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(54) **LENS CLEANER**

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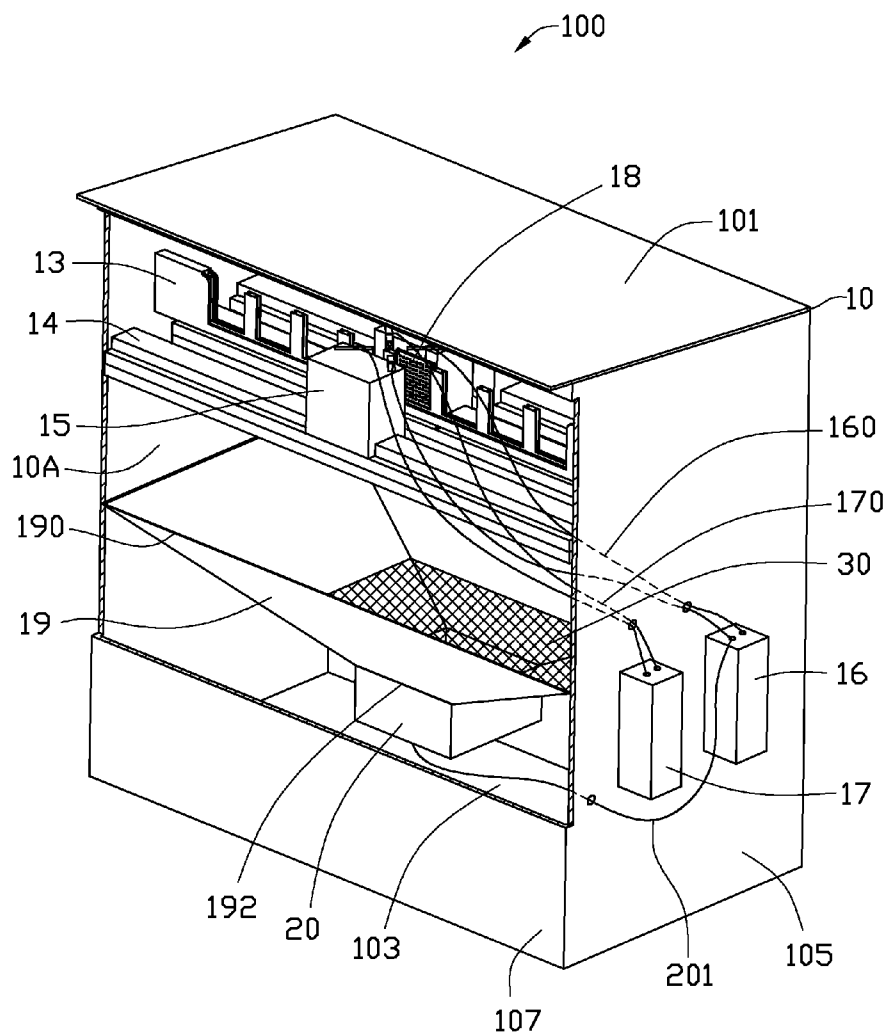
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(57) **ABSTRACT**

A lens cleaner includes a fixture, an elongated loading plate, two guide members, an air blowing member, an air evacuating member, and two cleaning members. The loading plate is attached to the fixture and configured for loading a number of lenses thereon. The two guide members are attached to the fixture and parallel to the loading plate. The air blowing member is configured for blowing air. The air evacuating member is configured for evacuating air. The two cleaning members are moveably attached to the two respective guide members. Each cleaning member defines a first inlet coupled to the air blowing member, a first outlet communicating with the first inlet, a second inlet, and a second outlet communicating with the second inlet and coupled to the air evacuating member. The first outlet and the second inlets open toward the loading plate.



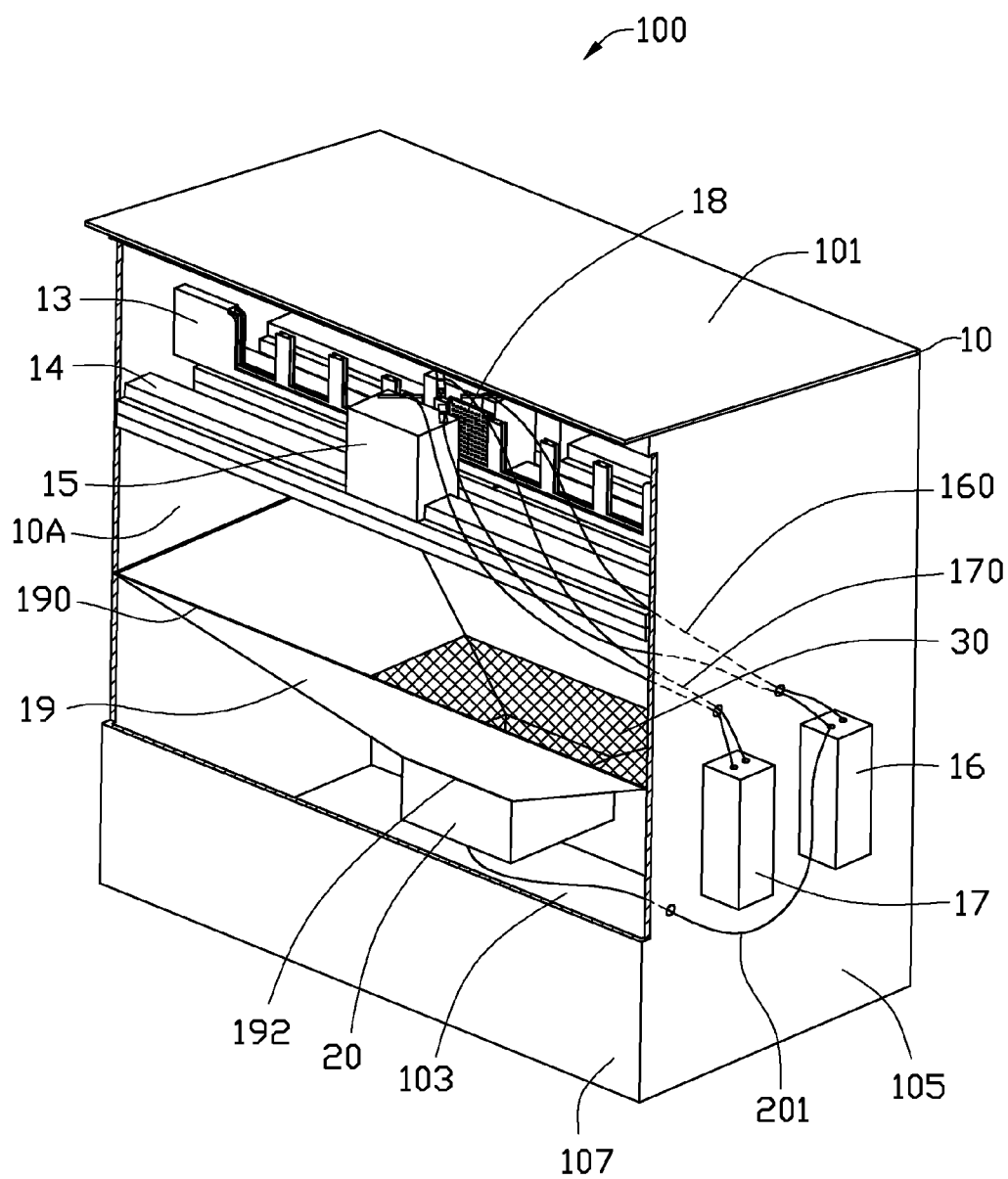
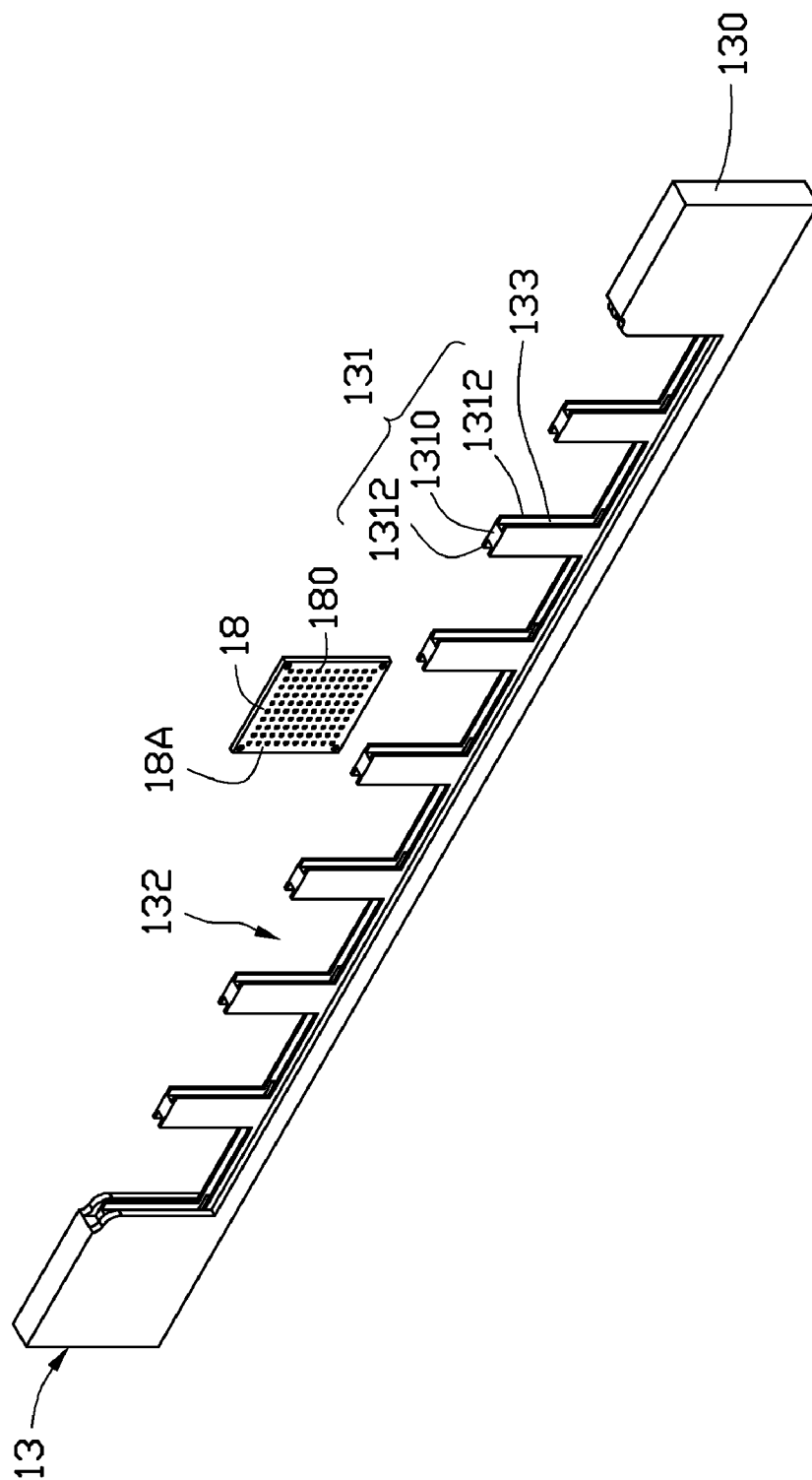


FIG. 1



256

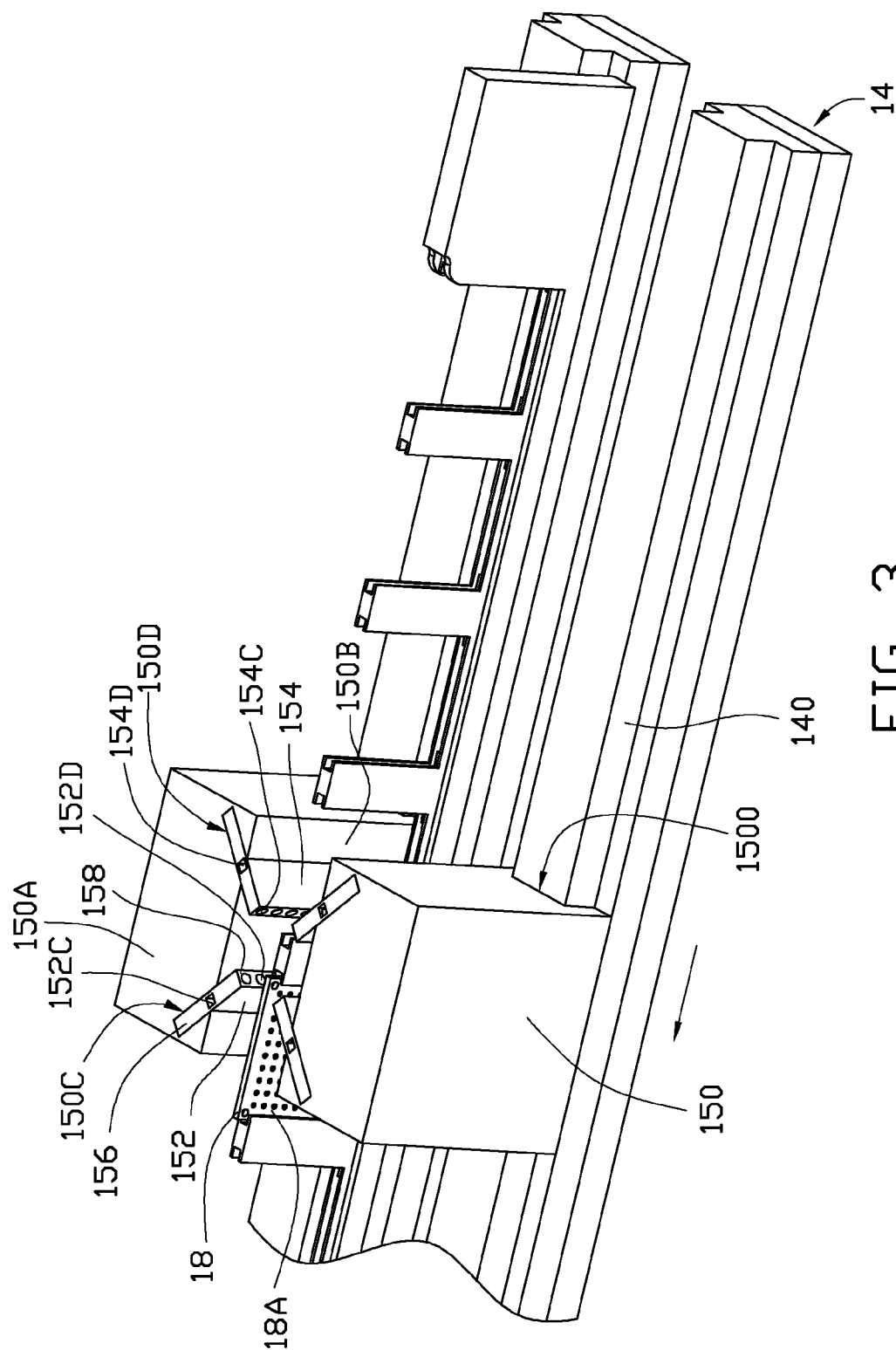


FIG-3

LENS CLEANER

BACKGROUND

[0001] 1. Technical Field

[0002] The disclosure generally relates to lens cleaners and, particularly, to a lens cleaner with an air blowing member for removing dust on a lens.

[0003] 2. Description of Related Art

[0004] Currently, a typical way for cleaning a lens is to blow off dust attracted on the lens by using an air gun. However, it is very difficult for the air gun to clean the lenses, as the dust may be attracted to the lenses by an electrostatic force.

[0005] What is needed, therefore, is a lens cleaner which can overcome the limitations described.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Many aspects of the disclosure can be better understood with reference to the following drawings. The components in the drawings are not necessarily drawn to scale, the emphasis instead being placed upon clearly illustrating the principles of the present lens cleaner. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

[0007] FIG. 1 is a schematic view of a lens cleaner in accordance with an exemplary embodiment.

[0008] FIG. 2 is an isometric view of a loading plate of the lens cleaner from FIG. 1, together with a tray.

[0009] FIG. 3 is a partial and schematic view of the lens cleaner of FIG. 1, showing two cleaning members and corresponding guide members located at opposite sides of a tray.

DETAILED DESCRIPTION

[0010] Embodiment of the lens cleaner will now be described in detail below and with reference to the drawings.

[0011] Referring to FIG. 1, a lens cleaner 100 in accordance with an exemplary embodiment is shown. The lens cleaner 100 includes a fixture 10, a loading plate 13, two guide members 14, two cleaning members 15, an air evacuating member 16, an air blowing member 17, and a tray 18.

[0012] The fixture 10 is in the form of a chamber with a receiving space 10A. The loading plate 13, the guide member 14, and the cleaning members 15 are received in the fixture 10. The air blowing member 17 and the air evacuating member 16 are arranged outside the fixture 10. In this embodiment, the fixture 10 is substantially cuboid-shaped, and includes a top board 101, a bottom board 103, two first side boards 105 in parallel, and two second side boards 107 in parallel. The top board 101 and the bottom board 103 are substantially parallel with one another. The first side boards 105 and the second side boards 107 each are located between, and adjoins the top board 101 and the bottom board 103. Each of the second side boards 107 is located between and adjoins the two first side boards 105.

[0013] Referring also to FIG. 2, the loading plate 13 is elongated and arranged between the two first side boards 105. In this embodiment, the loading plate 13 includes two distal ends 130. The two distal ends 130 are attached to the two respective first side boards 105. The loading plate 13 includes a number of clamping portions 131 and a number of first slots 132. The clamping portions 131 are sequentially arranged a direction between the two side boards 105. In this embodiment, the clamping portions 131 are equidistantly spaced. The first slots 132 are defined between every two neighboring

clamping portions 131. Thereby the clamping portions 131 and the first slots 132 are alternately arranged in a direction between the two side boards 105. The clamping portions 131 each include a top surface 1310 and two side surfaces 1312. The two second side surfaces 1312 adjoin the top surface 1310. The two side surfaces 1312 are located at two opposite sides of the clamping portion 131, and are exposed to the two neighboring first slots 132. The clamping portions 131 each have two second slots 133 defined in the two respective side surfaces 1312. The two second slots 133 are exposed at the top surface 1310. The loading plate 13 can be used to load a number of lenses (not shown). In this embodiment, a tray 18 is provided to mount the lenses on. The tray 18 is substantially cuboid-shaped, and includes two parallel loading surfaces 18A at two opposite sides thereof, and a number of through holes 180 defined in any loading surfaces 18A. The lenses can be received in the respective through holes 180. The tray 18 can be secured in the loading plate 13 by inserting the tray 18 through the two second slots 133 of the two neighboring clamping portions 131. Thereby the tray 18 is located in the corresponding first slot 132 and clamped by the two corresponding clamping portions 131. In alternative embodiments, a number of trays 18 can be provided and clamped by the corresponding clamping portions 131.

[0014] In this embodiment, the through hole 180 is substantially cylindrical. It is noted, when the tray 18 is secured in the loading plate 13, two opposite edge portions of the tray 18 is fittingly received in the two second slots 133, and a central portion of the tray 18 is exposed at the first slot 132.

[0015] Referring also to FIG. 3, the two guide members 14 are arranged at two sides of the loading plate 13. The two guide members 14 are parallel to the loading plate 13. Each of the guide members 14 has two opposite ends (not labeled) attached to the two first side boards 105. The guide member 14 includes an elongated rail 140.

[0016] The cleaning members 15 each includes a main body 150, an air blowing block 152, and an air evacuating block 154. In this embodiment, the two main bodies 150 each are substantially cuboid-shaped, and has a groove 1500 defined in a bottom thereof. The two grooves 1500 receive the two respective rails 140. Thereby the two cleaning members 15 are slidably attached on the two respective guide members 14.

[0017] The two main bodies 150 each includes a first upper surface 150A and a first lateral surface 150B adjoining the first upper surface 150A. The two first lateral surfaces 150B are substantially parallel to the loading surface 18A of the tray 18. In this embodiment, each main body 150 has a first receiving recess 150C and a second receiving recess 150D defined in the lateral surface 150B. Each of the first receiving recess 150C and the second receiving recess 150D is exposed at the first upper surface 150A. The air blowing block 152 is substantially cuboid-shaped, and is partially received in the first receiving recesses 150C. The air evacuating block 154 is substantially cuboid-shaped, and is partially received in the second receiving recess 150D.

[0018] The air blowing block 152 and the air evacuating block 154 each include a second upper surface 156 and a second lateral surface 158 adjoining the second upper surface 156. Each of the two second lateral surfaces 158 is inclined relative to the first lateral surface 150B of the main body 150. A lengthwise direction of the second lateral surface 158 of the air blowing block 152 intersects with a lengthwise direction of the second lateral surface 158 of the air evacuating block

154. In this embodiment, the two second lateral surfaces **158** are substantially perpendicular to each other in the lengthwise directions thereof. The air blowing block **152** has a first air inlet **152C** defined in the second upper surface **156** thereof, and has a number of first air outlets **152D** defined in the second lateral surface **158** thereof. The first air inlet **152C** communicates with the first air outlets **152D**. The air evacuating block **154** has a number of second air inlets **154C** defined in the second lateral surface **158** thereof, and has a second air outlet **154D** defined in the second upper surface **156** thereof. The second air inlets **154C** communicate with the second air outlet **154D**. The first air outlets **152D** and the second air inlets **154C** open toward the loading plate **13**. In this embodiment, the first air outlets **152D** of any of the cleaning members **15** face the second air inlets **154C** of the other cleaning member **15**.

[0019] The air blowing member **17** and the air evacuating member **16** are arranged on the first side board **105** (see FIG. 1). In this embodiment, the air inlets **152C** of the two cleaning members **15** are connected to the air evacuating member **16** through two respective first pipes **160**. The air outlets **152D** of the two cleaning members **15** are connected to the air blowing member **17** through two respective second pipes **170**. In alternative embodiments, the air inlets **152C** of the two cleaning members **15** can be connected to the air evacuating member **16** through two respective hoses. In addition, the air outlets **152D** of the two cleaning members **15** can also be connected to the air blowing member **17** through two respective other hoses.

[0020] In operation, the two cleaning members **15** can be moved along two corresponding guide members **14** to locate at two opposite sides of the tray **18**. When the first air outlets **152D** and the second air inlets **154C** open toward the loading surfaces **18A** of the tray **18**, the air blowing member **17** introduces airflow to the first air inlets **152C** of the air blowing blocks **152** through the second pipes **170**. The airflow is discharged from the first air outlets **152D** to blow off dust on the surfaces of the lenses. Thus, the lenses are cleaned. In this embodiment, the first air outlets **152D** blow air toward the loading plate **13** at an inclined angle. The air evacuating member **16** is configured for evacuating the air with the dust into the second air inlets **154C**, and further out of the fixture **10** through the first pipes **170**.

[0021] In alternative embodiments, the cleaning members **15** may be moved along the two guide members **14** to located between the trays **18** in sequence, thus cleaning the lenses efficiently.

[0022] The lens cleaner **100** may further include a dust gathering enclosure **19** and a vessel **20**. In this embodiment, the enclosure **19** has a frusto-polygonal shape, and tapers away from the loading plate **13**. That is, the enclosure **19** tapers toward the bottom board **103** of the fixture **10** in a vertical direction. The enclosure **19** includes a first opening **190** and a second opening **192** at two opposite sides thereof. The first opening **190** opens toward the loading plate **13**, or the top board **101**. A configuration of the first opening **190** is shaped to confirm to that of the fixture **10** in the receiving space **10A**. The vessel **20** is connected to the dust gathering enclosure **19** at the second opening **192** thereof. The second opening **192** opens toward an inner surface (not labeled) of the vessel **20**. In operation, dust that is not vented into the second air inlets **154C** can fall off due to gravity and evacuating, thus the enclosure **19** thus can be used to gather the dust into the vessel **20**.

[0023] In this embodiment, a third pipe **201** can be provided to connect an inner space of the vessel **20** to the air evacuating member **16**. Thus, the dust gathered in the vessel **20** can be vented out of the fixture **10** by the air evacuating member **16**. The lens cleaner **100** may include a dust gathering net **30** for gathering the dust thereon before the dust is vented into the vessel **20**. The dust gathering net **30** can be arranged in the enclosure **19** between the first opening **190** and the second opening **192**. In use, the dust gathering net **30** can be easily detached from the enclosure **19** to be cleaned.

[0024] In alternative embodiments, the lens cleaner **100** may include only one guide member **14** and only one cleaning member **15**. In use, the cleaning member **15** can be moved along a side of the loading plate **13** to clean the lenses. It is noted, the lens cleaner **100** including only one guide member **14** and only one cleaning member **15** should also be considered within the scope of the disclosure.

[0025] It is understood that the above-described embodiment is intended to illustrate rather than limit the disclosure. Variations may be made to the embodiment without departing from the spirit of the disclosure. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the scope of the disclosure.

What is claimed is:

1. lens cleaner, comprising:

a fixture;

an elongated loading plate attached to the fixture, the loading plate configured for loading a plurality of lenses thereon;

at least one guide member attached to the fixture parallel to the loading plate;

an air blowing member configured for blowing air;

an air evacuating member configured for evacuating air;

at least one cleaning member moveably attached to the at least one guide member, the at least one cleaning member defining a first inlet coupled to the air blowing member, a first outlet communicating with the first inlet, a second inlet, and a second outlet communicating with the second inlet and coupled to the air evacuating member, the first outlet and the second inlets opening toward the loading plate.

2. The lens cleaner of claim 1, further comprising a plurality of trays mounted on the loading plate, each tray comprising a plurality of through holes for receiving the respective lenses.

3. The lens cleaner of claim 2, wherein the loading plate comprises a plurality of spaced clamping portions, and a plurality of first slots, the clamping portions and the first slots are alternately arranged along the lengthwise direction of the loading plate, the trays are inserted in the respective first slots and clamped by the corresponding clamping portions.

4. The lens cleaner of claim 3, wherein each of the first clamping portions comprises two side surfaces at two opposite sides thereof exposed at the corresponding first slots, and two second slots defined in the two respective side surfaces, the two second slots of each first clamping portion are configured for receiving opposite edge portions of the corresponding tray.

5. The lens cleaner of claim 1, wherein the at least one guide member comprises two parallel guide members at opposite sides of the loading plate, the at least one cleaning member comprises two cleaning members corresponding to the guide members.

6. The lens cleaner of claim 5, further comprising a dust gathering enclosure spatially corresponding to the loading plate and a vessel communicating with the dust gathering enclosure, the dust gathering enclosure being configured for gathering the dust falling into the vessel.

7. The lens cleaner of claim 6, wherein the dust gathering enclosure has a frusto-polygonal shape and tapers in a direction away from the loading plate.

8. The lens cleaner of claim 6, wherein the vessel is coupled to the air evacuating member.

9. The lens cleaner of claim 6, further comprising a dust gathering net arranged in the dust gathering enclosure.

10. The lens cleaner of claim 1, wherein the fixture is in the form of a cuboid-shaped chamber.

11. A lens cleaner comprising:

a fixture;

an elongated loading plate attached to the fixture, the loading plate configured for loading a plurality of lenses thereon;

at least one guide member attached to the fixture parallel to the loading plate;

an air blowing member configured for blowing air;

an air evacuating member configured for evacuating air;

at least one cleaning member moveably attached to the at least one guide member, the at least one cleaning member defining a first inlet coupled to the air blowing member, a first outlet communicating with the first inlet, a second inlet, and a second outlet communicating with the second inlet and coupled to the air evacuating member, the first outlet and the second inlets opening toward the loading plate;

a vessel; and

a dust gathering enclosure located below and opening toward the loading plate and tapering toward the vessel and communicating with the vessel.

12. The lens cleaner of claim 11, further comprising a plurality of trays mounted on the loading plate, each tray comprising a plurality of through holes for receiving the respective lenses.

13. The lens cleaner of claim 12, wherein the loading plate comprises a plurality of spaced clamping portions, and a plurality of first slots, the clamping portions and the first slots

are alternately arranged along the lengthwise direction of the loading plate, the trays are located at the respective first slots and clamped by the corresponding clamping portions.

14. The lens cleaner of claim 13, wherein each of the first clamping portions comprises two side surfaces at two opposite sides thereof exposed at the corresponding first slots, and two second slots defined in the two respective side surfaces, the two second slots of each first clamping portion are configured for receiving opposite edge portions of the corresponding tray.

15. The lens cleaner of claim 11, wherein the at least one guide member comprises two parallel guide members at opposite sides of the loading plate, the at least one cleaning member comprises two cleaning members corresponding to the guide members.

16. The lens cleaner of claim 11, wherein the dust gathering enclosure has a frusto-polygonal shape.

17. The lens cleaner of claim 11, wherein the vessel is coupled to the air evacuating member.

18. The lens cleaner of claim 11, further comprising a dust gathering net arranged in the dust gathering enclosure.

19. The lens cleaner of claim 11, wherein the fixture is in the form of a cuboid-shaped chamber.

20. A lens cleaner comprising:

an enclosed chamber;

an elongated loading plate received in the chamber, the loading plate configured for mounting a plurality of lenses thereon; and

a first and a second cleaning member arranged on opposite sides of the loading plate and movable along the loading plate, each of the first and second cleaning members including an air blowing nozzle for blowing air toward the loading plate at an inclined angle, and an air evacuating nozzle for evacuating air, the air evacuating nozzle of the first cleaning member facing the air blowing nozzle of the second cleaning member, the air evacuating nozzle of the second cleaning member facing the air blowing nozzle of the first cleaning member.

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