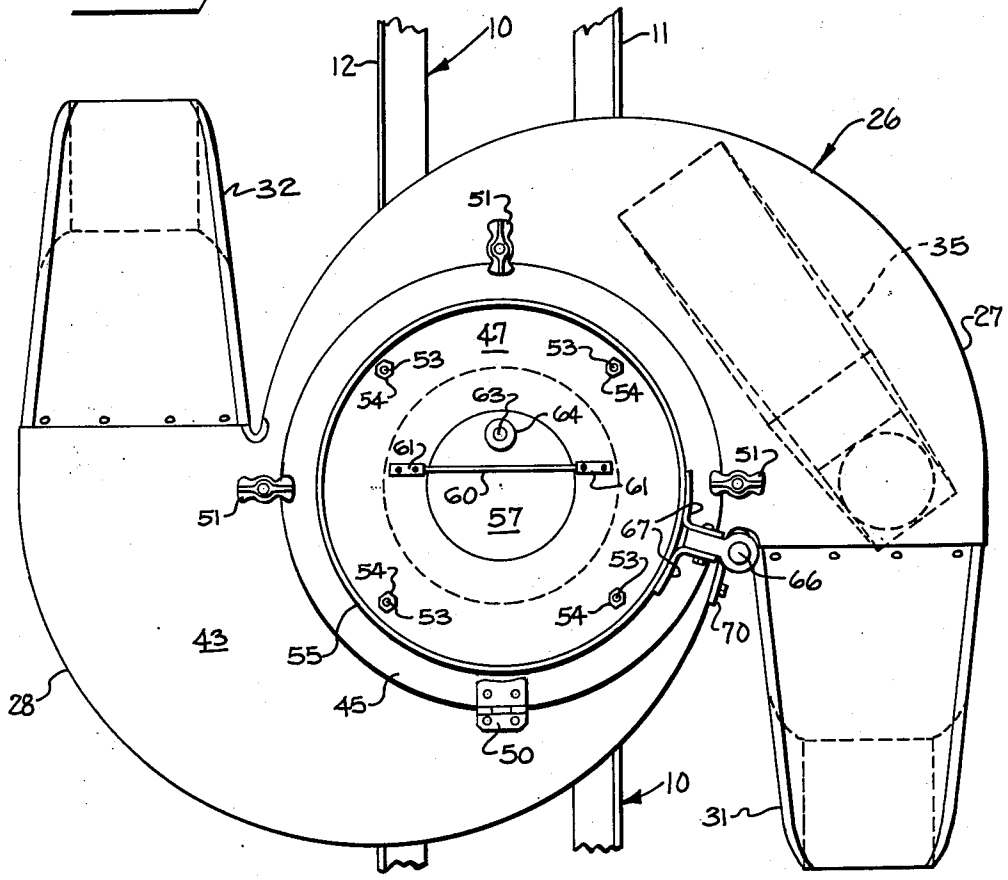
Dec. 5, 1961 G. B. HOLTZCLAW 3,011,203

TRAVELING CLEANER WITH AIR SUPPLY CUT-OFF

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Fig-2



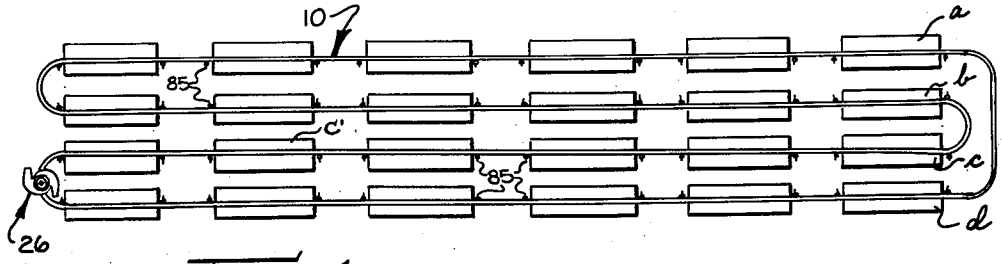


Fig-1

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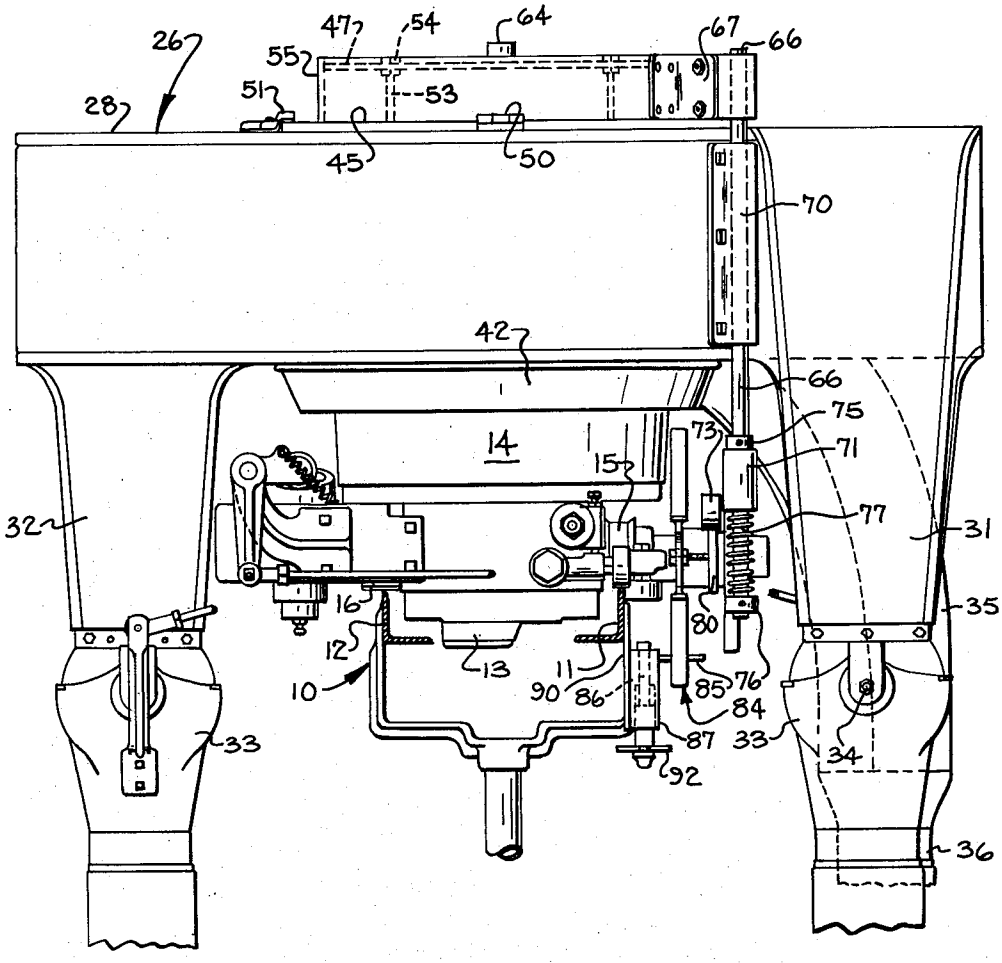
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Fig-3



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TRAVELING CLEANER WITH AIR SUPPLY CUT-OFF

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Fig. 4

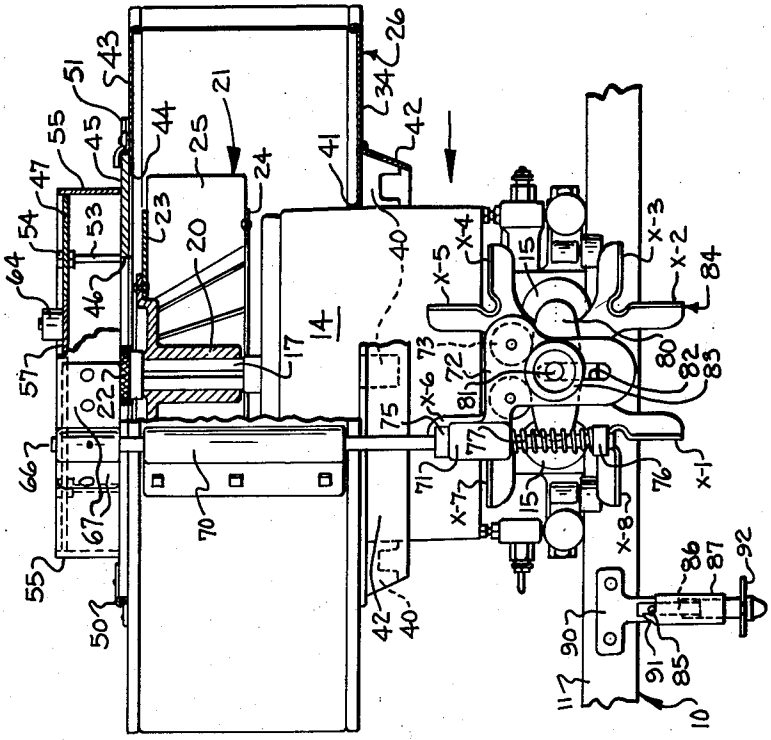
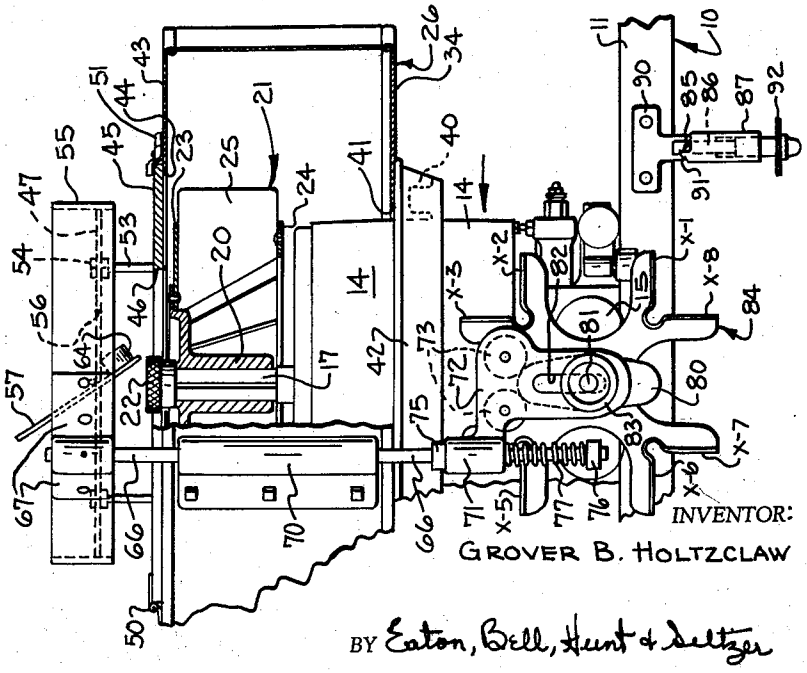


Fig. 5



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United States Patent Office 3,011,203 Patented Dec. 5, 1961

3,011,203
TRAVELING CLEANER WITH AIR SUPPLY CUT-OFF

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Filed Feb. 4, 1959, Ser. No. 791,109
6 Claims. (Cl. 15—312)

This invention relates to air-moving traveling cleaners of the character used for removing lint and other light material from machinery and other surfaces in textile mills.

It is an object of this invention to provide an improved blower-type traveling cleaner which may be used for cleaning many different types of machines arranged in rows, but which is particularly devised for directing streams of air against textile looms and the yarns and fabrics being woven, with automatic means for cutting off the supply of air to the cleaner at selected intervals of predetermined duration; such as, when the cleaner is traveling above any particular loom or looms which are not in operation, or when the cleaner is traveling over spare floor area.

The cleaning of textile looms during operation thereof presents many problems which have been largely overcome by overhead traveling cleaners of the type disclosed in my U.S. Patent No. 2,695,039. However, it is frequently necessary to stop operation of one or more looms of a group of looms being cleaned, for periods of varying duration depending upon conditions which may require the attention of the operator. For example, during piecing up of a large number of warp ends, changing warp beams, or making certain mechanical repairs in a loom, it is obviously necessary that the loom be shut down.

Since the efficiency of a traveling cleaner requires that the air be discharged therefrom in confined streams or currents of high velocity, movement of the traveling cleaner over a loom on which repairs are being made has been troublesome. High velocity air streams cause any loose or broken ends to wave around or become entangled so they cannot be readily handled or pieced up by the operator. Also, if a warp beam is being changed on a loom while adjacent looms are operating, high velocity air streams over the idle loom may remove lint and the like from parts of the looms which are not normally exposed to such air streams, and such lint may be blown about and settle on adjacent looms and other adjacent surfaces.

The effect of the air streams obtainable from traveling blowers of the type referred to above may be undesirable not only over idle looms but also over spare floor, as when the cleaner travels around track bends at the ends of adjacent rows of looms or between looms which are spaced substantially from each other, since this may scatter lint and the like which may have already settled to the floor.

It is, therefore, another object of this invention to provide a traveling cleaner apparatus in which adjustable means are provided for automatically cutting off the supply of air to the cleaner at such times as may be desired, and turning it on again, at the will of the operator.

In its preferred embodiment, the traveling cleaner of the present invention comprises a blower including a volute casing supported for movement along an overhead trackway above one or more rows of textile machines and having a driven rotary air impeller or fan therein. The casing has one or more side air outlets

thereon and its upper wall is provided with an air inlet therein provided with a movable closure means for, at times, cutting off the supply of air to the impeller. The trackway is provided with spaced control elements, which may be rendered active or inactive at the will of the operator, and which operate mechanism movable with the blower for closing and opening the closure means for the inlet of the casing at predetermined intervals of predetermined duration.

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 schematic plan view showing several rows of spaced looms or other textile machines above which an endless trackway is located, with the improved traveling cleaner mounted upon the trackway;

FIGURE 2 is a greatly enlarged top plan view of the traveling cleaner in association with a straight portion of the trackway;

FIGURE 3 is an end elevation of the traveling cleaner with the trackway being shown in cross-section, looking up at the lower side of FIGURE 2;

FIGURES 4 and 5 are side elevational views looking at the right-hand side of FIGURE 3, with portions of the main blower casing and the impeller broken away and in cross-section and showing the closure means or air supply cutting off means in closed and opened positions, respectively.

Referring more specifically to the drawings, the apparatus is illustrated diagrammatically in FIGURE 1 in association with a plurality of looms or similar textile machines arranged in rows, as is the case in the room of a textile mill. In this instance, four such rows of machines are illustrated indicated at *a*, *b*, *c* and *d*. A trackway, broadly designated at **10**, which may or may not be endless, is suitably supported so various runs thereof extend longitudinally of and above the respective rows of machines. In this instance, the machines in each row are shown as being spaced equal distances apart from each other, although it is common practice to arrange looms in each row in pairs, wherein the looms of each pair are relatively closely spaced and each pair of looms is spaced substantially from the adjacent pair of looms. It will be observed in FIGURES 2 and 3 that the trackway **10** comprises a pair of parallel rails or tracks **11** and **12** along which the traveling cleaner moves.

The traveling cleaner comprises a carriage **13** containing suitable gearing, not shown, driven by an electric motor **14** supported upon carriage **13**. Carriage **13** is provided with suitable rollers **15**, **16** thereon which ride upon tracks **11**, **12**. One or more of said rollers **15**, **16** may be driven, and energization of electric motor **14** may be effected, by means substantially as disclosed in U.S. Patent No. 2,011,763 granted to W. B. Hodge et al. on August 20, 1935.

Electric motor **14** has a shaft **17** (FIGURES 4 and 5) thereon which preferably rotates on a vertical axis and on which a hub **20** of a fan or impeller **21** is fixedly mounted. In this instance, a lock nut **22** is threaded onto the upper end of motor shaft **17** for securing impeller **21** on shaft **17**. Impeller **21** comprises upper and lower axially opposed annular plate members **23**, **24** which support a circular series of blades **25**. Upper plate member **23** is suitably secured to the flanged upper portion of hub **20**.

Surrounding impeller **21** is a centrifugal blower casing broadly designated at **26**. Casing **26** may be of singular volute form, although it preferably comprises a pair of substantially diametrically opposed volute body por-

tions 27, 28 whose side outlet portions are provided with respective downwardly curved ducts or hollow arms 31, 32 extending in generally opposite directions relative to each other. Each duct 31, 32 is provided with a nozzle 33 pivotally suspended from the corresponding duct, as at 34. Nozzles 33 may be oscillated by means such as is disclosed in my United States Patent No. 2,695,039, issued November 23, 1954, so that the column or current of air flowing downwardly through each of the ducts 31, 32 is discharged from the respective nozzle 33 in such a manner as to sweep over the looms or other textile machines fore and aft.

Either or both of the volute body portions 27, 28 may be provided with other air discharging ducts thereon, as desired. In this instance, the lower wall 34 of the volute body portion 27 of casing 26 has the upper end of a downwardly and outwardly curving auxiliary duct 35 suitably connected thereto for communication with the interior of volute body portion 27 (FIGURES 2 and 3). Ducts 31, 32, 35 may extend downwardly any desired distance below trackway 10. However, in this instance, the lower end or nozzle 36 of auxiliary duct 35 terminates on substantially the same level as the lower ends of nozzles 33.

In order to support blower casing 26 and help cool the body of motor 14, a medial portion of the body of motor 14 has a plurality of circularly spaced brackets 40 thereon. Bottom wall 34 of casing 26 is suitably secured to brackets 40. Bottom wall 34 may be provided with an opening 41 therein through which motor 14 loosely extends and which is sufficiently larger than motor 14 to permit a relatively small amount of air to flow therethrough into casing 26 to thereby further cool the motor 14. If desired, an annular shield or ring 42 may be suitably secured to the outer surfaces of brackets 40 to assist in causing air to flow past the lower portion of motor 14.

The top wall of casing 26, indicated at 43, is provided with a relatively large opening 44 substantially concentric with impeller 21 and being of sufficient size to facilitate passing impeller 21 therethrough during removal from or installation of impeller 21 on shaft 17.

Opening 44 is partially closed by a plate 45 having a main air inlet opening 46 therein substantially concentric with motor shaft 17 and impeller 21. Plate 45 could be omitted, but is preferably provided to serve as a reinforcement for upper wall 43, a support for a fixed damper plate, cap or shield 47, and a means by which the air inlet opening for casing 26 may be of substantially smaller diameter than the diameter of impeller 21 and impeller 21 can still be easily removed from within casing 26 through the opening 44 in upper wall 43.

Support plate 45 may be secured to top wall 43 of casing 26 in any desired manner. In this instance, plate 45 is hingedly connected to top wall 43, as at 50 (FIGURE 2), and is held in closed position, against top wall 43 of casing 26, by releasable fastening means shown in the form of pivoted buttons or latches 51. Shield plate 47 is supported in fixed spaced relation above top wall 43 of casing 26, and above support plate 45, by a plurality of circularly spaced posts or rods 53 whose lower ends are suitably spaced to reinforcing plate 45 and whose upper ends are preferably threaded for receiving respective pairs of lock nuts 54 which engage upper and lower surfaces of shield 47, thereby permitting vertical adjustment of shield 47.

An axially movable tubular or endless closure member 55 encompasses the peripheral edge of shield 47 in sufficiently close proximity thereto to provide a substantial air seal therebetween while permitting free axial movement of closure member 55 relative to shield 47. Shield 47 and closure member 55 are illustrated in FIGURE 2 as being circular. However, it is apparent that shield 47 and closure member 55 may be of any desired shape just so long as their proximal surfaces are of substantially the same configuration. As best shown in FIGURES 3 and 4, the height or axial length of closure member 55 is equal to or greater than the distance between shield 47 and plate 45. Thus, when closure member 55 occupies closed or lowered position, with its lower edge against the upper surface of support plate 45, a substantial air seal is maintained between the periphery of shield plate 47 and plate 45. When closure member 55 occupies closed position, a damper 57, to be presently described, also occupies closed position (see FIGURE 4) so that no air is admitted to impeller 21 through opening 46 when the fan 21 is rotating. If desired more or less air may be admitted to impeller 21, when closure member 55 is in lowered position, by employing a larger or smaller opening at 41.

Means are provided for periodically opening closure member 55 as shown in FIGURE 5. In so doing, closure member 55 is moved upwardly relative to shield 47 so that air may then flow inwardly between the lower edge of closure member 55 and the upper surface of support plate 45 as it is drawn through inlet opening 46 into casing 26. In order to minimize the height of the traveling cleaner above trackway 10, the height of closure member 55 and the displacement between plate 45 and shield 47 are held to a minimum. However, in order that the inward flow of air beneath the opened closure member 55 be not unduly restricted, shield 47 is provided with a relatively large opening 56 in its medial portion which is closed, at times, by a pivoted damper 57.

Damper 57 is shown in the form of a circular plate loosely fitting within opening 56. Damper 57 is eccentrically pivotally supported by means of a rod or shaft 60 which may be welded or otherwise secured to damper 57 in off-center relation thereto and whose opposite ends are journaled in bearing blocks 61 disposed on opposite sides of opening 56 and being suitably secured to the upper surface of shield 47.

In order to counter-balance the eccentricity of damper 57 and cause it to open promptly whenever negative air pressure is reduced or eliminated by virtue of closure member 55 being moved to open position, the shorter portion of damper 57, as determined by shaft 60, has a stud or threaded rod 63 projecting upwardly therefrom on which an internally threaded weight member or collar 64 is threadably mounted. When closure member 55 occupies closed position (FIGURES 3 and 4) damper 57 occupies closed position due to negative pressure within closure member 55 then acting upon the eccentrically supported damper 57. When closure member 55 is open, it is apparent that negative pressure beneath shield 47 is substantially reduced or absent, with the result that weight member 64 causes damper 57 to move downwardly at the weighted end thereof so the longer portion of damper 57 moves upwardly and so that air may pass through opening 56 in shield 47 as well as beneath the lower edge of closure member 55.

Various means may be provided for raising and lowering closure member 55 to respectively open and close the same. A preferred embodiment of such means will now be described. In this instance, the means for opening and closing closure member 55 is so constructed as to be effective at certain intervals predetermined by the attendant or operator of the machines shown in FIGURE 1.

Tubular closure member 55 is supported and guided for vertical movement relative to shield 47 by means of a shifter rod, vertical shaft or guide post 66 to which one side portion of closure member 55 is suitably secured, as by a bracket 67. Guide post 66 is guided for vertical movement in a guide block 70 suitably secured to the side wall of blower casing 26. Guide post 66 extends downwardly beyond guide block 70 and loosely penetrates a cuff or shifter element 71 attached to or formed integral with a follower arm 72 whose upper portion has a pair of cam followers or rollers 73 journaled thereon (FIGURES 4 and 5).

Vertical shaft 66 has a pair of vertically spaced collars 75, 76 fixed thereon, and a compression spring 77, encircling the lower portion of vertical shaft 66, bears against the lower surface of cuff 71 and the upper surface of collar 76 to normally maintain collar 75 against the upper surface of cuff 71. If so desired, shaft 66 may be fixedly secured to cuff 71, but the shaft 66 is preferably mounted in the manner described in order that closure member 55 may be raised manually to clear shield 47 and weight member 64, after which it may be swung sidewise on shaft 66. Plate 45 may then be released from latches 51 and swung upwardly on hinge 50 for cleaning or making repairs to impeller 21 or other elements within casing 26.

The weight of closure member 55, shaft 66 and other elements carried by shaft 66 is normally sufficient to maintain followers 73 in engagement with the periphery of a substantially symmetrical and elliptical cam 80 loosely mounted on a stub shaft 81 projecting outwardly from carriage 13. Follower arm 72 is provided with a substantially vertical slot 82 loosely penetrated by shaft 81, for guiding follower arm 72 to maintain the same in the desired attitude relative to vertical shaft 66. Arm 72 is retained on shaft 81 by a suitable collar 83 fixed on the reduced free end of shaft 81.

Cam 80 is formed integral with or suitably secured to a rotatable actuating member or star wheel 84 which is also journaled on shaft 81. Star wheel 84 is provided with a plurality of circularly arranged eccentric arms or abutments X–1 through X–8, certain of which are adapted to successively engage spaced adjustable trip fingers 85 carried by trackway 10.

In the arrangement of FIGURE 1, one of the trip fingers 85 is shown adjacent each end of each textile machine so as to cause closure member 55 (FIGURES 2 through 5) to open and then close as the traveling cleaner approaches and subsequently moves past each textile machine, in a manner to be later described. Also any of the trip fingers 85 may be manually moved to inoperative position so as to avoid movement of closure member 55 as the traveling cleaner moves thereby.

Each trip finger 85 has a downwardly extending stem 86 thereon which is guided within a fixed tubular lower portion 87 of a bracket 90 suitably secured to and depending from the corresponding track of trackway 10. The upper end of tubular portion 87 is provided with a stop 91 against which the corresponding trip finger may be turned by manipulation of a handle or hand wheel 92 provided on the lower end of stem 86, below the level of the corresponding tubular portion 87.

It is apparent that, when any one of the fingers 85 need not be used, it may be turned by manipulation of the corresponding hand wheel 92, so as to extend parallel to trackway 10, out of the path of travel of star wheel 84. However, whenever a corresponding trip finger 85 is turned outwardly, as shown in FIGURES 4 and 5, stop 91 on the upper end of the corresponding tubular portion 87 causes the respective trip finger 85 to remain stationary as any one of the arms of star wheel 84 engages the same.

By way of example, it shall be assumed that the particular trip finger 85 shown in each of the FIGURES 4 and 5 in one of those fingers positioned in advance of a loom or other textile machine then in operation and from which the lint and other foreign matter is to be removed. Thus, it is to be further assumed that the traveling cleaner is at the moment in a position over a temporarily idle textile machine and that closure member 55 occupies lowered or closed position (FIGURES 3 and 4).

In operation, as the traveling cleaner moves from right to left in FIGURE 4, since trip finger 85 is in operative position, abutment X–1 engages trip finger 85 and causes star wheel 84 to rotate a quarter-revolution in a counterclockwise direction as star wheel 84 moves from left to right beyond the trip finger 85, as shown in FIGURE 5. Since cam 80 rotates with star wheel 84, one of the lobes or high points of cam 84 moves into engagement with

followers 73 on follower arm 72, thereby elevating follower arm 72 to, in turn, elevate closure member 55 to the open position of FIGURE 5.

It follows that, with continued movement of the traveling cleaner from right to left in FIGURE 5, abutment X–7 will engage the next succeeding active or operative trip finger 85 which may be at the opposite end of the same machine or at any other desired point in the track system, to impart another quarter-revolution to star wheel 84 and cam 80 so that the latter elements again occupy the position shown in FIGURE 4. The followers 73 are thus permitted to move downwardly from the position of FIGURE 5 to that of FIGURE 4 to permit closure member 55 to move downwardly therewith to the closed position of FIGURE 4.

It is thus seen that, as star wheel 84 engages alternative active trip fingers 85, it is so rotated as to cause closure member 55 to occupy respective open and closed positions and thus to permit or restrict delivery of air from the one or more outlets of the traveling blower unit. To explain further, let us assume that one or more of the machines in a row is stopped for the purpose of making repairs, replacing the warp beam, or for some other reason for which it is desired that the flow of air from the traveling cleaner moving thereover be interrupted, such as at a machine indicated at *c'* in the row of machines *c* shown in FIGURE 1. In this instance, it is to be assumed further that the traveling cleaner moves from right to left as it travels above the machines in row *c*.

Thus, the two trip fingers 85 adjacent opposite ends of machine *c'* would be adjusted to inactive position while the remaining trip fingers 85 might remain in active or outward position so as to effect the desired cycle in movements of the star wheel 84. In this instance, upon moving from right to left in FIGURE 1 past the machine to the right of the machine *c'*, closure member 55 will have been moved to closed position in the manner heretofore described and, since the two trip fingers 85 adjacent opposite ends of machine *c'* are then inactive, closure member 55 will continue to occupy said closed position from the time it leaves the machine preceding the machine *c'* until it approaches the machine subsequent to machine *c'*.

It is seen that the traveling cleaner can be rendered ineffective at predetermined intervals of predetermined duration at the will of the operator, without interrupting rotation of impeller 21 within casing 26.

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 having a carriage movable upon a track over a plurality of alined textile machines, said cleaner comprising a centrifugal blower mounted on said carriage, a driven rotary fan in said blower, said blower including a substantially horizontal top portion having a normally open air inlet therein, and said blower having a side portion provided with at least one air outlet therein; the combination therewith of a substantially horizontal shield plate overlying but spaced from said air inlet, means supporting said shield plate in fixed relation to said blower, a tubular closure member encompassing said shield plate in substantially air tight relation thereto and being of a length at least substantially equal to the distance between said top portion and said shield plate, at least two longitudinally spaced trip elements carried by said track, and means engageable with trip elements in the path of travel of said last-named means for moving said closure member downwardly against said top portion of the blower and for moving said closure member upwardly away from said top portion in alternation.

2. A structure according to claim 1 in which said shield plate has an opening therein, a damper for said opening,

means eccentrically supporting said damper on said shield plate for pivotal movement in said opening so that said damper comprises a long portion and a short portion, counter-balancing means carried by said short portion to normally maintain said damper in at least partially open position when said closure member is moved away from said top portion, and said long portion serving to cause the damper to move to closed position by atmospheric pressure when said closure member is against said blower top portion and said fan is rotating.

3. In a traveling cleaner, for removing lint and other foreign substances from various surfaces, mounted for movement along a track over and above a row of machines, said traveling cleaner comprising a centrifugal blower including a volute casing having an upper wall, a bottom wall and a side wall, said side wall having an outlet opening therein, said upper wall having an air inlet opening therein, and a driven rotary fan in said casing arranged to draw air through said inlet opening and discharge air through said outlet opening; the combination therewith of a shield plate spaced above and overlying said air inlet opening, means supporting said shield plate in fixed relation to said upper wall, a tubular closure member encompassing said shield plate in sufficiently close proximity thereto to substantially prevent air from flowing therebetween and being of a height at least equal to the distance between said upper wall and said shield, plate and means operable automatically for raising and lowering said closure member in alternation relative to said upper wall and said shield plate at predetermined intervals.

4. A structure according to claim 3 in which said shield plate has an opening therein, and a damper loosely disposed in said last-mentioned opening and being pivotally supported by said shield plate.

5. In an apparatus for displacing lint and other light material on a row of textile machines having a trackway mounted above and extending longitudinally of the row of machines, said apparatus comprising a blower having a casing mounted for travel along said trackway, said casing having a top wall provided with an air inlet therein, said casing also having a side wall provided with at least one air outlet therein, and at least one nozzle communicating with said outlet and depending from said casing; the combination therewith of a substantially horizontal shield plate spaced above said top wall and overlying said air inlet, means supporting said plate in fixed relation to said top wall, a movable closure member encompassing said plate in a substantially air tight manner and being of a height such as to enclose the space between said top wall and said plate, a movable shifter element carried by said blower, a connection between the closure member and the shifter element, a rotatable cam carried by said blower, follower means carried by said shifter element and engaging said cam, a plurality of longitudinally spaced fingers carried by and projecting from said trackway, and means engageable with successive fingers for imparting successive steps in rotation to said cam, alternate steps by the cam causing movement of said shifter element in one direction relative to the blower for opening said closure member, and intervening steps by said cam causing movement of the shifter element in the opposite direction for closing said closure member whereby air is periodically discharged from the nozzle.

6. In a traveling cleaner mounted for travel above a plurality of textile machines, said cleaner comprising a volute casing having top and side walls, said top wall having an air inlet opening therein, at least one depending nozzle connected to said side wall, a fan in said casing, a motor for said fan, and said fan acting during travel of said cleaner to draw air through said inlet opening and to discharge a stream of air through the nozzle; the combination of movable closure means for said inlet opening for cutting off the supply of air into said casing through said inlet opening when said closure means occupies closed position, said closure means comprising a tubular closure member positioned above said top wall and being of greater diameter than said inlet opening, a guide post mounted for substantially vertical movement on said side wall and in off-set relation to said closure member, a fixed connection between said post and said closure member, a substantially horizontal shield plate within said closure member and having a peripheral edge disposed in substantially air tight relation to said closure member, means supporting said shield plate in spaced relation above and in fixed relation to said top wall and overlying said air inlet opening, said closure member being of a height at least equal to the distance between the top wall and the shield plate, means operable at certain intervals in the course of travel of said cleaner for moving said post and closure member upwardly to open position to permit ingress of air between said closure member and said top wall and through said air inlet opening with consequent discharge of air through said nozzle, and other means operable at other intervals between said certain intervals for moving said post and said closure member to closed position.

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