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CLEANING DEVICE FOR THREAD WORKING TEXTILE MACHINES

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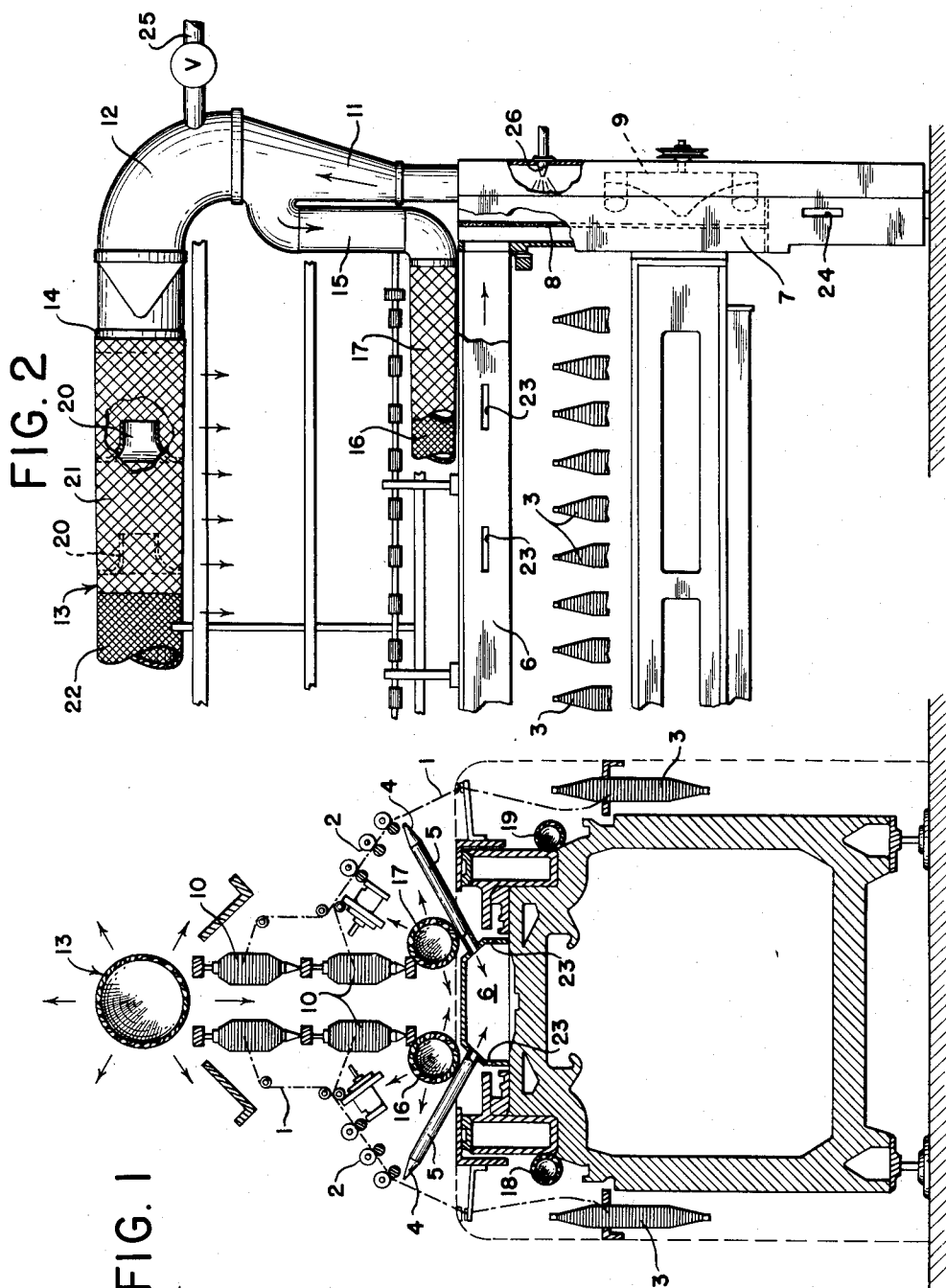


FIG. 1

FIG. 2

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CLEANING DEVICE FOR THREAD WORKING TEXTILE MACHINES

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This invention relates generally to a device for diminishing the deposit of dirt particles on the exposed parts of a textile machine in which threads are worked upon. The device comprises means for drawing off by suction broken threads, dust particles or loose fibrous materials, means for filtering the air so drawn off, and means for recycling a part of the cleaned air back to the area of the machine containing the working threads. The invention is characterized in that at least one hollow body having a porous wall is mounted within reach of the surfaces liable to be soiled and that the inside of the body is connected by a conduit with the discharge side of a suction fan. The air coming from the discharge side of the suction device or fan passes through the pore openings of the hollow body wall and sets up a diffuse air motion of low flow velocity which in turn displaces the atmospheric air laden with dirt particles from the exposed parts. The air is then drawn off by suction, passed through a filter to the fan and so recycled through the hollow body to repeat the process.

It is known to be old in the art to pass air discharged by a suction fan of a spinning machine into a pressure conduit extending throughout the length of the machine and provided with blower slots directed laterally across the machine table. The air discharged from the blower slots flows in a directed stream with considerable velocity across the surface of the machine table and is supposed to prevent the dust and lint falling within this area from settling. In this older system, however, one cannot prevent the dirt particles from reaching in a more concentrated form those very places where they become troublesome, viz. in the region of the running yarns. Part of these dirt particles adhere to protruding fibers of the yarns and are thus spun into them which in turn causes a considerable impairment to the quality of the yarn. Simultaneously therewith, the blast stream draws from the inside of the machine by suction, additional room air laden with dust and lint particles, thus still further increasing the amount of the impurities blown against the threads. Furthermore, the blast stream causes a powerful vortex (eddy) action along the surface of the machine table. This causes floating fibrous material to form conglomerates which on assuming the form of flocculi are conveyed into the region of the threads emerging from the stretching mechanism. When these flocculi are spun into the threads, the thickness of the yarn becomes greater, which during the further processing of the yarn, will cause additional operational trouble.

It is also known to be old to pass air delivered by a suction device of a spinning machine into a pressure duct arranged above a spool frame. This air is allowed to escape through blast slots placed in the side of the duct and so arranged that the air stream flows across the machine into open space. As pointed out above, this arrangement does not appreciably contribute to the abatement of the accumulation of dirt in the machine because the blast effect causes vortexes which merely concentrate the dirt into objectionable flocculi.

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It is known that a considerable part of the working time of textile machine operators must be spent on cleaning jobs because unobjectionable yarn quality can be obtained only from machines kept meticulously clean.

The amount of time spent for cleaning-up jobs prevents assigning more machines to the operators who could more profitably be used in performing other necessary duties such as tying torn threads, replacing empty roving yarn spools, and inserting and withdrawing the spools. It is therefore an object of the invention to provide for a simple yet effective means for keeping textile machines clean.

The invention is explained in greater detail with the aid of the exemplifying forms of construction shown in the accompanying diagrammatic drawing in which:

Fig. 1 is a cross-section of a ring-spinning machine equipped with my improved device for lessening dirt deposit; and

Fig. 2 is a longitudinal side view of the ring-spinning machine of Fig. 1.

Referring to the drawings in detail, the ring-spinning machine shown has the thread 1 drawn off the feed spools 10 and run into the stretching mechanism 2 and thence wound on spools 3. In the region of the point of emergence of each thread from the stretching mechanism there is a suction nozzle 4 fitted to a suction pipe 5 opening into a central collecting duct 6. The number of suction nozzles 4 depend upon the number of threads which are formed on the machine. There should, however, be at least one suction nozzle 4 for each thread formed. The collecting duct opens into a box 7 in which are mounted a wire filter 8 and a fan 9. When a thread breaks between the stretching mechanism and the spool 10, the loose end of the thread coming out of the stretching mechanism is drawn by the suction stream into the suction nozzle 4 and is carried through the suction duct 5 and the collecting duct 6 into the filter 8. The drawn-off fibrous material remains on the filter surface and the purified air streams into a diffuser 11 mounted on the upper face of the box. Connected with the diffuser 11 is a duct 12 through which the air discharged at the delivery side of the suction device or fan is led into the hose-like hollow body 13. The hollow body 13 is mounted directly above the spool frame containing the yarn feed spools and extends over the entire length of the ring-spinning machine.

The hollow body 13 is made up of a fabric having porous walls. It is removably attached by means of a clamp 14 to the end of duct 12. The cross-sectional area of the hollow body decreases with increasing distance from the point of admission of the air into the hollow body. Branching off the diffuser 11 is a conduit 15 which opens into two additional hollow bodies 16 and 17, respectively, each of which has porous walls. Preferably the walls of these hollow bodies are likewise made of an air-pervious fabric. The hollow bodies 16 and 17 are mounted symmetrically with respect to the central plane of the machine. Additional hollow bodies 18 and 19 can be mounted in the region of the spools 3 (see Fig. 1) and be connected by a channel (not shown) with the duct 12 or with the pressure (discharge) side of the fan. Ducts 12, 15, diffuser 11 and the portion of the machine connecting the diffuser with the discharge side of the fan 9 can be considered as constituting pressurized ducts connecting the fan with the porous hollow bodies 13, 16 and 17.

The operation of spinning the roving yarn drawn off the spools 10 entails the formation of a considerable amount of dust and loose or floating fibrous material. Parts of the machine particularly exposed to the accumulation of dust particles are those which are situated within the area of the stretching mechanism. Furthermore, fly dust is carried off by the ambient atmospheric air and

is apt to settle out on the other parts of the machine. The latter eventually has particularly disadvantageous effects on roving yarn spools because the fiber flocks settling out on them are spun together with the roving yarn drawn off which then causes thicker parts to be formed in the spun yarn. These thickened parts are apt to become troublesome in machines in which there is further working of the spun yarn.

The afore-described installation makes it possible to prevent to a far-reaching extent the machines from getting soiled by dust or floating fibrous debris settling out on them. The air delivered by the suction device (fan) into the hollow bodies 13, 16, 17, 18 and 19 flows through the innumerable pores left between the fabric threads back into the ambient open air in such a way as to set up a diffuse low velocity flow of air which displaces the dust-laden ambient air particularly from the roving yarn spools 10 and from those remaining parts of the machine that are within the region of the running threads. This flow of air prevents the floating dust particles carried along by the ambient air from settling out on the aforementioned exposed parts of the machine, and at the same time, the dust and lint formed during the yarn-spinning operation is conveyed to the outside by this air movement while in a state of extremely fine distribution. The diffuse flow of the air escaping into the room through the walls of the hollow bodies is so weak as to cause a movement of air which is substantially non-eddying even only a small distance away from the wall of the hollow body. This prevents floating fibrous particles from aggregating into flocks which are apt to become even larger by capturing additional loose fibrous particles.

The hollow bodies are made conical in order that the amount of air escaping into the room per unit area of the hollow body wall through the pore orifices will be as uniform as possible. This can be still further promoted by the arrangement of guiding elements or vanes 20 inside of the hollow body. For the same purpose the walls of the hollow bodies are made of a plurality of textile webs having different air permeabilities. Thus fabric section 21 abutting against duct 12 has wider pore orifices than the contiguous part 22 which in turn is more loosely woven than the terminal part (not shown) at the opposite end of the machine. In many cases only one of these expedients is needed for establishing a low velocity outward flow of diffuse air with approximately the same amounts of air escaping outwardly per unit area.

The hollow-body wall could also be made of a wire gauze. However, the afore-described fabric construction has the advantage of being easier to clean. It is known that the air delivered by the fan 9 into the duct 12 always carries along with it a certain amount of dust and fibrous particles in spite of being cleaned in the filter. These impurities are left behind on the inner wall of the hollow body and can periodically be removed by detaching the fabric hose and turning it inside out.

It is sometimes advisable to augment the air passed into the hollow bodies by admixing it with ambient (room) air taken from the central portions of the yarn working machine. This enhances the action of the air flow which sweeps the dust particles off the machine. For this purpose, for example, the wall of the collecting channel 6 (Fig. 1) is provided with orifices 23 through which air is drawn by suction and is then passed, along with the air drawn in through the suction nozzles 5, over the filter 8 in the box 7. This arrangement has a further advantage in that a substantial part of the dust or airborne fibrous material formed in the stretching mechanisms is withdrawn from the region of the machine before it has time to settle out. On the other hand, it would also be possible to leave in the wall of box 7 (Fig. 2) one or several orifices 24 which open into the space between the filter and the suction (intake) side of the fan. In that way the ambient (room) air drawn in by

suction through said orifices does not have to overcome the resistance to flow imposed by the filter.

Many processes for working fibrous substances (textile fibers) in the textile industry call for the maintenance of uniform climatic conditions in the machine hall. Thus it is customary to install spinning machines and other textile machines in a room connected to an air-conditioning installation and permanently ventilated with fresh air held at a suitable temperature and moisture content. In these cases it is advantageous to admix the recycled air delivered by the suction device with fresh air coming directly from the air-conditioning installation, instead of with ambient (room) air. This can be done by having a duct 25 which is connected to an air-conditioning machine open into main duct 12.

Since the recycled air delivered by the suction device often has a slightly higher temperature than the average room temperature it is sometimes advisable to keep the moisture content of the admixed conditioned air at a higher figure. This can be done by providing for a moisture inducing means, such as a spray 26, to be attached to the discharge side of the suction device. Any such system makes it possible to maintain within the region of the running threads those climatic conditions most favorable for the manufacturing processes.

The invention is based upon the recognition of the fact that the disadvantages pointed out in connection with the known systems can be obviated, provided the admission into the room of the recycled air delivered by the suction device is made without any blast action within the reach of the exposed machine parts. Due to the multiplicity of the minute pore orifices in the wall of the hollow bodies, the air escaping into the room sets up a diffuse low-velocity air flow which displaces the room air laden with dirt particles from those machine surfaces most likely to be soiled while avoiding any blast action.

The invention is not limited to the forms of embodiment shown in the drawing and described in the specification. It can be used in all those cases wherein a textile machine in which operations are performed on threads, have suction devices for carrying away broken threads, dust particles or loose fibrous material.

I claim:

1. A device for catching broken threads and for decreasing dirt deposit on the exposed parts of a yarn working textile machine comprising at least one suction nozzle placed in the area of running yarn, a suction fan, a collecting duct connecting said nozzle to the intake side of said fan, a filter in said collecting duct, at least one porous hollow body, and a pressurized duct connecting said porous hollow body to the discharge side of said fan, said porous hollow body being placed in the region of the exposed parts so that air passing through said suction nozzle is partially recycled back to said suction nozzle by way of low velocity air discharge from said porous hollow body, said low velocity air displacing dirt laden room air from said exposed parts without substantial eddying.

2. A device according to claim 1 wherein the porous hollow body is made of a fabric.

3. A device according to claim 1 wherein the porous hollow body is made of wire gauze.

4. A yarn spinning machine comprising at least one suction nozzle placed in the area of running yarn, a suction fan, a collecting duct connecting said nozzle to the intake side of said fan, a filter in said collecting duct, at least one porous hollow body, a pressurized duct connecting said porous hollow body to the discharge side of said fan, a spool frame, spools mounted on said frame and a machine table; said porous hollow body being placed so that air passing through said suction nozzle is partially recycled back to said suction nozzle by way of low velocity air discharged from said porous hollow body, said low velocity air displacing dirt-laden air from the exposed parts of said yarn spinning machine, and said hollow body being mounted above said spool frame.

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5. A device according to claim 4 having at least one hollow body mounted directly above the machine table.

6. A device according to claim 4 having at least one porous hollow body in the region of the spools serving for winding up the threads.

7. A device according to claim 1 wherein the cross-sectional area of the porous hollow body decreases progressively as the distance from the end of air admission increases.

8. A device according to claim 1 having vanes inside said hollow body to guide the air flow.

9. A device according to claim 1 wherein ambient room air is mixed with the recycled air.

10. A device according to claim 1 wherein there are suction intake orifices in the collecting duct for mixing ambient room air with the recycled air.

11. A device according to claim 1 wherein there is an orifice between the filter and the suction fan for mixing ambient room air with the recycled air.

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12. A device according to claim 1 having in addition an air conditioning duct connecting with the pressure duct and having an air conditioning machine connected to said air conditioning duct.

5 13. A device according to claim 1 wherein there are moisture supplying means attached to the inside of the pressure duct for raising the moisture content of the recycled air.

14. A device according to claim 1 wherein the pore orifices of the porous hollow body decrease in cross-sectional area as the distance from the end of the air admission increases.

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