

CABLE MANAGEMENT ASSEMBLY FOR USE IN THE EXTENSION AND RETRACTION OF WIRES OF AN AUTOMATED MOVING MACHINE

5 **BACKGROUND OF THE INVENTION**

1. Field of the Invention

10 The present invention is directed to automated moving machine, and more particularly to additive and subtractive manufacturing machines, such as 3D printers and computer numerical control (CNC) machines, including robotic mechanisms, large format signage printers, and any other device comprising of wires or cables attached to a moving component.

15 2. Discussion of the Related Art

Automated moving machines comprise of electronic parts with one or more electronic components connected to wires that bear mechanical loads or electricity and telecommunications signals. As automated moving machine
20 continue to be miniaturized, wire management becomes increasingly important to ensure that the wires are not pulled apart or are directed into undesirable areas or positions where it may cause harm or damage to the electronic device and surroundings, while still remaining unseen or kept largely out of sight.

25 Conventional methods of wire management include the popular use of cable chains, which can be used to accommodate horizontal, vertical and three-dimensional movements. Cable chains provide one solution of wire management and do not address the issue of keeping the wires unseen or out
30 of sight. Cable chains also restrict the movement of wires to run in a circular motion from extended to a retained position.

As automated moving machine continue to be miniaturized, maintaining the same motion capabilities while miniaturizing, through the use of conventional wire management solutions such as the cable chain is challenging.

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Accordingly, there exists a need for providing a method of wire management that limits exposure of wires and does not restrict the moving component of the automated moving machines, thus allowing for a clean design without hindering the machines motion capabilities.

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SUMMARY OF THE INVENTION

The cable management assembly for use in the extension and retraction of wires of a moving component in an automated moving machine in the present invention overcomes the disadvantages as briefly set forth above.

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The present invention is directed to an automated moving machine. The automated moving machine comprising a moving component that moves in at least one directional axis and at least one or more wires bearing mechanical loads, electrical or telecommunications signals attached to the moving component.

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In accordance to the present invention, comprising wires attached to a moving component of an automated moving machine at one end, and the wires fastened to a carriage at the other end, and the carriage attached to a linear rail.

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The wires move in accordance to the moving component of an automated moving machine and in accordance to the movement of the moving component, the wires are extended out or retracted further in to either end of the linear rail, guided by the the other end of the wires fastened to the carriage on the linear rail.

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The cable management assembly may further include a guide to encourage the wires to extend and retract to hide the wires from view.

5 The guide may consist of at least one mechanical bearing to encourage the extension and retraction of the wires to hide the wires from view.

The guide may consist of a shaped plastic object to encourage the wires to extend and retract the wires from view.

10 The cable management assembly may include carriages with terminal block or connectors where the wires fastened to the carriage connect to electronic components in the automated moving machine

15 The cable management assembly may further include wires fastened to the carriage that connect directly to electronic components. The electronic components may be attached onto the carriage.

DETAILED DESCRIPTION

20 The embodiments will now be described more fully hereinafter. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will convey the scope of the invention to those skilled in the art.

25 A first exemplary embodiment of a cable management assembly is described hereinafter. In general, the assembly may include a carriage, a linear rail, wires at one end that are connected to at least one moving electronic part and wires at the other end that are fastened to a carriage.

30 It will be understood that one or more electronic components may make up the moving electronic part. For example, the moving electronic part may be a laser-

cutter toolhead where the electronic part may comprise of the laser-cutter tool and stepper motors to move the laser-cutter tool.

5 Another example where the moving electronic part may comprise of one or more electronic components is a 3D printer extruder part, where the electronic components on the 3D printer extruder part may comprise of a stepper motor, a heating element and a thermistor.

10 Additional details of the first exemplary cable management assembly is described hereinafter. The wires at the other end fastened to a carriage may be connected to one or more electronic components, power supply unit or a combination of both. The wires at the other end fastened to a carriage may also connect to at least one or more terminal blocks or connectors that is attached to the carriage. The wires from the terminal block or connectors may connect to
15 an electronic component or power supply unit.

A second exemplary embodiment of a cable management assembly of a cable management assembly is described hereinafter. A guide supports the wires between the moving electronic part and carriage. The guide may be formed of
20 a solid object, sheet or layers of sheet that for which the purpose is as a guide to encourage the extension and retraction of wires when the moving electronic part moves during operation. The guide may include one or more walls or brackets to prevent the wires from moving into positions where the wires may get stuck or obstruct other parts of the automated moving machine.

25 An alternate exemplary guide that may be utilized with the cable management assembly described in the second exemplary embodiment of a cable management assembly is described hereinafter. The guide may comprise of one or more mechanical bearings that may rotate when the wires extend and
30 retract in accordance to the movement of moving electronic part. The guide may also rotate in accordance to the movement of the moving electronic part.

WHAT IS CLAIMED IS:

1. A cable management assembly comprising:
at least one carriage;
at least one a linear rail;
at least one end of wires attached to a moving electronic part of a automated moving machine;
at least one end of a wires is fastened to a carriage; and
the carriage attached to a linear rail.
2. The cable management assembly according to Claim 1, for use in the extension and retraction of wires during operation of an automated moving machine.
3. The cable management assembly according to Claim 2, wherein the cable management assembly comprises a guide.
4. The cable management assembly according to Claim 3, wherein the guide comprises of at least one mechanical bearing.
5. The cable management assembly according to Claim 3, wherein the guide is a solid object.
6. The cable management assembly according to Claim 3, wherein the guide is a plastic sheet.
7. The cable management assembly according to Claim 2, wherein the automated moving machine is a CNC machine.
8. The cable management assembly according to Claim 2, wherein the automated moving machine is a 3D printer.

9. The cable management assembly according to Claim 3, wherein one end of the wires fastened to a carriage is connected to terminal blocks attached on the carriage.
10. The cable management assembly according to Claim 9, wherein the guide comprises of at least one mechanical bearing.
11. The cable management assembly according to Claim 9, wherein the guide is a solid object.
12. The cable management assembly according to Claim 9, wherein the guide is a plastic sheet.
13. The cable management assembly according to Claim 3, wherein one end of the wires fastened to a carriage is connected to terminal blocks attached on the carriage.
14. The cable management assembly according to Claim 13, wherein the guide comprises of at least one mechanical bearing.
15. The cable management assembly according to Claim 13, wherein the guide is a solid object.
16. The cable management assembly according to Claim 13, wherein the guide is a plastic sheet.
17. The cable management assembly according to Claim 3, wherein the wires fastened to a carriage is connected to wire connectors attached to the carriage.
18. The cable management assembly according to Claim 17, wherein the guide comprises of at least one mechanical bearing.

19. The cable management assembly according to Claim 17, wherein the guide is a solid object.

20. The cable management assembly according to Claim 17, wherein the guide is a plastic sheet.

21. The cable management assembly according to Claim 3, wherein the wires fastened to a carriage is connected to wire connectors attached to the carriage.

22. The cable management assembly according to Claim 21, wherein the guide comprises of at least one mechanical bearing.

23. The cable management assembly according to Claim 21, wherein the guide is a solid object.

24. The cable management assembly according to Claim 21, wherein the guide is a plastic sheet.

25. The cable management assembly according to Claim 3, wherein the wires fastened to the carriage is directly connected to an electrical part in an automated moving machine.

26. The cable management assembly according to Claim 25, wherein the guide comprises of at least one mechanical bearing.

27. The cable management assembly according to Claim 25, wherein the guide is a solid object.

28. The cable management assembly according to Claim 25, wherein the guide is a plastic sheet.

29. The cable management assembly according to Claim 3, wherein the wires fastened to the carriage is directly connected to an electrical part in an automated moving machine

30. The cable management assembly according to Claim 23, wherein the guide comprises of at least one mechanical bearing.

31. The cable management assembly according to Claim 24, wherein the guide is a solid object.

32. The cable management assembly according to Claim 25, wherein the guide is a plastic sheet.