PNEUMATIC CLEANING APPARATUS FOR LOOMS

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Pneumatic cleaning apparatus for looms which is of the type comprising a blower mechanism incorporating a number of blower conduit means provided with a plurality of blower nozzle means. The blower conduit means are arranged at predetermined locations of the loom, and at least one of such blower conduit means is operably connected with movable components of the loom. Additionally, distributor conduit means serve to connect the blower conduit means with a common source of low pressure-blower air.

BACKGROUND OF THE INVENTION

The present invention relates to an improved pneumatic cleaning apparatus for a loom. Pneumatic cleaning devices are already known to the art for cleaning looms. According to a known physical construction of cleaning devices, a travelling blower unit is associated with a number of looms. This travelling blower unit moves back and forth along a rail above the looms. Furthermore, this known construction of travelling blower unit is provided with movable blower nozzles which are directed downwardly towards the loom and parts and components thereof. Such blower nozzles have the function of blowing away fly and fibers from the parts of the loom which are contacted by the air currents emanating from the blower nozzles during passage of the travelling blower unit over the looms. Furthermore, a pneumatic cleaning device is also known to the art in which, in addition to a travelling blower unit which is associated with a number of looms, a suction mechanism is provided for each loom. These suction mechanisms of the individual looms, and each of which possesses a suction opening arranged beneath the associated loom at the floor of the weaving room, are operatively connected to a common suction conduit. A controllable flap mechanism is associated with each suction opening. More precisely, the control of this flap mechanism occurs as a function of the passage of the travelling blower unit over the associated loom. In operation, the flap mechanism at the suction device of a loom is then completely opened when the travelling blower unit arrives at such loom and, thus, begins to impact this loom with a jet or current of blower air. The dust and other contaminate which are placed into turbulence under the action of the blower air stream are, therefore, entrained by the suction device and removed by the suction channel. If the travelling blower unit departs from an associated loom, then the flap mechanism only partially closes. Thus, a reduced suction action is also maintained at the loom which has just been blown off even during the contacting with air of the other looms. Now, a noteworthy drawback of the known cleaning devices for looms resides in the fact that dust is given the opportunity of depositing upon the machine components between the individual passes of the travelling blower unit. It has been found in practice that in many instances it is impossible to remove such dust which settles upon the machine components by a travelling, periodically effective air current. Even if the suction device remains completely or partially effective between the individual passes of the travelling blower unit, it is not possible to prevent the dust from settling upon the machine components which are located furthest from the suction opening. On the contrary, the suction device at its very best is only capable of engaging dust or other foreign matter which is dropping to the floor at its immediate region and conducting such dust away.

SUMMARY OF THE INVENTION

Accordingly, it is a primary object of the present invention to provide an improved pneumatic cleaning apparatus which effectively overcomes the drawbacks of the prior art structures. Another more specific object of this invention relates to an improved pneumatic cleaning apparatus for textile machines, in particular looms, which is readily capable of effectively removing dust, fly, fibers, and other contaminate, from the textile machine in an extremely efficient, positive and reliable manner. Still further significant object of the present invention relates to an improved pneumatic cleaning apparatus for looms which allows the removal of foreign matter such as, dust, fly, fibers, and the like, from the component or parts of the loom in a most efficient, positive and effective manner, thereby improving the working conditions in the weaving area, as well as improving the quality of the woven cloth.

In order to implement the above-mentioned objects and still further objects which will become more readily apparent as the description proceeds, the inventive cleaning apparatus is generally manifested by the features that blower conduit means are arranged at predetermined locations of the loom. At least one of these blower conduit means is connected with movable components or parts of the loom, and further, these blower conduit means operably communicate with a common source of low pressure-blower air through the agency of distributor conduit means.

According to a preferred embodiment of the inventive cleaning apparatus, the latter incorporates a suction device which is disposed beneath the loom. The blower nozzles of the inventive cleaning apparatus are preferably uniformly distributed over the width of the loom and the suction device possesses an air inlet which narrows towards the bottom and which extends substantially transverse to the direction of the warp over a considerable portion of the width of the loom. These blower nozzles can be advantageously formed by providing openings at the blower conduit means which extend transverse to the direction of the warp, whereby, for instance, the distributor conduit means are connected at their front end to the associated blower conduit means.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be better understood, and objects other than those set forth above, will become apparent, when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawing wherein:

FIGURE 1 is a sectional view through a preferred form of inventive cleaning apparatus provided at a loom, and wherein such sectional view is taken substantially parallel to the warp threads; and
FIGURE 2 is a fragmentary view depicting a second embodiment of a blower conduit which is associated with the warp stop motion.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Describing now the drawing and, in particular, with reference to the exemplary embodiment of inventive cleaning apparatus shown in FIGURE 1, it should be understood that reference numeral 10 broadly designates the schematically illustrated loom which is secured to the floor 12 of the weaving room or area by means of its lateral frame members 11. This loom 10 is of standard construction and, therefore, possesses conventional components such as a warp beam 16, a warp stop motion 18, harnesses 20, a fell or weft impact edge 21, a sley 22 which is mounted for pivotal movement at location 70, a breast beam 26 and a cloth beam 28. The warp or warp threads as delivered by the warp beam 16 are designated by reference numeral 14.

Now, the exemplary illustrative embodiment of inventive cleaning apparatus which is provided at the loom 10 is designated by reference numeral 30. This cleaning apparatus 30 embodies a pair of cover plate members 31 and 32 which are inclined towards one another, and which collectively cover a portion of the floor 12 which is located beneath the loom 10. Furthermore, these cover plate members 31 and 32, together with the lateral frame members 11 form a funnel means 33. It will be recognized that whereas the cover plate member 31 terminates at the region of the warp beam 16 and beneath the warp stop motion 18, the other cover plate member 32 extends up to the region of the cloth beam 28. Furthermore, the funnel means 33 merges or opens into a suction opening 34 of a suction device which includes a suction channel 36. This suction opening 34 communicates via the suction channel 36 with the non-illustrative suction flange means of a suitable non-illustrative air conveying device.

Continuing, it will be seen that an air box or compartment 38 is located beneath the cover plate member 31 and will be understood to extend over the width of the loom. This air box 38 communicates with a suitable air supply system. More precisely, it will be recognized that the air box 38 is operably associated via an inlet opening 40 and an air channel 42 with a non-illustrated blower conduit which is part of the cleaning apparatus 30. Furthermore, the portion of the cover plate member 31 which is situated above the air box 38 possesses a blower nozzle 44 which is formed by the overlapping marginal portions 35 and 41 of this cover plate member 31. The discharge opening of this blower nozzle 44 is directed, as shown, towards the suction opening 34. Furthermore, an air distributor flange unit 55 is connected to at least one end face or side of the air box 38, as best shown by referring to FIGURE 1.

Furthermore, blower conduit means, to be considered shortly hereinafter, are associated with those components or parts of the loom 10 which are particularly subjected to contamination by dust and fly and which are particularly in danger of having deposited thereon such dust and fly. Now, in the exemplary illustrated embodiment, one such blower conduit means 53 is associated with the warp stop motion 18, a further blower conduit means 54 with the harness 20 and an additional blower conduit means 56 with the reed 24. Considering first the blower conduit means 53, it will be seen that such is arranged above the warp stop motion 18 and possesses blower nozzle means 68 which are directed towards this warp stop motion 18, that is to say, in this instance blower nozzle means which are directed downwards. On the other hand, the blower conduit means 54 is located at the lowermost position of the lower frames of the harnesses 20 at the side of the warp stop motion 18 and, further, this blower conduit means 54 is equipped with a number of blower nozzles 64 which are directed approximately horizontally towards the harnesses 20 and a further number of blower nozzles 66 which are directed downwards towards the funnel means 33. Finally, it should be mentioned that the blower conduit means 56 is rigidly connected to the sley 22 of the loom 10. This blower nozzle means 56 is provided with blower nozzles 62 which are directed upwardly towards the reed 24 as well as other blower nozzles 60 which are directed towards the harnesses 20. These blower nozzles 60, 62, 64 and 66 are uniformly distributed over one or more rows over the length of the associated blower conduit means 56, 54 and 53, and can be formed by the provision of circuit-shaped or elongated openings provided in each of the associated blower conduit means.

Apart from the foregoing structure, it will be recognized that the blower conduit means 53, 54 and 56 are operably coupled via distributor conduit means, now to be considered, with the air distributor flange means 55. Each such distributor conduit means, in the exemplary illustrative embodiment, consists of a respective branch conduit or channel 45, 48 and 51 connecting the respective blower nozzles 44, 62 and 64 to the respective distributor conduit means. Air emanating from the blower conduit means 53 is guided via the associated blower nozzle means 68 onto the warp stop motion 18. The air current or stream which escapes from the blower nozzle means 64 of the blower conduit means 54 impacts against the confronting side or face of the harnesses 20. The blower nozzle means 60 of the blower conduit means 56 attached to the sley 22 of the loom oscillates with this sley between the harnesses 20 and the fell or weft impact edge 21. Hence, the air which flows out of the blower nozzle means 60 impacts in pulsating fashion the side of the harnesses 20 which face away from the blower nozzle means 54. Moreover, the air emanating from the blower nozzle means 62 of the blower conduit means 56 simultaneously impacts against the reed 24 which is fixedly secured to the sley 22. As a result, the components or parts 18, 20 and 24 of the loom 18 which are contacted by the air currents are protected from contamination by fly and dust and it is thus possible to extend the settling of dust or the like.

The air which is blown between the warp stop motion 18, upon leaving the latter, is deflected in the direction of the funnel means 33 and thereby forms an air curtain which prevents dust and fly from entering the loom. This air curtain screens the warp beam 16 against the entry of fly and dust from the shed and the zone of movement of the sley 22. A further directed air jet from the blower nozzle means 66 of the blower conduit means 54 is directed towards the funnel means 33. These directed air currents wipe the loom components which are situated at the region of the funnel means 33 and, therefore, prevent the settling of fly and dust. The fly and dust which is entrained by the air currents is blown towards the bottom of the funnel means 33 and is sucked off by the suction opening 34 and conducted away by the suction channel 36. Moreover, the blower nozzle means 44 likewise wipes across the lower portion of the side wall of the cover plate member 31 and blows any fly and dust or the like which has dropped or collected at this location towards the suction opening 34.

Now, in FIGURE 2, there is depicted a further embodiment of a blower conduit or channel 53 which is
located at the region of the warp stop motion 18. This blower conduit or channel 53' possesses a substantially rhombic-like cross-section, whereby the lateral or side walls 80 bounding the blower conduit or channel 53' possess a relatively steep inclination, as shown, and at the lower portion of this conduit 53' form a slotted nozzle means 70 which extends over the entire length of the associated blower conduit or channel 53'. Furthermore, blower channel or nozzle means 53' is rotatably mounted at its upper portion by means of two pins or cams 74 at the frame means 11 of the loom 10 and, furthermore, is disposed in driving connection with a revolving shaft member 73 of the loom 10 through the agency, for example, of a rod 71 and an associated crank pin 72. Consequently, this blower conduit or channel means 53' is thus subjected to an oscillatory movement about an axis which is parallel to its longitudinal axis. As also will be seen by referring to FIGURE 2, the upper side walls 80 of the blower conduit means 53' intersect one another at an acute angle.

It has been found that owing to the particular cross-sectional form of this blower conduit or channel 53', there results a relatively pronounced injection action for the slotted nozzle 70. By means of the relatively small amount of air which departs from the slotted nozzle 70, a relatively large quantity of surrounding air is entrained, so that an intensive cleaning action is obtained even with a relatively small expenditure. This cleaning action is further intensified in that the air departing from the blower conduit means 53' impacts the warp stop motion 18 at an inclination owing to the pendulum or oscillatory movement of the aforementioned blower conduit means 53' and such in particular prevents the deposition of fly or the like in the eye or eyelets of the warp stop motion 18.

Furthermore, it has been found that almost no deposit of fly occurs at the upper region of the blower conduit 53' which, with different constructional forms of such blower conduit would result in fly or other foreign material dropping from time to time on the warp and which would lead to disturbances.

Whereas, in certain instances, it is necessary or advantageous in order to maintain the loom clean to only then place the cleaning apparatus out of operation when the loom is also stopped, under certain other circumstances, it is possible to carry out an intermittent operation in that the apparatus of the blower device and, possibly also that of the suction device, is periodically brought to standstill for the purpose of saving energy. Naturally, it is conceivable to use a common blower for the blower device and the suction device, wherein an air filter is arranged in front of this blower in the flow direction of the air. Additionally, it is possible to operate the cleaning apparatus of a number of looms with a common blower or ventilator installation. In order to increase the cleaning action, it is also possible to superimpose a pulsating movement upon the continuous delivery of air.

Of course, still other components or parts of the loom can be associated with blower nozzles and/or blower conduits. For instance, it can be advantageous to produce at the upper side of the cover plate 32 an air current which is directed towards the suction opening 34, similar to the air current which emanates from the nozzle 44. Furthermore, the blower conduits which extend substantially parallel to the weft thread can, of course, also be supplied at both their ends with blower air. It is naturally also possible to connect the blower conduits 54, 56 with the air box 38 or its distributor flange means 55 through the agency of a T-pipe member which is mounted at the blower conduits 54, 56.

What is of considerable importance for the inventive cleaning apparatus is that the blowing of the loom takes place with a relatively large quantity of air at a relatively low pressure. It has namely been found that only then is it possible to continuously maintain the loom clean.

It is for this reason that, as will be evident by inspecting the drawing, the cross-section of the blower conduits and nozzles is designed to be correspondingly large. The pressure of the blower air in the blower conduit means is preferably in the order of magnitude of 100 millimeters water column.

It can be advantageous to control the air delivered to the air box 38 with regard to its moisture content and/or its temperature, in accordance with the requirement which prevail in the working zone of the loom. This, in turn, relieves the air conditioning installation for the weaving room from the requirements of the working zone, which result in considerable reduction in installation and operational costs of the last-mentioned air conditioning installation.

While there is shown and described present preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto, but may be otherwise variously embodied and practiced within the scope thereof.

Accordingly, what is claimed is:

1. A pneumatic cleaning apparatus for looms comprising a blower mechanism incorporating a plurality of blower nozzle means directed towards components of the loom, said blower mechanism further including a plurality of blower conduit means communicating with said blower nozzle means and arranged at predetermined locations of the loom, at least one of said blower conduit means being operably connected with movable components of the loom, distributor conduit means for connecting said blower conduit means with a common source of high-pressure blower air, said blower conduit means extending substantially transverse to the loom, said blower nozzle means being defined by openings provided in said transversely extending blower conduit means, said one of said blower conduit means being secured to the sley of the loom, and said one blower conduit means having at least some of its associated blower nozzle means directed towards the harnesses of the loom. 2. A pneumatic cleaning apparatus for looms as defined in claim 1, and said one blower conduit means which is secured to the sley of the loom having at least some of its associated blower nozzle means directed towards the reed of the loom. 3. A pneumatic cleaning apparatus for looms as defined in claim 1, and further including a suction device arranged beneath the loom. 4. A pneumatic cleaning apparatus for looms as defined in claim 1, and further including collecting funnel means provided beneath the loom. 5. A pneumatic cleaning apparatus for looms as defined in claim 4, and said collecting funnel means including at least one pair of cover plate members and said cover plate members inclined towards one another and extending over the width of the loom. 6. A pneumatic cleaning apparatus for looms as defined in claim 1, and further including collecting funnel means provided beneath the loom, a suction device arranged beneath the loom, said suction device including a suction opening, and said collecting funnel means communicating with said suction opening of said suction device. 7. A pneumatic cleaning apparatus for looms as defined in claim 1, and further including collecting funnel means provided beneath the loom, said collecting funnel means including at least one pair of cover plate members, said cover plate members being inclined towards one another and extending over the width of the loom, air box means operatively communicating with the source of blower air, and said distributor conduit means being operatively connected with said air box means. 8. A pneumatic cleaning apparatus for looms comprising a blower mechanism incorporating a plurality of blower nozzle means directed towards components of the loom, said blower mechanism further including a plu-
rality of blower conduit means communicating with said blower nozzle means and arranged at predetermined locations of the loom, at least one of said blower conduit means being operably connected with movable components of the loom, distributor conduit means for connecting said blower conduit means with a common and continuous source of low pressure-blower air, said blower conduit means extending substantially transverse to the loom, said blower nozzle means being defined by openings provided in said transversely extending blower conduit means, and said distributor conduit means consisting partially of flexible intermediate members.

9. A pneumatic cleaning apparatus for looms comprising a blower mechanism incorporating a plurality of blower nozzle means directed towards components of the loom, said blower mechanism further including a plurality of blower conduit means communicating with said blower nozzle means and arranged at predetermined locations of the loom, at least one of said blower conduit means being operably connected with movable components of the loom, distributor conduit means for connecting said blower conduit means with a common source of low pressure-blower air, collecting funnel means provided beneath the loom, said collecting funnel means including at least one pair of cover plate members, said cover plate members being inclined towards one another and extending over the width of the loom, air box means communicating with said source of blower air, at least one of said cover plate members being provided with means defining a slotted nozzle which communicates with said air box means, and said slotted nozzle extending approximately over the width of the associated cover plate means and being directed towards the lowest location of said collecting funnel means.

10. A pneumatic cleaning apparatus for looms comprising a blower mechanism incorporating a plurality of blower nozzle means directed towards compounds of the loom, said blower mechanism further including a plurality of blower conduit means communicating with said blower nozzle means and arranged at predetermined locations of the loom, at least one of said blower conduit means being operably connected with movable components of the loom, distributor conduit means for connecting said blower conduit means with a common source of low pressure-blower air, collecting funnel means provided beneath the loom, said collecting funnel means including at least one pair of cover plate members, said cover plate members being inclined towards one another and extending over the width of the loom, air box means operatively communicating with said source of blower air, said distributor conduit means being operatively connected with said air box means, and said air box means being arranged beneath one of said cover plate members.

11. A pneumatic cleaning apparatus for looms comprising a blower mechanism incorporating a plurality of blower nozzle means directed towards components of the loom, said blower mechanism further including a plurality of blower conduit means communicating with said blower nozzle means and arranged at predetermined locations of the loom, at least one of said blower conduit means being operably connected with movable components of the loom, distributor conduit means for connecting said blower conduit means with a common source of low pressure-blower air, and means for mounting at least one of the remainder of said blower conduit means for oscillating movement approximately about its associated longitudinal axis.

12. A pneumatic cleaning apparatus for looms as defined in claim 11, wherein said last-mentioned blower conduit means includes lower and upper ends, blower nozzle means at said lower end and the upper end of said last-mentioned blower conduit means having a substantially roof-shaped configuration formed by side portions which intersect one another at an acute angle.

13. A pneumatic cleaning apparatus for looms as defined in claims 8, and said blower conduit means and said blower nozzle means being so dimensioned in cross section as to constitute a low pressure system.

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