₁ and the end of a row of machines S₂ is shown, a single machine being illustrated in each row. However, in most null installations operating within the framework of conventional mill economics, it is understood that each row will comprise a plurality of machines.

Connected to the travelling fan unit 12 is a blower duct 14 which extends from the fan unit to a discharge nozzle 16 directed along the mill floor in the aisle between two adjacent machine rows. According to the illustrated embodiment of the invention, additional blower nozzles 18 may be provided on this blower duct to direct an airstream over the components of the spinning machine to clear foreign matter therefrom, as best seen in FIG. 2.

According to the illustrated embodiment, an additional blower duct 30 is provided on the opposite side of the machine from blower duct 14, with a discharge orifice 34 directing a blow airstream beneath the row of machines, as seen to the left in FIG. 1.

Where a plurality of rows of machines is employed, as seen in FIG. 1, the row of machines adjacent to that row having blower ducts extending to the floor on both sides of the machine, as illustrated in connection with S₁ having blower ducts 14 and 30, one of the next adjacent rows of machines, namely S₂, in the embodiment illustrated in FIG. 1 is provided with a blower duct 32 which does not extend to the mill floor 2, but extends to a discharge nozzle 36 as shown in FIG. 1. The distance of discharge nozzle 36 of duct 32 from the floor is slightly greater than the height of a blocking barrier 38. Discharge nozzle 36 of blower duct 32 is directed to discharge an airstream over the top of blocking barrier 38 and down to the mill floor beneath the row of machines on which duct 32 is provided, namely machine row S₂, and as seen to the right in FIG. 2. Blocking barrier 38 is preferably constructed as shown in detail in FIG. 3 by providing a clamping strip 40 adapted for securement to the machine frame 8 along the outer side thereof. A plurality of barrier flaps 38a is sandwiched between the clamping strip and the machine frame, with the lower edges of flaps 38a freely movable, and extending to the mill floor. The flaps 38a are preferably formed of a flexible air permeable filter material of any one of a large variety of conventionally available types, e.g. metal screening, filter cloths, etc.

A suction duct 46 is connected to the suction side of the travelling fan unit 12, preferably of the machine supporting the barrier 38 as seen in row S₂ of FIG. 1 and FIG. 2. The suction duct 46 has a suction nozzle 48 at the lower end thereof positioned to move over the barrier 38 at the front unit traverse guide rail 10. It is preferred that the outlet of the nozzle 48 be spaced from the lower edge of barrier flaps 38a so that as the nozzle 48 moves adjacent the flaps 38a the flap adjacent the nozzle will be drawn towards the nozzle, flexing to break the bond between any material on the flap and the flap, and sweeping the space between the nozzle and the flap.

As best seen in FIG. 2, the blower duct 32 is preferably formed with an auxiliary nozzle 54 relatively small in cross-section, as compared to the cross-section of blower duct 32, and directing a relatively small blow airstream against the blocking barrier 38, preferably at a point near the top of the inlet to suction nozzle 48 and serving to loosen any material collected on the blocking flaps 38a.

In arranging the discharge nozzles 36 and 54 it is preferred that they be positioned so as to direct a blow airstream against the blocking barrier 38, preferably where two point near the top of the inlet to suction nozzle 48 and serving to loosen any material collected on the blocking flaps 38a.

OPERATION

As will be understood by those skilled in the art from the foregoing description, the necessary blow and suction ducts are preferably combined with conventionally available travelling clarifiers such as used on spinning frames or the like textile machinery.

It is required in order to practice the invention that a blocking barrier be arranged in the path of a blown airstream directed along the mill floor, with the blocking barrier positioned at the extreme of effectiveness of the established blow stream in clearing a given floor area. Thus in the illustrated embodiment, where two rows of textile machinery are illustrated, the blowstream directed through blower ducts 14 and 30 is generally effective to clean a floor area beneath a given row of machines, along with the floor area between two adjacent rows of machines. Thus barrier 38 is positioned on the side of the row of machines S₂, to the right in FIG. 1, and this row of machines S₂ instead of having a blow duct 30 extending to the floor, as employed in connection with barrierless machine group S₁, has a slightly shorter blow duct 42 extending to a point above the barrier 38.

In use the fan units 12 are moved along the guide rails 10, and the airstreams established to effect blowing and suction. The foreign matter blown by ducts 30 and 14 beneath machine S₁ and along the floor 2 towards barrier 38 is collected on the barrier flaps 38a.

This foreign matter collecting on the barrier flaps 38a is removed from the barrier by the passage of suction nozzle 48 over the barrier. It will be noted that in passing over the barrier the suction airstream through nozzle 48 draws the lower ends of blocking flaps 48 towards the nozzle, flexing the flap to aid in breaking the bond between any material collected on the flap and the flap surface, and additionally sweeping the floor immediately adjacent the flap. Further where the auxiliary blow nozzle 54 is employed the blow stream from nozzle 54 aids in dislodging foreign matter from the barrier flaps for entrainment in the suction airstream.

The above disclosure has been given by way of illustration and elucidation, and not by way of limitation, and it is desired to protect all embodiments of the herein disclosed inventive concept within the scope of the appended claims.

What is claimed is:

1. In a textile mill having a row of textile machines, means for cleaning the floor area, said means comprising: a travelling fan unit; a guide rail on which said fan unit is mounted for movement along the row of machines; a blower duct coupled to said fan unit and having a discharge orifice directing a blow stream of air along the mill floor; a blocking barrier element mounted in the path of the blow stream; and a suction duct having an intake orifice movable over said blocking barrier to remove foreign matter impinged on said barrier by the blow stream from said blower duct.

2. Means for cleaning the floor area of a textile mill as in claim 1 in which said blocking barrier comprises a plurality of barrier flaps fixed at the upper edge thereof
and flexing freely at the lower edge thereof as said suction duct moves thereover.

3. Means as in claim 2 in which said barrier flaps are formed of an air pervious material.

4. Means as in claim 1 in which a blow nozzle having an air carrying capacity less than that of said blower duct is arranged to discharge air on said blocking barrier as said suction duct passes over said barrier to dislodge foreign matter from said barrier.

5. In a textile mill as in claim 1: a plurality of spaced rows of textile machines; a travelling fan unit for a first row of said plurality of rows of textile machines; and a blower duct extending from said fan unit on one side of said first row of machines; a discharge nozzle on said blower duct directing an airstream towards another row of textile machines; said blocking barrier arranged on another row of said plurality of rows of machines; a travelling fan unit on said other row of machines; said suction duct connected to said last named fan unit; an intake nozzle on said duct adjacent said barrier and moving over the surface thereof facing said first row of machines.

6. In a textile mill as in claim 5, a blower duct on said fan unit on said other row of machines, said duct having a discharge orifice discharging a blown airstream in the direction of air blown by the blower duct on said first row of machines.

7. In a textile mill as in claim 6 in which said first row of machines has two blow ducts each extending from the fan unit substantially to the floor, one on each side of the row and each having a discharge orifice directing a blown airstream in the same direction, one of said ducts blowing air beneath the machine and the other blowing air across the aisle toward the other rows of machines; and said other row has a blower duct extending from the fan unit on said second row to the floor on the side of the row opposite to that along which said suction duct moves, said blower duct having a discharge orifice directing a blown airstream away from said second row; and a blower duct extending from said last named fan unit to a point above said blocking barrier, said last named duct having a discharge orifice directing a blown airstream over said barrier and onto the floor beneath said second row of machines.

8. A method for cleaning the floor of a textile mill, said method comprising the steps of: establishing an air blow stream directed over the floor area to be cleaned; moving the air blow stream in a direction transverse to its axis of blow; entraining foreign matter in the path of the blow stream in the blow stream; blocking the foreign matter entrained in the blow stream along a line at the extremity of the desired area to be cleaned by the blow stream while permitting the blow stream to pass; collecting the foreign matter blown by the blow stream at the line of blocking; establishing a suction stream, the axis of which at an intake point is at an angle to the line of blocking; and moving said suction stream along the line of blocking to entrain the foreign matter there collected.

References Cited

UNITED STATES PATENTS
2,879,536 3/1959 Denning 15—312
3,574,118 3/1968 Seress et al. 15—312 X

OTHER REFERENCES


ROBERT W. MICHELL, Primary Examiner

U.S. Cl. X.R.

15—312; 134—37