

CONVEYER SYSTEM FOR CLEAN ROOM

FIELD OF INVENTION

The present invention relates to a conveyor system. In particular, the present invention relates to a conveyor system having a conveyor assembly suitable for clean
5 room environment.

BACKGROUND

In a line of production, conveyer systems have been widely used for conveying objects from one point to another. Conveyor systems are available in many forms that are catered for different needs. Whatever designs of the conveyor
10 system are, due to their mechanical nature, the drive mechanisms of the conveyor system self-produce contaminants operationally.

In a clean room environment, the conveyor systems are carefully designed with mechanisms that minimize discharged particles within a desirable level. It would therefore require more frequent maintenance to keep the cleanness under the
15 clean room specifications, which increases the cost of the productions.

Further, the discharged particles are very fine particles and when the discharged particles are not properly contained within a controllable area, the discharged particles are set free to move, which may potentially contaminate the clean room environment.

20 FIG. 1 illustrates a roller conveyer assembly **100** for conveying objects. The roller conveyor assembly **100** comprises two opposing rails **102**, **104** and a plurality

of rollers **106** that are spaced along the length of each rail. The opposing rails **102** and **104** are spaced apart from each other in parallel. They are configured in a mirroring manner with the rollers **106** on each side facing each other.

Typically, each roller of the conveyor assembly **100** is attached and driven by
5 a respective motor **108** through a shaft. The motor **108** is generally mounted on the other side of the rail with its shaft extended through the rail to support and drive the roller **106**. Such conveyor assembly system **100** is commonly adapted for clean room environment.

Once example of a roller conveyor assembly can be found in US patent no.
10 6,959,804 issued to Magstar Technologies, Inc.

SUMMARY

Without limiting the scope of the invention a brief description of some of the claimed embodiments of the invention is set forth below. Additional details of the
15 described embodiments of the invention and/or additional embodiments of the invention may be found in the Detailed Description of the Invention below.

In accordance with one aspect of the present invention, there is provided a conveyor assembly having a rail having a plurality of holes along its length, a plurality of motors attached on the rail with a driving shaft of the motor extending
20 through the holes, and a plurality of rollers for connecting to the driving shaft. The conveyor assembly comprises a gap defined between the motor and the rail, whereby

the gap is adapted for collecting and trapping particles discharged from the motor.

In one embodiment, the assembly may further comprise a cover ring for covering the holes while allowing the driving shaft to extend there through, wherein the gap is formed between the cover ring and the motor.

5 In another embodiment, the motor may further comprise an alignment profile around the driving shaft adapted for aligning the motor to attach on the rail, wherein the gap is defined between the alignment profile and the rail. The holes on the rail may be sized to fit with the alignment profile to align the motor to attach on the rail, and the cover ring is sized to fit the hole, whereby the gap is form between the cover
10 ring and the alignment profile.

Further, the gap may be formed right beyond an opening on the motor where the driving shaft of the motor is extended there through.

In another aspect of the present invention, there is also provided a cover ring adapted for the aforesaid conveyor assembly.

15 **BRIEF DESCRIPTION OF THE DRAWINGS**

A detailed description of the invention is hereafter described with specific reference being made to the following drawings:

FIG. 1 is a perspective view of a conveyor assembly;

FIG. 2 is a perspective view of a conveyor assembly in accordance with an
20 embodiment of the present invention; and

FIG. 3 is a cross sectional view of the conveyor assembly of FIG. 2 across line A-A.

DETAILED DESCRIPTION

While this invention may be embodied in many different forms, there are described in detail herein specific preferred embodiments of the invention. This description is an exemplification of the principles of the invention and is not intended to limit the invention to the particular embodiments illustrated.

For the purposes of this disclosure, like reference numerals in the figures shall refer to like features unless otherwise indicated.

FIG. 2 illustrates a perspective view of a conveyor assembly **200** in accordance with an embodiment of the present invention. The conveyor assembly **200** comprises a rail **202**, a plurality of rollers **206** and corresponding number of motors **204** for the rollers. For simplicity, only one rail **202** is provided and described herein. It is understood to a skilled person that, when desire, another rail may be required in a mirroring manner to form a conveyor system for supporting and conveying objects on both sides.

FIG. 2 is presented in a way to illustrates the conveyor assembly **200** in an exploded view **212**, an assembled view **214** with a cover ring **220**, an assembled view **216** without the cover ring **220**, and a fully assembled view **208**. Both assembled views **214** and **216** are presented without the rollers **206**. The fully assembled view **208** shows two rollers **206** that are already assembled on the rail **202** and ready to convey object accordingly.

As shown in the exploded view **212** of FIG. 2, the conveyor assembly **200** further comprises a driving shaft **208**, an alignment profile **209**, a through hole **203** on the rail **202**, the cover ring **220**, a spacer/stopper **222**, a fastening mean **224** and the roller **206**. The conveyor assembly **200** is adapted with the motor **204** fitted on the rail **202** on one side and the roller **206** fitted on the other side of the rail **202**. The driving shaft **208** is extended from the motor **204**. The motor **204** operationally drives the driving shaft **208** to rotate. The alignment profile **209** is defined around the driving shaft **208**, and as exemplified in FIG. 2, it is a small rising circular platform around the driving shaft.

The through hole **203** is defined on the rail **202** for receiving the motor **204**. It is sized to fit with the alignment profile **209** so that the motor **204** can be appropriately guided for fitting and aligning on the rail **202**. When the motor **204** is fitted and aligned on the rail **202**, the driving shaft **208** extends through the through hole and projected on the other side of the rail **202** as shown in the assembled view **216**.

The spacer/stopper **222** is further provided for fitting through by the driving shaft **208**. The rollers **206** are typical rollers for conveyors well known in the art. Each roller **206** are directly attached to the respective driving shaft **208** such that the driving shaft **208** directly drives the rollers **206** to rotate about the shaft's axis. It is desired that the roller **206** has no direct physical contact with the rail **202** but in a close proximity thereto. A fastening means may further used to secure the roller **206** on the driving shaft **208**. The spacer/stopper **222** may be used as spacer or stopper to keep the roller **206** a close proximity to the rail **202**.

It is of course understood that the present invention is also applicable for rollers that are not driven by the motor, which are also known as passive or idle rollers. Although these rollers are not driven by motor, therefore passive, but they too discharge particles as there are moving parts, such as rollers, bearings.

5 The cover ring **220** is adapted with a circumference to fit to the through hole **203** as shown in the assembled view **214**. The cover ring **220** also further defines a shaft hole **221** for allowing the driving shaft **208** to extend through. It is desired that the shaft hole **221** is sized to allow the shaft to rotate freely without any disruptions or interferences. Preferably, the cover ring **220** is made of any known anti-static
10 material or electrostatic discharge material or the like. It can also be any material having antistatic agent. Also preferably, the cover ring **220** is also provided with a thickness whereby when it is fitted to cover the through hole **203**, it has a closed proximity to the alignment profile **209** leaving a very small space/gap **223** between the alignment profile **209** and the cover ring **220**, when the motor **204** is mounted on
15 the rail **202**. For example, the very small gap **223** between the cover ring and the shaft may be maintained between 0.01mm ~ 0.50mm.

FIG. 3 illustrates a cross sectional view of the conveyor assembly **200** of FIG. 2 across A-A. As described above, when the conveyor assembly **200** is properly assembled, motor **204** is mounted on one side of the rail **202**. The alignment profile
20 **209** provides an alignment guide to the motor **204** to mount on the rail **202** appropriately. When the motor is mounted on the rail **202**, the driving shaft **208** extends through the through hole of the rail **202** to the other side of the rail **202**. The cover ring **220** is fitted to cover the through hole. The roller **206** is fastened on the

driving shaft **208** through the fastening mean **224**.

When the conveyor assembly **200** is assembled, a gap **250** is defined between the cover ring **220** and the alignment profile **209** of the motor **204**. Preferably, the gap **250** is relatively bigger than the very small gap **223**. Such provision space of the gap **250** with a differential in pressure relative to the gaps **223** helps in trapping of potential discharge particles. Accordingly, particles discharged from the motor **204** will be trapped within the gap **250** operationally. Accordingly, the maintenance can be easily carried out by removing the cover ring **220**.

In an alternative embodiment, it is possible to avoid the cover ring **220** by fabricating the rail **202** with only small through holes that are catered for the driving shaft **208** to go through to the other side for fitting with the rollers. In such configuration, the side of the rail **202** for receiving the motor **204** may still require to provide a channel for adapting the alignment profile **209** so that the motor **204** can be properly aligned when mounted on the rail **202**. Preferably, the channel is made slightly deeper relative to the height of the alignment profile; so that a gap or space is define between the motor and the rail. Such gap or space is shown to be able to effectively collect or trap the particles discharged from the motor **204**; mainly through the shaft hole of the motor.

The present invention provides a solution for clean room conveyor system. In particular, the present invention provides a small gap between the motor and the rail right beyond shaft hole of the motor to collect and trap discharged particles. The shaft hole is a small opening on the motor adapted for the driving shaft to extend out from the motor to drive the rollers. Operationally, particles generated in the motor will

discharge from the small opening. The gap or spaces is a relatively simple solution for collecting and trapping the discharged particles. The conveyor configured in accordance with the present invention is able to meet a cleanliness performance in a clean room up to ISO14644-1 ISO4 0.1 μ m 10 counts.

5 The above description illustrates various embodiments of the present invention along with examples of how aspects of the present invention may be implemented. While specific embodiments have been described and illustrated it is understood that many changes, modifications, variations and combinations thereof could be made to the present invention without departing from the scope of the present invention. The
10 above examples, embodiments, instructions semantics, and drawings should not be deemed to be the only embodiments, and are presented to illustrate the flexibility and advantages of the present invention as defined by the following claims:

CLAIMS:

1. A conveyor assembly having a rail having a plurality of holes along its length, a plurality of motors attached on the rail with a driving shaft of the motor extending through the holes, and a plurality of rollers for connecting to the driving shaft, the
5 conveyor assembly comprising:

a gap defined between the motor and the rail, whereby the gap is adapted for collecting and trapping particles discharged from the motor.

2. The conveyor assembly according to claim 1, further comprising a cover ring for covering the holes while allowing the driving shaft to extend there through,
10 wherein the gap is formed between the cover ring and the motor.

3. The conveyor assembly according to claim 1, wherein the motor further comprises an alignment profile around the driving shaft adapted for aligning the motor to attach on the rail, wherein the gap is defined between the alignment profile and the rail.

15 4. The conveyor assembly according to claims 1 and 3, wherein the holes on the rail are sized to fit with the alignment profile to align the motor to attach on the rail, and the cover ring is sized to fit the hole, whereby the gap is form between the cover ring and the alignment profile.

5. The conveyor assembly according to claim 1, wherein the gap is formed right
20 beyond an opening on the motor where the driving shaft of the motor is extended there through.

6. The conveyor according to claim 2, wherein the cover ring is made up of an anti-static material or electrostatic discharge material.

7. The conveyor according to claim 1, wherein the gap is relatively larger than a gap/space between the driving shaft and the hole on the rail.

5 8. The conveyor according to claim 7, wherein the gap/space between the driving shaft and the hole on the rail is in the range of about 0.01mm-0.05mm.

9. The conveyor according to anyone of the preceding claims, adapted to meet a cleanliness performance in a clean room under ISO14644-1 ISO4 0.1 μ m 10 counts.

10 10. A cover ring adapted for the conveyor assembly in accordance with any one of the preceding claims.